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RAILWAY REVIEW

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No. 1

JANUARY 3, 1914.

Vol. 54.

Fire Destroys Old Detroit Station, and New One is Put Into Use.

The new passenger station of the Michigan Central R. R., at Detroit, Mich., described and illustrated in our issue of last week, was put into service sooner than had been expected, by reason of a fire which partially destroyed the old Third Street station on December 26. It had been expected to inaugurate service into the new terminal on Sunday, January 4; but while the fire was still in progress, the trains were diverted to the new terminal, and its facilities put into use without confusion or delay. The Detroit United Ry., also by a stroke of enterprise, promptly put into service its new loop which affords street car service to the station. The damage to the old station is estimated at about \$200,000, and amounts practically to destruction of the building. Great loss and inconvenience also will be incurred in the destruction of records and documents in the railroad's offices, which were located in the old station.

To Bring Restitution Suits Against 'Frisco Directors.

Judge Sanborn in the United States Circuit court, at St. Louis, Mo., entered an order, on Friday, December 26, directing the receivers of the St. Louis & San Francisco R. R. system to bring suits against present and former directors of the company for restitution of alleged profits on account of syndicate promotion of subsidiary roads, as disclosed at the recent hearings of the Interstate Commerce Commission. The court had the matter in the shape of a petition filed by William N. Niles, of New York, a Frisco stockholder, who asked permission to bring restitution suits. The order of the court was two-fold: it denied the application of Mr. Niles for permission to file suit, and it directed the receivers to file the suit, if their counsel thought the action could be maintained. The court appointed as special counsel for the receivers John D. Johnson and Loomis Johnson, who were attorneys for Niles. These attorneys were given exclusive charge of the suits, which thereby were taken from the jurisdiction of W. F. Evans, general counsel for the Frisco railroad, and of Henry S. Priest, counsel for the receivers. That the special counsel will be convinced that such suits would be successful is taken for granted, as the attorneys are the same who represented Mr. Niles in his petition.

Want Rate Decision Hurried.

On Tuesday, December 23, the freight traffic committee of the Chicago Association of Commerce adopted the following, and the declaration is the declaration of the association: "Whereas, the freight traffic committee of the Chicago Association of Commerce did, on the 9th day of October, 1913, adopt certain resolutions touching upon the question of the pending investigation upon the part of the Interstate Commerce Commission into the proposed general advance of 5 per cent in freight rates in so-called official classification territory; and "whereas, said committee in their resolutions have not opposed, and do not oppose, the suggested advance in the all-rail interstate rates; and whereas, the question is now on hearing before the Interstate Commerce Commission; and whereas, long continued uncertainty as to the final

outcome, in the judgment of this committee, will be detrimental to the commercial activities of the country; now, therefore, be it: Resolved, this committee respectfully urge upon the Interstate Commerce Commission the propriety of causing all parties to the case to proceed with all possible dispatch to the end that a speedy determination of the question may be reached. Be it further resolved, that a copy of these resolutions be sent to the members of the Interstate Commerce Commission."

"O, Take Your Time, Miss Lucy."

The Chicago Tribune says: "The most frequent comment among bankers and business men is that if the railroads win an advance of rates an upturn will begin. In blissful indifference to this anxious attitude the Interstate Commerce Commission has just asked of the railroads a long list of questions, proposed, it is said, by its counsel, Mr. Brandeis. Many of these questions seem to have little bearing on the question of the justice or expediency of granting the railroads' petition for a freight advance, however desirable answers to them may be as data for a thorough consideration of railroad relations to the public and for legislation. If this petition for freight advance cannot safely be passed upon without such consideration, a decision is not to be hoped for in months, and business recovery will not be aided by the railroad tonic."

Private Car Line Inquiry.

The Interstate Commerce Commission will inaugurate in Chicago, on January 21, the investigation of private car lines which it has been planning. Commissioner McChord will preside. The examination is to be held in Chicago because nearly all of the big owners of private railroad equipment have their headquarters in that city. There are about 750 concerns of this kind, large, and small, in operation at the present time, many of which have thousands of cars each. Complaints of the charges imposed by private car lines and of the service furnished have been filed with the commission by shippers, but that body has been unable to give effective relief for want of direct power to regulate these concerns. The Pullman Company is the only private car line directly subject to the jurisdiction of the commission, and that is because congress decreed it to be a common carrier. But congress did not include the other private car lines in this category. The Supreme court, however, has declared the private car lines common carriers to the extent that they are required to obey the safety appliance law and accept the regular railroad car demurrage charges. It is possible that the commission will endeavor to relieve complaining shippers by indirect regulation of the private carriers through the railroads, which pay these concerns three-fourths of a cent a mile for each car operated. In the far West the charge is 1 cent. This is regarded as a part of the freight rate. The railroads complain they are paying too much, while the private car men say they are not getting enough. The commission will inquire particularly into the charges that the owners of these lines receive a preferred service, which constitutes a discrimination against the ordinary shipper.

Michigan Commission Hits D., T. & I. Ry.

The Michigan state railroad commission has issued an order requiring trains on the Detroit, Toledo & Ironton Ry. to reduce speed to six miles an hour when running over timber bridges and trestles in the state. Officials of the road have been cited to appear before the commission and show cause why all traffic should not be suspended because of the condition of the bridges and trestles, which are reported to be unsafe by Chief Engineer James Bice and O. W.

Albie. Pending this hearing the order for reduced speed is issued. The findings of the commission will be reported to the Interstate Commerce Commission and to the Ohio railroad commission. The latter body has recently placed certain restrictions on the Detroit, Toledo & Ironton in the use of motive power which it has declared to be not up to standard.

Operators' Strike Threatened and Averted, Frisco R. R.

A strike of telegraph operators on the St. Louis & San Francisco R. R. was averted this week by the narrowest possible margin. The Order of Railway Telegraphers presented to the railroad, last May, demands for a revision of the wage scale and for a re-adjustment of working conditions; and conferences with the officials looking to the same end, have been in progress since last October. Following continued refusal of the railway officials to meet these demands, the union issued an order calling a strike to begin on Monday, December 29. At this juncture the Frisco sprung a surprise by installing, within the space of 18 hours, complete telephone equipment in every station and discarding the telegraph instruments. The union telegraph operators were suspended. The substitution was made on all the main divisions of the Frisco without a hitch, and sets a record for dispatch and completeness in such work. Special trains were sent out on each of ten divisions, Sunday morning, in charge of the division superintendents. At each station they stopped and took out the telegraph equipment, while experienced linemen attached telephone instruments to the telegraph circuits and perfected the connections. By Monday morning train orders and commercial messages were dispatched over the main portion of the system entirely by telephone. Following this, conferences between the railway and union officials were renewed, on Monday morning; and the strike order was temporarily suspended. A compromise agreement was signed on Wednesday, December 31. The 300 members of the order who were suspended, will be taken back without discrimination as fast as places for them are found. The telephone system will continue in operation and will be further extended, but at some points the telegraph lines will be restored. Wages will be increased six per cent, instead of the 15 per cent which was demanded.

Uniform Rates and Valuation.

In an address at the annual meeting of the American Economic Association at Minneapolis, December 29, Interstate Commerce Commissioner B. H. Meyer spoke of government ownership as the possible final outcome of increasing government regulation; but even that, he said, would not put an end to rate problems. He wished it understood that he was speaking as a rate expert and not as a government official. "The kaleidoscopic nature of the facts which enter into a particular rate problem will always, probably, defeat every attempt to impose a uniform rule upon traffic throughout the United States. It is, however, more important that justice should be maintained than that some specific standard should be promulgated. The most important single factor is the fair or final value, which we hope will be known in the not distant future. Outstanding securities against the property being valued should not receive any consideration in the establishment of rates to be collected for the public use of the property."

The Moral of the Panama Work.

Speaking of the work of the United States government in constructing the Panama canal, James Bryce in his recent work on South America, says: "Its success in escaping all charges of partiality or corruption, as well as in producing efficiency in the work and contentment among the workers, has, indeed, been such as to make some persons draw from it an argument in fav-

or of state control of all great enterprises. To the unbiased observer it is rather an instance of the efficiency obtainable by vesting full administrative control in men whose uprightness and capacity have already been proved beyond question, and who have not risen, by political methods, and who have nothing to gain by any misuse of their power. So far as any political moral can be drawn from the case, that moral recommends not democratic collectivism, but military autocracy."

Locomotive Boiler Explosion, Wabash R. R.

The boiler of a Wabash R. R. locomotive exploded by dropping its crown sheet at Buffalo, N. Y., on Dec. 25, killing two men and injuring seven others. One of those killed was the fireman, said to have been on his first trip, and the other was a watchman reported to have been struck by the boiler front which was torn from its fastenings and projected forward a considerable distance. No official report as to the exact cause of the accident and the responsibility therefor is as yet available.

Coal Output in 1913.

A production between 565,000,000 and 575,000,000 short tons of coal in the United States during 1913 is the official estimate of the United States geological survey, an increase over the record-breaking production of 1912 of 30,000,000 to 40,000,000 tons. These figures are given out by Edward W. Parker, coal statistician of the survey, with the statement, however, that the coal-mining industry in 1913 lacked any spectacular features, the increase, in other words, being normal and an index of the general industrial activity of the country. Of this increase about 4,500,000 tons was in the production of anthracite and the rest in the output of the bituminous coal mines.

B. & O. Safety First Organization.

The Baltimore & Ohio system will usher in the new year by starting the most systematic campaign against accidents and their causes, reducing the injuries to persons, damage to property and improving the sanitary conditions of railroad employment in a way never before undertaken by a railroad company. The committee will be composed of seven members, including a chairman and an official from the transportation, motive power, maintenance of way, stations and traffic and the relief departments and a former inspector of the Interstate Commerce Commission, all of whom will be relieved of other duties and devote their entire time to studying the questions of safe operation. There will also be an advisory committee acting in conjunction with the general safety committee, which consists of J. G. Pangborn, chairman; E. R. Scoville, for several years a division superintendent; John Hair, formerly superintendent of motive power, representing the mechanical branch of the service; W. McC. Bond, formerly division engineer; J. T. Campbell, of several years' experience as an agent; Dr. E. M. Parlett, representing the relief department and matters of sanitation, and B. C. Craig, who has been an inspector of railway safety appliances. The advisory committee consists of A. Hunter Boyd, Jr., of the law department; J. W. Coon, of the operating department; and Dr. J. F. Tearney, of the relief department. One day each month will be designated as "Safety Day" on each division, when the members of the committee will confer with local committeemen, make an inspection of terminals, yards, shops, stations, freight houses and other railroad property. It is expected that the committee will spend a large part of the time on the road during the next several months, putting in a complete organization and becoming familiar with conditions on all parts of the system. For the first time, the members of the safety committee will devote all of their time to the questions of improving the safety of its patrons and the men who operate the properties.

Block Signal and Interlocking Extensions in 1913.

Official replies to inquiries made by the Railway Review show the mileage of road on which installation of block signals was made during the year 1913, by various railroads, as noted below. Where mention was made of installation on road of more than one track, the total single-track mileage is given parenthetically.

AUTOMATIC BLOCK SIGNAL.	Miles of Road
Alabama & Vicksburg Ry.....	40.00
Atchison, Topeka & Santa Fe Ry (200.65 miles of track)	180.95
Atlantic Coast Line R. R.....	125.40
Baltimore & Ohio System—	
Baltimore & Ohio R. R. (40.45 miles of two or more tracks)	69.15
Baltimore & Ohio S. W. R. R.....	35.20
Cincinnati, Hamilton & Dayton Ry. (27.5 miles of two or more tracks).....	108.90
Baltimore & Ohio Chicago Terminal.....	0.60
Boston & Albany R. R.....	11.20
Boston & Maine R. R.....	28.40
Buffalo, Rochester & Pittsburgh Ry. (145.1 miles of track)	95.30
Chicago & Eastern Illinois R. R.....	59.00
Chicago & Northwestern Ry.....	59.77
Chicago & Western Indiana R. R.....	1.00
Chicago, Burlington & Quincy R. R. (81 miles of track)	27.00
Chicago, Great Western R. R.....	58.80
Chicago, Indianapolis & Louisville Ry.....	133.10
Chicago, Milwaukee & St. Paul Ry.....	251.50
Chicago, Rock Island & Pacific Ry.....	4.80
Chicago, St. Paul, Minneapolis & Omaha Ry.....	109.00
Cleveland, Cincinnati, Chicago & St. Louis Ry. (113 miles of track).....	67.30
Delaware, Lackawanna & Western R. R.....	44.95
El Paso & Southwestern System.....	39.20
Elgin, Joliet & Eastern Ry.....	1.62
Galveston, Harrisburg & San Antonio Ry.....	00.40
Great Northern Ry. (266.1 miles of track).....	220.70
Illinois Central R. R. (328.1 miles of track).....	200.70
Lake Shore & Michigan Southern Ry. (29.5 miles of track)	16.80
Lehigh & Hudson River Ry.....	24.00
Lehigh Valley R. R. (53.29 miles of track).....	37.13
Louisville & Nashville R. R.....	82.00
Missouri, Kansas & Texas Ry.....	104.50
Missouri Pacific System.....	7.36
Monongahela R. R.....	2.02
New York Central & Hudson River R. R. (342.94 miles of track)	136.82
New York, Chicago & St. Louis Ry.....	143.00
Norfolk & Western Ry.....	45.90
Northern Pacific Ry.....	414.70
Oregon Short Line R. R. (62 miles of track).....	50.00
Oregon-Washington R. R. & N. Co. (25.22 miles of track)	20.32
Pennsylvania R. R.....	150.00
Philadelphia & Reading Ry.....	5.90
Southern Ry.	100.00
Southern Pacific Co. (495 miles of track).....	368.90
Toledo & Ohio Central Ry.....	1.00
Union Pacific R. R. (102.47 miles of single-track signals remodeled to cover double track).....	000.00
Vermont Valley R. R.....	24.00
Wabash R. R.....	130.90

Western Maryland R. R.....	12.30
Total in United States.....	3851.49
Canadian Pacific Ry. (40 miles of track).....	32.00
Toronto, Hamilton & Buffalo Ry. (32.34 miles of track)	26.40

NON-AUTOMATIC BLOCK SIGNALS.	Miles of Road
Atchison, Topeka & Santa Fe Ry.....	36.51
Baltimore & Ohio System—	
Cincinnati, Hamilton & Dayton Ry. (19.1 miles of two or more tracks).....	175.00
Birmingham Ensley & Bessemer R. R.....	6.00
Buffalo, Rochester & Pittsburgh Ry.....	211.13
Chicago, St. Paul, Minneapolis & Omaha Ry.....	464.79
Cumberland Valley Ry.....	20.00
Fairmount & Veblen Ry.....	46.00
Great Northern Ry.....	5.80
Great Southern R. R.....	11.00
Gulf, Florida & Alabama Ry.....	90.00
Missouri Pacific System.....	292.54
Pawhuska & Northeastern Ry.....	3.00
Pennsylvania Southern R. R.....	16.00
Philadelphia & Reading Ry.....	00.80
Southern Ry.	145.60
Spokane, Portland & Seattle Ry.....	537.00

Total2061.17

INTERLOCKING.

In addition to the above record of block signal extensions the following new interlocking plants, together with additional working levers in such plants or in extensions to old plants, have been reported:

	New Plants	New Working Levers
Louisville & Nashville R. R.....	5	172
Southern Pacific Co.....	7	221
Chicago, Rock Island & Pacific Ry.....	7	456
Lake Shore & Michigan Southern Ry.....	3	104
Illinois Central R. R.....	5	88
Northern Pacific Ry.....	10	145
Atlantic Coast Line R. R.....	11	188
Grand Trunk Ry. (Canada).....	3	116
Michigan Central R. R.....	3	557
Detroit Terminal R. R.....	1	107
Chicago & Northwestern.....	7	135
Missouri Kansas & Texas.....	3	39
Canadian Northern Ry. (Canada).....	4	64
Chicago, Milwaukee & St. Paul.....	2	68
Missouri Pacific System.....	4	91
Great Northern Ry.....	7	109
Oregon-Washington R. R. & N. Co.....	1	88
Southern Ry.	37	249
Buffalo, Rochester & Pittsburgh Ry.....	2	60
St. Louis & San Francisco R. R.....	1	17
Wabash R. R.....	13	85
Canadian Pacific Ry.....	10	337
Delaware, Lackawanna & Western R. R.....	4	153
Oregon Short Line R. R.....	2	8
Chesapeake & Ohio Ry.....	1	23
Atchison, Topeka & Santa Fe Ry.....	3	72
Cumberland Valley Ry.....	1	9
Chicago, St. Paul, Minn. & O. Ry.....	1	16
Lehigh Valley R. R.....	6	103
Total	164	3880

New Car and Locomotive Repair Plant, Boston & Maine R. R.

SYNOPSIS.—General car and locomotive repair shops are being completed by the Boston & Maine R. R. at North Billerica, near Lowell, Mass. These shops are laid out according to the "midway" plan and in the locomotive department, will have a capacity for handling the heavy repairs to about 50 engines per month. Locomotive repairs with the exception of forge shop work, are to be made in one large building, in accordance with the latest approved practice.

In January, 1911, the Boston & Maine entered upon the construction of a general car and locomotive repair plant at North Billerica, Mass., 22 miles northwest from Boston and four miles south of Lowell, this being the point of junction of the Lexington branch with the main line from Boston to Concord, N. H. These shops are expected to be ready for occupancy in the course of the next two or three months and when completed, will afford facilities for making general repairs to about 50 engines per month. The site selected for the plant, while generally level, was otherwise somewhat unfavorable in that the ground was low and wet, requiring the handling of between five and six hundred thousand yards of filling material in order to provide a satisfactory yard surface at the proper elevation. All of the shop buildings proper, including the power house, are

constructed with steel frame work and brick walls resting on concrete foundations and footings. The main storehouse and the sub-stores for paints and oils, are constructed of brick, to correspond with the remaining buildings of the group, the framework for the storehouse, however, being of timber construction. Owing to the nature of the soil, the column-footings for the heavier buildings, including the storehouse, were set on concrete piling.

General Layout of the Plant. The arrangement of the various buildings comprising the group is such that locomotives work is handled in shops on either side of one end of a 100-ft. midway running transversely across the shop yard, while passenger car repairs are likewise disposed at the opposite end of this midway. Between the locomotive and passenger car groups, which are about 750 feet apart there are placed, nearest the locomotive group, the power house and the storehouse, while adjacent to the passenger car shops, space has been reserved for a proposed freight car repair shop and a planing mill. Lumber storage space is provided at the northeast end of the yard, between which and the location for the proposed planing mill, are the dry kiln and the dry lumber storage shed. The location and arrangement of the buildings is gen-



General View of Car and Locomotive Repair Plant, Locomotive Shop at Right, Car Smith and Machine Shops at Left, Power-House and Store-House in Center, Boston & Maine R. R., North Billerica, Mass.

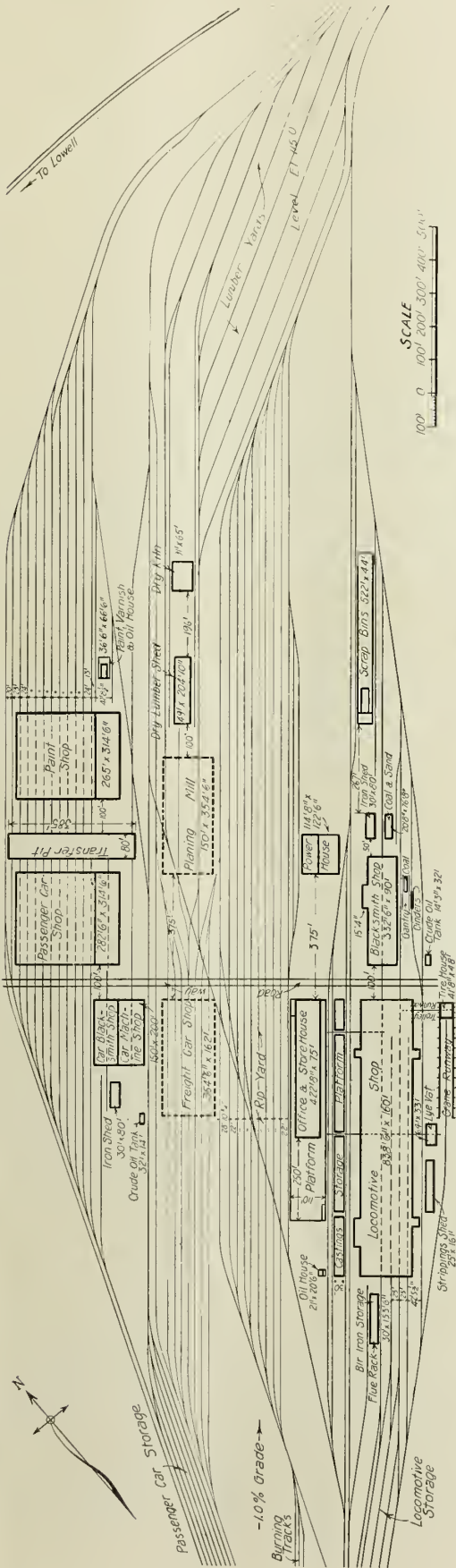


Interior of Locomotive Shop, Boston & Maine R. R., North Billerica, Mass.

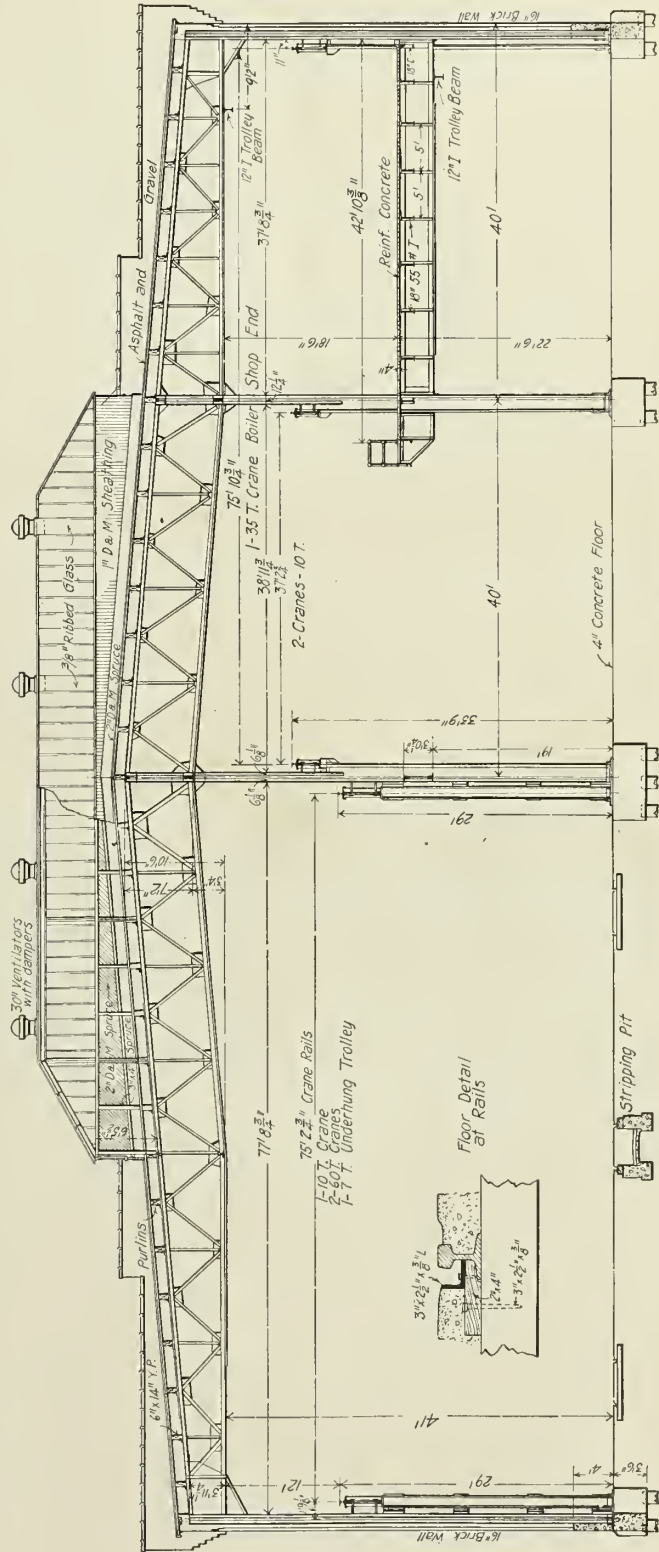
erally such that the necessity of possible future extensions can be met without difficulty.

Machine and Erecting Shop. Locomotive repairs, with the exception of smith-shop work, will be done in the locomotive shop, 160 by 838 ft. in size. This building, the construc-

tion of which is indicated in the line drawing and half-tone illustrations herewith, is divided into two longitudinal bays for a distance of 286 feet and into three longitudinal bays for the remainder of the length of the building. The larger of these bays, constituting the erecting and the tank shops, comprises one-half of the space in the entire building. The 80 by 286-ft. space opposite the tank shop is assigned to boiler work, while the remaining space is divided into two bays 40 feet in width each. The outer of these bays, along the west side of the shop, is provided with a gallery; the first and second floor areas in this bay being devoted to light machine work, tool and brass rooms, air brakes, etc. The intermediate bay, which is served



General Layout of Car and Locomotive Repair Plant, Boston & Maine R. R., North Billerica, Mass.

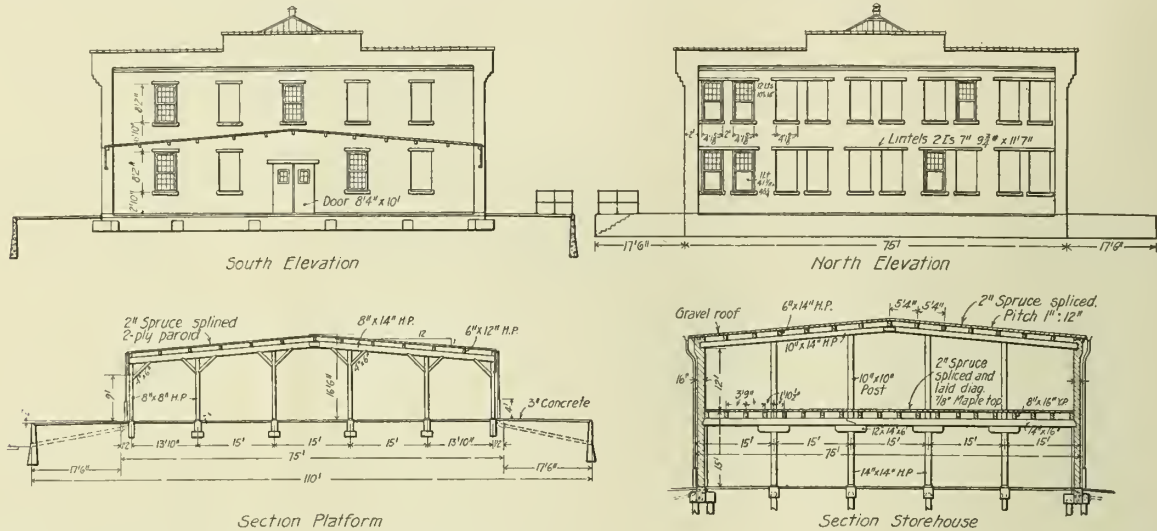


Cross Section of Locomotive Shop, Boston & Maine R. R., North Billerica, Mass.

by two 10-ton cranes, constitutes the heavy machine shop. The cranes in this bay also serve to transfer materials and parts to and from the gallery, receiving and depositing them at a series of platforms extending out from the gallery floor level into the machine bay space.

Crane service in the erecting shop consists of two 60-ton cranes for handling locomotives, one 10-ton crane and one 7-ton underhung trolley, all running on a common track with a

Alongside the locomotive shop and between it and the storehouse, is a castings platform, extending the full length of the building, except for interruptions at intervals to permit communications on the ground level with the storehouse. Outside at the boiler shop end are storage racks for bar iron and flues. To the east is a lye vat for cleaning purposes, and a shed for storing the accessory parts of locomotives undergoing repairs. Special facilities are provided for the handling of



Cross Sections and End Elevations, Store-House, Car and Locomotive Repair Plant, Boston & Maine R. R., North Billerica, Mass.

span of 75 ft. 2¾ ins. The boiler shop is served by a 35-ton capacity crane having a span of 75 ft. 10¾ ins. The erecting shop is to be operated on the longitudinal-bay principle, there being three tracks on approximately 25-foot centers, running the length of the building. Of these three, the middle one only, is supplied with pits, this one intended for use as a receiving track and in stripping and re-assembling locomotives. A stub track and in stripping and re-assembling locomotives. A stub dustrial tracks cross the building at intervals to facilitate the handling of materials between this shop and the several related points outside. The floor of the locomotive shop is of concrete. The roof is provided with a series of glass-encased, transverse monitors. The roof-covering is of asphaltum and gravel.

locomotive driving wheels and tires, these consisting of a "tire-house" 42 by 48 feet in size near one corner of the locomotive shop and in which are located the furnaces for removing and applying tires. This structure communicates with the main shop by means of a special trolley for handling wheels and the wheel lathes are located just inside the main shop near the point of entrance of the trolley. The wheel and tire storage space lying alongside the main shop is served by a traveling crane.

Blacksmith Shop. The blacksmith shop, 90 by 332 feet in size, is located directly across the midway from the locomotive shop. Its arrangement is characteristic of shops of this nature, a striking feature being the unusually large amount of glass

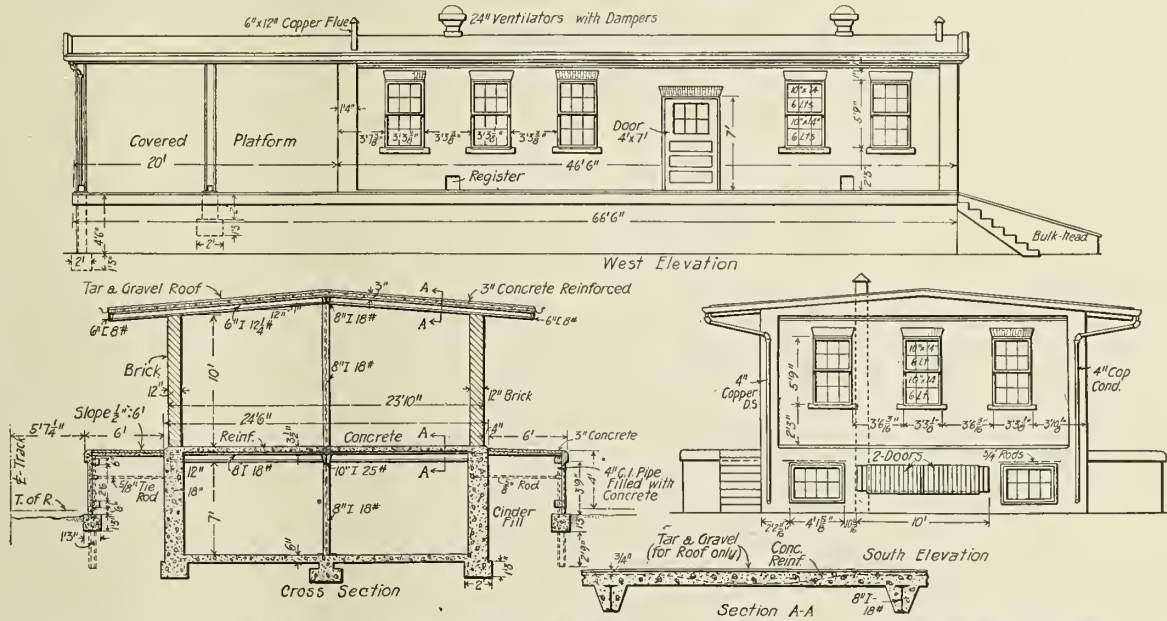


Interior of Store-House, Car and Locomotive Repair Plant, Boston & Maine R. R., North Billerica, Mass.

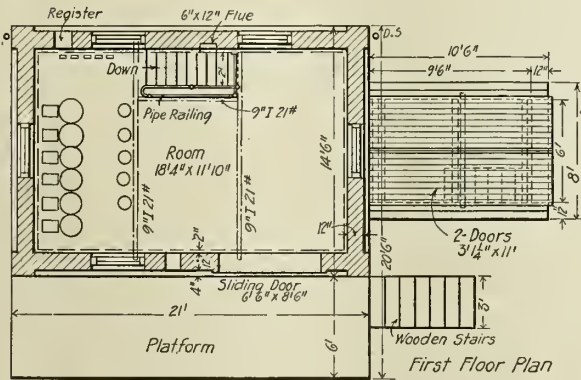
used in the monitor construction. Both light and heavy forge work will be done in this shop, as will also the bolt work. For the latter, four forging machines with their furnaces have been installed. The oil by which these and the furnaces for the six power-hammers are fired, likewise the heaters in the tire house, is stored in a concrete vault conveniently located near the midway and equidistant from the smith and tire shops. Alongside the blacksmith shop there has been located a gantry crane for the purpose of handling coal to and from the locomotives brought in for repairs.

The Power-House. The Power house is a brick structure on concrete foundations 115 by 122½ feet in over-all dimensions, the engine and the boiler rooms, 60 and 50 feet in

width respectively, being separated by a heavy curtain wall of brick running through the building in its longer dimension. The main power generating equipment consists of two General Electric 350 k. w. three phase alternating current generators directly driven by Rice & Sargent duplex engines, these units being supplemented by a low-pressure Curtis turbine operating on exhaust steam from the reciprocating engines and driving a 750 k. w. generator. Other engine-room equipment consists of two duplex air compressors, boiler-feed and fire-service pumps, circulating pumps for the condensers and for the return from the heating systems of the several buildings. Steam is generated by means of five Babcock & Wilcox boilers rated at 100 h. p. each. Four of these, in pairs, are fired by means of



Cross Section, Plan and Elevation of Paint and Varnish Storehouse, Car and Locomotive Repair Plant, Boston & Maine R. R., North Billerica, Mass.



Cross Section and Plan of Oil House, Car and Locomotive Repair Plant, Boston & Maine R. R., North Billerica, Mass.

Murphy stokers; the fifth being utilized to consume the shavings and cuttings from the wood working plants.

Office and Store-House. The office and store-house building is two stories high and of the mill type of construction. It is 75 ft. by 422 ft. 8 ins. in size and has a 17½-ft. platform along each of the two sides while at the rear is a storage platform 110 by 250 feet in size with which the side platforms are continuous. These platforms are at car-level and have, like the first floor of the store-house proper, 3-in. concrete floors. The large platform is partially protected by a shed of the same width as the store-house building. The general shop offices together with those of the store-keeper, are located on both floors of the building in the end nearest the midway.

The Car Repair Group. In the car-repair group, only those essential to the up-keep of passenger cars are thus far provided; these being a coach repair shop and a paint shop with an 80-ft. transfer table between, at the opposite end of the midway from the locomotive shop. Across from these are the car department smith and the machine shops. The coach repair shop and the paint shops are 282 by 314 and 265 by 314 feet in size respectively each has ten tracks and each has a two-story section on the east side in which those repair departments whose work is not directly applicable to the car bodies are located. Both shops have concrete floors. The smith and machine shops are separate departments of the same building, 150 by 200 ft. in size, the building being divided by a curtain wall. The equipment of these shops is typical of that usually provided where this class of work is to be handled.

As in the case of the locomotive blacksmith shop, bar iron and crude oil storage is provided the car smith shop. Paint and oil stores for the car department are kept in a specially

constructed building, the construction of which, together with that of the main oil house near the locomotive shop, is shown by means of the illustrations. The Bowser equipment for oil storage and disbursement is used. General supervision of the layout of the plant and the design and construction of the va-

rious buildings was, until September of last year, under the tion of Mr. F. K. Irwin, special engineer; since his retire the work has been conducted by Mr. F. C. Shepherd, eng of construction for the road. Mr. A. B. Corthell is chief neer of the road with office at Boston, Mass.

Pacific Type Locomotives for the Erie Railroad.

There are several types of locomotives whose design is such that they can be readily adapted to a variety of service conditions. The most notable of these is the ten-wheel, or 4-6-0 type, which for many years has done excellent work in both freight and passenger service. Under favorable conditions, locomotives of this type can be used interchangeably in either class of work; while in other cases, the passenger locomotives have larger wheels than the freight, in order to give them greater speed capacity; the two designs being otherwise practically interchangeable.

The Pacific type, because of its increased steaming capacity, is largely replacing the ten-wheeler in heavy service, and is showing the same adaptability as an all-around road engine as did its predecessor. Such a locomotive, with a large amount of adhesion weight, high tractive force and steaming capacity, and with driving-wheels from 63 to 69 inches in diameter, is equally suitable for fast freight service or for heavy passenger service where grades are severe or stops are comparatively frequent.

The Baldwin Locomotive Works has recently built, for the Erie R. R., twenty Pacific type locomotives which, while primarily intended for freight service, are suitably equipped for handling passenger traffic, and are proving successful in such work. These engines exert a tractive force of 43,200 pounds; and with 184,300 pounds on drivers, the ratio of adhesion is 4.27. The total equivalent heating surface is 5285 square feet, or 338 square feet per cubic foot of cylinder volume. This is a liberal ratio for a six-coupled engine, and it indicates that the boiler is of ample capacity for severe duty.

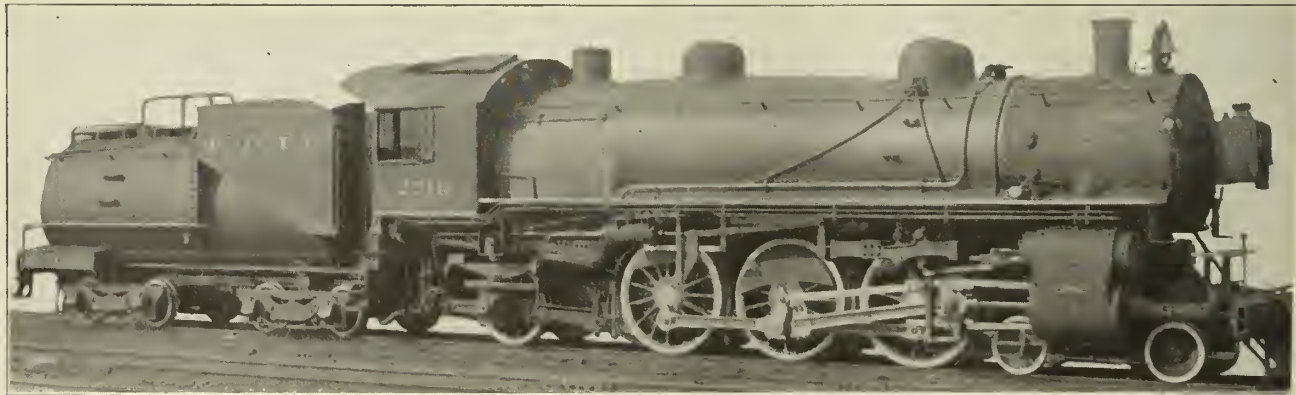
The frames and structural parts of these locomotives are unusually substantial in construction, and are strongly braced. The main frames are 6 inches wide, with single front rails measuring 11 inches deep at the cylinder fit. The leading truck is equipped with the Woodard centering device. The steam distribution is controlled by 14-inch piston valves, which are driven by Baker gear and are set with a lead of 3/16 inch. The cylinder and steam-chest bushings, piston and valve packing rings and steam pipes, are of Hunt-Spiller iron. The cylinder cocks are pneumatically operated. No by-pass valves are used in this design.

These locomotives are of course, fitted with superheaters, the equipment also including brick-arches, air-operated fire doors, Ragonnet power reverse gears, speed recorders, and flange lu-

bricators. The tenders are of the Vanderbilt type, with fi composed of 6 by 4 by 3/4-inch steel angles. The tanks capacity for 9000 gallons of water and 14 tons of coal ea

The leading features of these locomotives are indicated i following table:

Type .....	.....
Service .....	.....Fr
Cylinders .....	.....25 by 2
Valves .....	.....14 in.]
Valve gear]
Tractive power .....	.....43,20
Boiler, type.....	.....Wago
Min. diameter .....	.....7
Working pressure .....	.....20
Fire-box, size .....	.....75 by 11
Grate area .....	.....58
Kind of fuel.....	.....Soft
Tubes, number and diameter.....	.....261—
Flues, number and diameter.....	.....36—53
Length .....	.....20 ft.
Heating surface, fire-box.....	.....203
Tubes and flues.....	.....2731
Arch tubes .....	.....32
Total .....	.....3966
Superheating surface .....	.....879
Driving wheels, diameter.....	.....6
Journals, main.....	.....11 by 1
Journals, others .....	.....10½ by 1
Truck wheels, front, diameter.....	.....4
Journals .....	.....6½ by 1
Back, diameter.....	.....4
Journals .....	.....9 by 1
Weight, on driving wheels.....	.....184,30
Total engine .....	.....281,6
Total engine and tender.....	.....450,00
Wheel base, driving.....	.....13 ft.
Total engine .....	.....33 ft.
Total engine and tender.....	.....66 ft. 4
Tender, wheels, diameter.....	.....4
Journals .....	.....6 by 1
Capacity, water .....	.....900
Capacity, coal.....	.....1



Pacific Type Locomotive for the Erie R. R.

rapid progress of superheaters, brick arches and mechanical stokers. If any one has a locomotive feed-water heater which is really practicable and economical he can get a hearing without difficulty. There is one consideration, however, which ought not to be lost sight of. If the average locomotive now spends seven hours out of every twenty-four undergoing repairs, and every new appliance adds to things which may get out of order, when will the point be reached where complexity becomes an unendurable maintenance burden? For a bunch of lawyers backed by efficiency promoters to undertake to criticize railway practice in such matters is the height of presumption and absurdity. All of that forty million dollar rate increase could easily be used up if all promoters of new appliances could have their way.

Are the Investigations Undertaken by the Interstate Commerce Commission in the Rate Case, Fair and Right?

The Interstate Commerce Commission, as an administrative body, is not bound to follow the methods of jurisprudence and is not bound by precedent nor the rules of evidence. Its power and duties are prescribed by law; and if it exceeds these it is subject to court review. In such important matters as the approval or suspension of a general rate increase, such as is now before it, its findings and its methods cannot be reviewed by court. This fact should not make the commission less vigilant in strict respect of the interstate commerce law and in the exercise of that spirit of fairness which is the essence of all justice, no matter by what kind of a tribunal it is administered.

The purpose of the law which gave the commission power to suspend and forbid rate advances, was to protect the public against exorbitant rates. It was not the purpose of the legislators to make it an instrument of inquisition into all past corporate history; nor to use its pressure for the propagation of fads and fancies regarding efficiency. Whatever powers the commission may have now, or in the future, over railway operations from standpoints of safety and economy, there is no connection between capitalization and rates or so-called "scientific management" and rates. Rates must be considered as a whole and the road that is heavily capitalized can get no higher rates than the one with the lowest capitalization. Efficiency is a relative term, and to base freight rates on the efficiency of the carrier is an absurdity. If the efficient road is to be allowed to charge higher rates than the non-efficient, the latter will take the business. If on account of superior efficiency and resulting economy it is to be penalized by reduction of rates, all incentive to improvement is taken away.

In the rate case of three years ago, these questions were lugged in by the lawyers of shipping organiza-

tions. The plea was that if the roads were fairly capitalized, with all water squeezed out, and operated up to 100 per cent efficiency, they would not need higher rates. The latter proposition they essayed to prove by the story of certain manufacturing plants; but they utterly failed in demonstrating how the theories could be applied to railway operation. Except for furnishing a newspaper sensation, the attack was an utter failure. The commission was interested, but its decisions claimed not influenced by this romancing.

But this time, the commission selected the apostle of the "new freedom" and of the "holy jumpers" of scientific management, to conduct the opposition to the railways, and is furthering all of his requests for information. From the simple question of whether the railways as a whole in a great section of the country need greater revenue to help them against the rising tide of expense, and whether the public would suffer any injustice by being compelled to pay slightly increased rates of freight, the hearing and argument are expanded to include the complicated subjects of capitalization and business management and engineering problems. One result of this is that the matter will be prolonged indefinitely while Mr. Brandeis questions and cross-questions and preaches; while the entire business of the country is held up to let him and his associates work off their ideas of industrial millennium. Another result will be that the charges made will go to the public ear while the defense and refutation will not. The public is prone to believe what is presented in its tribunals, even more than what it hears at its chautauquas and in its neurotic magazines.

And for what good? Does the commission really believe that it can make use of this sort of stuff in deciding what are fair rates? Its own decisions in the past show, as common sense shows, that it cannot and will not. Why then should it seize this application of the railways backed by practically all the business interests of the country, to gather a lot of information and misinformation on subjects that are totally unrelated to it? Judge Prouty says that the commission must learn for itself whether the railways are entitled to advance—not from "newspaper assertions." True, but newspaper assertions may betray public sentiment. And if the public sentiment repudiates the champion selected for it by the commission, and his methods, it would be just as well for the commissioners to read the papers. By what mental process is the conclusion arrived at that the "Don Quixote" knows better what the public wants than it knows itself?

But the real question is, "Supposing the champion establishes certain charges of overcapitalization, of interlocking directorates, and of failure to attain perfection in firing locomotives and making all employees do their full measure of duty at all times; will that justify or excuse a failure to approve a five per cent increase in rates?" The question is its own answer.

To force bankruptcy on the arteries of commerce will not hasten economy or efficiency; but on the contrary, will delay them. It might wipe out some capitalization which now draws no dividends, but what earthly effect would that have on rates?

The questions which Mr. Brandeis and the commission are asking of the railways may bring out some interesting information but it will not be new nor of the least value in this case. The power of the commission over rates was not given it as an inquisitor's rack or thumb screw. It was intended to subserve fairness between carriers and shippers—not to bring out vaunted arguments for government ownership; to uncover a financial past for which the government itself cannot escape responsibility; nor to elicit argument for further regulation of capitalization; nor to belittle the work of improvement in machinery methods and men which the best body of railway managers in the world are carrying out as fast as modern conditions of labor will let them.

Probably the commission can legally take evidence on the existence of "Sims' Hole" or on the antiquity of graft or the white slave traffic in Central Africa, if it wants to. They would have just about as much to do with this five per cent increase as do the interrogations of certain cranks who have entered appearance at the hearings; or even that series of questions which have been promulgated officially.

The time will never come either under private or government ownership when everything is settled and no adjustments have to be made. They cannot all be determined at once by the starvation method. The attempt to do it starves and weakens business as a whole; and all postponement for the purpose of fogging the issue and making a complicated matter out of a simple business problem, is a gross injustice not only to the owners of railway property but to the entire people of the country.

Review of the Year.

The most notable thing which comes to mind in reviewing the record of railway events for the past year is the great devastation to railway property that occurred in the valley of the Ohio and tributary rivers during the months of March and April. Pretty much all over the states of Ohio and Indiana, and through eastern and southern Illinois, railway roadbed and bridges were destroyed, and on thousands of miles of railway train operation had to be abandoned for periods ranging from several days to many weeks. Both the engineering and operating departments were put to their wits to determine where to begin first in order to establish even temporary schedules of train operation.

The Pennsylvania Lines West, the Baltimore & Ohio system, the Monon, the Chesapeake & Ohio, the Big Four, the Erie and the Wabash were among the principal sufferers, so far as through lines were

concerned, but on a larger number of local and branch lines and electric interurban lines traffic was likewise paralyzed. On individual systems the damage sustained reached into millions of dollars, and the engineering department of many of the lines had to undertake an extensive construction program which continued throughout the remainder of the year; in fact not all of the bridge replacements have been accomplished even yet, and the demand for structural material was so great that the bridge manufacturers have been rushed to supply it.

In connection with these floods there has been much talk of needed governmental investigation to determine to what extent river channels have been encroached upon or waterway areas reduced, in the construction of railroad, highway and municipal bridges, and private property of other kinds. The whole question involves engineering studies of an important character, but it is doubtful if the agitation will result in remedial measures of any consequence.

In the construction of new railroad our investigations show that, so far as the United States is concerned, the enterprises were confined mainly to branch lines or short stretches of road. During the year 1913, as well as during the previous year, the greatest activity in railway construction was in Canada, where three large corporations, the Canadian Pacific Ry., the Canadian Northern Ry., and the Grand Trunk Pacific Ry., are lively competitors in a race to cover virgin agricultural territory. During the year track laying was completed on the transcontinental line between Moncton, N. B., and Winnipeg, Man., which is being built for the Grand Trunk Pacific Ry. It is expected that the present year will see the practical completion of this long line through to the Pacific coast, the gap yet remaining to be closed being on the division west of Winnipeg, on the western slope of the Rocky mountains.

There has been remarkable progress in the installation of automatic block signals. Our compilation, published in another part of this issue, shows that automatic block signals extended over new territory covered upwards of 3800 miles of railway and the extension of manual and other forms of non-automatic block covered upwards of 2000 miles of road additional. On many of the large systems, however, there was an actual decrease in the mileage of road protected by manual block, which is accounted for by the substitution of automatic block signals where manually operated signals were previously in service.

While less of the spectacular has characterized locomotive construction during 1913 than in other years, there is abundant evidence of progress that is believed to be of a more lasting variety than is usually to be noted in summing up the record of the year. This progress is believed to be more permanent from the fact that it applies to fundamentals rather than to innovations, the value of which after being introduced always remains to be proven. Thus there is practical-

ly nothing in locomotive construction and operation at the present time that was not appreciated and sought for a year ago, but there is much in the way of refinement that has been actually attained, and still more, the attainment of which in the future seems assured.

As for the matter of increased capacity of motive-power units which has been so conspicuous a desideratum during the past five or six years, the railway mechanical department has unquestionably acquitted itself with flying colors. What with the perfection of the stoker and such fuel and water conservers as the brick arch and the superheater, the immediate restrictions on the size and power of a given locomotive are certainly to be encountered only outside of the locomotive department. Having met with extraneous restrictions, such as right of way clearances, capacity of track and bridges to sustain concentrated loads, the strength of draft attachments in holding long trains together and the ability of air brake apparatus to afford satisfactory control of such trains, designers appear to have been given opportunity to develop refinement of detail and consequent improvement in performance. Thus those novelties of a few years ago that have survived the experimental stages, have been improved until, as in the case of the stoker for example, their behavior is as dependable as is that of the locomotive itself. Mere bigness is no barrier from the manipulation standpoint since the stoking problem is no longer a problem, and the screw or power-reverse gear makes valve control an even simpler matter than was the case with lighter engines before these expedients were introduced. Water and coal economizing devices are too well established to permit of their being omitted.

These, however, are the marks of progress of other years. The present and even more hopeful indications are to be found in the better understanding of the functions of locomotive parts and the materials entering into their make-up. The years 1910 and 1911 are notable for the large numbers of heavy and complicated locomotives of the Mallet type that were turned out; 1912 saw the rise of the Mikado type as a freight engine and in heavy fast passenger trains the Pacific type has had a remarkable development and appears to be firmly intrenched. Probably no more hopeful indication need be asked for than the fact that refinements of design have established the Mikado, or at least the Santa Fe type, as a near competitor of the Mallet, and the much neglected consolidation type on a much closer plane of equality with the Mikado than would have been thought possible prior to the recent design by the American Locomotive Co. for the Wheeling & Lake Erie R. R. (See Railway Review for December 6.) An even more interesting situation which indicates the possibilities of refined design, is the remarkable showing made by recent Atlantic type locomotives in competition with those of the Pacific type on the Pennsylvania R. R. In each instance as above,

savings in weight of from 40,000 to 60,000 lbs. and even more are made, involving lessened first cost, lessened cost of upkeep and no inappreciable saving in the reduction of internal friction, making in a notable degree, for what is now foremost among the objects sought for, that being greater efficiency in operation.

To enumerate the features of locomotive design in which marked improvement is evident, would be to catalog substantially the entire list of detail parts entering into engine construction. There is no doubt, however, that the chiefest of these are such as pertain to the locomotive boiler and the means for improving the combustion of fuel. Reserve boiler capacity is the well recognized keynote of sustained hauling power; this involving not only increased size, but larger proportionate fire-box volumes, improved conditions of draft, superheating, etc., each important in itself and such as are finally being brought into successful combination. Heat treated and alloy steels are regularly finding place on recently constructed engines, increasing the strength and wearing qualities of vital parts and placing the likelihood of failure correspondingly remote. Having arrived at the present stage wherein there has been at least a partial demonstration of the value of refinement of details, it seems opportune for our locomotive designers to pursue this trend as thoroughly as may be possible, leaving the creation of new types out of consideration for a year or two.

There is, however, one notable innovation undergoing development, that is particularly worthy of mention, that being the so-called "triplex" compound locomotive which the Baldwin Locomotive Works proposes to design for the Erie R. R. In this design, which is of the 2-8-8-8-2 wheel arrangement, there will be three pairs of cylinders of equal size, the third and extra pair being used under the tender to take advantage of the adhesive weight of that member. These cylinders and those at the forward end of the locomotive will operate on low pressure steam received from the intermediate or high pressure cylinders. Should this study resolve itself into a satisfactory solution of the question of varying load on the tender, it seems reasonable to anticipate a broad application of this new principle. This and several other possibilities, notably the use of means other than the exhaust nozzle in creating draft, as was suggested two years ago and is being experimented with by Prof. H. B. McFarland, engineer of tests of the Atchison, Topeka & Santa Fe Ry., will be found the subject of an interesting article on page 1017 of the Railway Review for November 1, 1913.

Several really big announcements were made in the course of the last twelve months, marking the progress of electrification of main line railways. Almost with the opening of the year the Chicago, Milwaukee & St. Paul Ry. made known its purpose to undertake one of the largest projects in the substitution of electric for steam motive power, that has yet been recorded in the history of electricity. This involves, as noted in these

columns last week in connection with final development of the plans, the ultimate electrification of 440 miles of line in Montana and Idaho, comprising a section of road characterized by mountain grades and heavy traffic, and with an abundance of water power in the surrounding country. Engineering work upon the somewhat similar and likewise extensive project of the Denver & Rio Grande R. R. in Colorado and Utah, whose plans were announced near the close of last year, has been in progress during 1913; although the actual work of installation has waited upon the completion of the new detour line over Soldier Summit, which was but recently put into operation. In March, last, the Pennsylvania R. R. announced its intention to electrify its suburban line from the Broad Street station, Philadelphia, to Paoli, a distance of 20 miles; and some six months later a similar decision was made with regard to another Philadelphia suburban line, extending to Chestnut Hill, a distance of 12 miles. Work on these two undertakings has been mostly of a preliminary nature up to this time, but actual construction will be commenced early in the new year. Another electrification project of the greatest consequence is that of the Norfolk & Western Ry., in the electrification of its Elkhorn branch, which handles the heavy coal traffic from the Pocahontas region. This covers some 30 miles of line and 85 miles of track, and although announcement was made only last spring, the details of the equipment are now fully decided upon, and the work is progressing rapidly. Two other projects of much importance which belong in

the record of 1913, and on which construction work is progressing, are in Canada. The Canadian Northern Ry. will operate by electricity, its tunnel under Mount Royal, and its new terminal in Montreal, Que., now partly completed, covering about 9 miles of line; and the Canadian Pacific Ry. will electrify its heavy grades between Rossland and Castlegar Junction, B. C., comprising about 31 miles of road.

All the above, which include the chief events marking the progress of the year, are undertakings decided upon, rather than installations completed. There was one notable piece of the work in the latter category, however, that of the Butte, Anaconda & Pacific Ry. This line, which carries principally a very heavy ore traffic, commenced operation of freight service by electricity in June, and of passenger service in October.

As to the electric systems represented in the above summary of electrification for the year, it is of more than passing interest to note that the C., M. & St. P. Ry., the two Canadian lines, and the Butte, Anaconda & Pacific Ry. are all using or will use the direct current system and overhead trolley at 2400 volts pressure. The two Pennsylvania projects are not yet officially announced as to type, but the report is that direct current probably will be adopted for these also. The Norfolk & Western is the single instance of new main line electrification this year, of first magnitude, which has adopted alternating current; and this road is blazing a trail of its own by adopting the "split-phase" alternating current system, as yet untried in this country.

A Comprehensive Search Light.

SYNOPSIS. Mr. Brandeis, with the assistance of the attorneys and experts of the Interstate Commerce Commission has prepared and the Commission sent out the first of this week a series of questions which it expects to be answered on forms also sent by the railways in the Official Classification Territory. These questions are of a most searching nature and apply not only to traffic methods and financing, but to economy in purchasing and operation. If answered in detail as required they will prove or disprove the whole category of charges regarding railway methods which have often been hinted at or boldly stated. The work imposed upon the railways by these interrogatories is enormous. A great series of economic and engineering subjects have never been studied; and the difficulties in the way, cannot be overcome in the thirty days leeway provided. In the case of many of them the answers must be unsatisfactory. Whether graft or anything of that general nature can be uncovered in this way may well be doubted. The title of "Conflicting Interests" begs the question of conflict. It is stated that the hearings in the rate increase case will not be postponed until all this encyclopedic information is obtained but that they will go on with the material in hand.

The Interstate Commerce Commission has sent to the roads in the Official Classification Territory an elaborate and searching series of printed questions, and blanks for answering the same. It says that the information furnished so far by the carriers is "elaborate and helpful," but that it requires additional information with "a view to determining both the causes of the diminishing net revenues and net income and the gen-

eral course to be pursued." The information thus given must be under oath and must be filed before Jan. 31, 1914. Where any question is not answered, the reason must be stated.

A letter accompanying the interrogatories says:

"The commission understands that some of the carriers are in position to make full responses to the questions submitted without substantial delay. It is also recognized that some of the carriers may require a longer time. Full answers are deemed to be necessary in order that the commission may properly determine the fundamental questions raised in this proceeding, but it is not essential that all answers should have been received from all of the carriers before the hearings can be resumed and it may develop in the course of the inquiry that the earlier responses received will be sufficiently illustrative to enable the commission without waiting for the completion of all of the responses to pass upon some questions. Each carrier is, therefore, requested to send to the commission as quickly as possible the answer to each question as soon as compiled in order that the day for further hearing may be set at the earliest practicable date. The commission will, on January 7, 1914, hear parties concerning any matters as to which further instruction is desired."

Seventy-eight questions are propounded, and these are divided into seven general groups.

GROUP A. PRELIMINARY.

Requires names, titles and addresses of the directors of the company, with a statement of power and duties; trustees of vot-

ing trust; and all officers from president down to master mechanics, etc.

GROUP B.—REVENUES AND THE CONSERVATION THEREOF.

Question No. 6.—From the originals or copies of waybills included in freight revenue accounts for the month of October, 1913, prepare and submit statements on Forms 1, 2, 3, and 4, embracing the interstate transportation of all carload shipments from such points of origin to such points of destination as will represent the movement in the greatest volume of each of the commodities listed below, the application of the published rates, rules, and regulations to the transportation of such commodities and certain traffic statistics in connection therewith. (30 commodities are listed.)

It is required that the respondent submit separate statements for each of these commodities carried from certain principal points of origin to certain principal points of destination, as follows: Joint traffic, moving under through or proportional rates for domestic use. Local traffic, moving under local rates for domestic use. Joint traffic, moving under through or proportional rates for export. Local traffic, moving under local rates for export.

The respondent will also prepare and submit four statements, embracing the totals of the separate statements showing the transportation of the selected commodities, under the four classes of rates, viz.: through or proportional rates, domestic; local rates, domestic; through or proportional rates, for export; local rates, for export.

Before beginning the work of compiling these statements the respondent will submit a preliminary statement to the Commission for its approval, containing a list of the principal points of origin and principal points of destination selected to represent the movement in the greatest volume of each of the commodities listed above, under the four classes of rates described above.

Question No. 7.—State on Form No. 9, as required by headings and instructions thereon, information regarding payments made by the respondent during the year ending June 30, 1913, to persons, firms, or corporations, for services in connection with the transportation of freight, such payments being "absorbed" by the respondent (deducted from revenue and no charge made to shipper).

Question No. 8.—(a) To what extent, if any, have passenger rates charged by the respondent been reduced since July 1, 1903, in compliance with State laws? (b) What has been the effect of such reduction upon the passenger revenue of the respondent? (c) State fully the methods employed in arriving at the amounts given.

Question No. 9.—Give on Form No. 10, as required by headings and instructions thereon, information regarding services performed by the respondent company during October, 1913, in "spotting" cars for loading or unloading on private tracks.

GROUP C.—ECONOMY.—SPECIAL NOTES APPLYING TO QUESTIONS IN THIS GROUP.

Note 1.—Wherever copies of contracts or agreements are required to be returned, the following data will be returned as supplemental and additional thereto:

- (a) Copies of calls for bids, with names and business addresses of firms, corporations, individuals, or other parties invited to submit bids.
- (b) Copies of all tenders or responses to calls for bids.
- (c) Copies of all letters of acceptance of bids.
- (d) Copies of all specifications which are to be observed by the contractor or vendor.

Note 2.—Wherever "material" is mentioned herein it will be understood to include, among other things, locomotive fuel coal and coke.

Question No. 10.—Give on Forms 11, 12, 13, and 14, as required by headings and instructions thereon, information regarding all equipment purchased or put in service by the respondent between July 1, 1898, and June 30, 1913.

Supplemental to the data furnished on the forms, respondent carriers will submit the following:

- (a) Copies of contracts.
- (b) Lists of appliances, fittings, and fixtures to be applied.
- (c) Statement of conditions under which the appliances, fittings, and fixtures are to be furnished. (If any appliances, fittings, or fixtures were furnished by respondent, the full conditions relative thereto should be stated.)
- (d) Statement of the rebates to be allowed by the firms, corporations, or individuals furnishing the appliances, fittings, and fixtures.
- (e) List showing names and business addresses of firms, corporations, or individuals, or selling agents for firms, corporations, or individuals supplying the appliances, fixtures, or fittings specified in contract or specifications.
- (f) The names and business addresses of all firms, corporations, and individuals with whom negotiations incident to the letting of contracts or the supplying of appliances, fittings, or fixtures were conducted.

In case equipment trust obligations were issued to cover any portion of the cost of equipment returned on the forms mentioned, the respondent carrier will submit with its return copies of the resolutions of its executive or other committee or of its board of directors authorizing the issuance of such obligations, and a full and complete statement which will show in detail all the circumstances in connection with the disposal of the obligations, the name or names and business addresses of the purchaser or purchasers, the name or names and business addresses of all firms, corporations, or individuals who acted as intermediary in the disposal of the obligations, the price at which the securities sold, and the commissions or other expenses paid, whether charged to the cost of the equipment or otherwise.

In the case of equipment built by forces of the respondent carrier, a statement showing details of the cost will be submitted, the statement to set forth in totals only the actual cost of the labor and material used, the cost of the supervision, and the amounts added for use of tools, and analogous items.

Question No. 11.—Furnish copies of all contracts or agreements entered into with corporations, firms, or individuals covering the purchase of material, including the treatment of ties and the sale of scrap, during the fiscal years ended June 30, 1910, and June 30, 1913. (See Special Note 1.)

Question No. 12.—Furnish copies of all specifications governing the purchase of material not purchased through contract for the years ended June 30, 1910, and June 30, 1913.

Question No. 13.—Furnish detailed description of the methods of inspecting and testing material purchased under the specifications submitted.

Question No. 14.—Does the respondent operate a testing laboratory? If so, it will submit a statement as to its character and scope and as to the effect the results of the operation of the laboratory have on the strengthening or raising of the standard of the specifications.

Question No. 15.—Does the respondent employ a testing engineer whose duty it is to ascertain the properties and adaptability of materials available for use in its operations?

Question No. 16.—Does the respondent have any plans or method of co-operating with other carriers in conducting tests or inspections of material or supplies purchased? If so, give complete details of plan and extent of its operations.

Question No. 17.—What disposition is made of material rejected by the inspectors or testing engineers as not in accordance with the specifications?

Question No. 18.—What system does the respondent have for collecting, sorting, and disposing of its scrap, and what measures are taken to reclaim and put in service the usable material that finds its way into the scrap?

Question No. 19.—Furnish a statement describing the methods used in purchasing, the facilities for storing, and the methods used in distributing the material used for maintaining and operating property of the respondent.

Question No. 20.—If the respondent purchases lubricating oil or compounds which are guaranteed as to mileage performance by the manufacturers or vendors, the respondent will furnish the following:

- (a) A copy of the guarantee in effect during each of the fiscal years ended June 30, 1910, 1911, 1912, and 1913.
- (b) On Form 15 the information required regarding its operations under such guarantee during each of the fiscal years ended June 30, 1910, 1911, 1912, and 1913.

Question No. 21.—If the cast-iron car wheels purchased by the respondent are guaranteed by the manufacturers or vendors as to mileage performance or length of service, the respondent will furnish the following:

- (a) A copy of the guarantee in effect during each of the fiscal years ended June 30, 1910, 1911, 1912, and 1913.
- (b) On Form 16 the information regarding the wheels purchased, subject to the guarantee applied to equipment, the number so purchased and applied that were removed and replaced on account of nonfulfillment of such guarantee, the number of such wheels removed that were not subject to reclamation, and the number of all kinds of cast-iron wheels sold as scrap during each of the fiscal years ended June 30, 1910, 1911, 1912, and 1913. (See further instructions on Form 16.)
- (c) On Form 17 the information regarding accidents caused by wheel failures during the period from July 1, 1909, to June 30, 1913.

Question No. 22.—Are the tie specifications of the respondent carrier based on exact data ascertained by tests?

Question No. 23.—If tests have been made during the period between July 1, 1910, and June 30, 1913, to develop the sizes and kinds of track ties, treated or untreated, best adapted for use in respondent's territory, the respondent carrier will furnish full details as to the results of such tests.

Question No. 24.—From what producing territory does the respondent carrier derive its supply of track ties?

Question No. 25.—Furnish on Form 18 the information required regarding ties purchased and used during the fiscal years ended June 30, 1910, 1911, 1912, and 1913.

Question No. 26.—If the information is available, the carrier will furnish a statement showing the average life of the several kinds of ties removed from track during the period of July 1, 1910, to June 30, 1913.

Question No. 27.—Give on Form No. 19, as required by headings, information regarding the consumption of fuel during the fiscal years ended June 30, 1910, and June 30, 1913.

Question No. 28.—Give on Form No. 20, as required by headings, information regarding the cost of fuel consumed during the fiscal years ended June 30, 1910, and June 30, 1913.

Note.—Returns should show the total expense of fuel except the expense of transportation over the respondent's line. If fuel is purchased f. o. b. carrier's line, the amount shown as "purchase price" should include the freight charges, if any, on other carriers' lines.

Question No. 29.—Name and describe the types of coaling stations of the respondent and give the average cost of handling coal for each type of station for the years ended June 30, 1910, and June 30, 1913.

Question No. 30.—Are statistics of fuel consumption so kept as to show consumption by individual locomotives, by classes of service, by individual enginemen, or otherwise? If so, furnish copies of statements for months of January and August, 1910, and January and August, 1913.

Question No. 31.—Have any tests of performance of specific locomotives been made under expert instruction for comparison as to the consumption of coal with the performance of the same locomotives without the expert instruction? If so, give the results of all such tests since June 30, 1910.

Question No. 32.—What changes have been made in the methods of firing, and what new devices for reducing coal consumption have been adopted since June 30, 1910? What was the approximate reduction, if any, in coal consumption due to new methods and devices?

Question No. 33.—State on the following form (omitted) the number of locomotives in use on June 30, 1910, and on June 30, 1913, and the number on each date equipped with brick arches, with steam superheaters, with mechanical stokers, and with feed water heaters.

Question No. 34.—Give on Form No. 21, as required by headings, information regarding rails laid in tracks of the respondent during the fiscal year ended June 30, 1913.

Question No. 35.—Give on Form 22, as required by headings and instructions thereon, information regarding rails removed

from tracks of respondent during the fiscal year ended June 30, 1913.

Question No. 36.—Give on Form 23, as required by headings, information regarding accidents resulting from rail failures during the period from July 1, 1909, to June 30, 1913.

Question No. 37.—Furnish copies of all contracts for construction or renewals of roadbed, bridges, structures, or other facilities entered into by the respondent during the fiscal years ended June 30, 1910, 1911, 1912, and 1913. (See Special Note 1.)

Question No. 38.—On the following form (omitted) for the month of October, 1913, give the total number of freight cars in revenue service on respondents' line, and the total number of car-days, loaded car-miles, and empty car-miles of such cars.

Question No. 39.—Give on Forms Nos. 24 (a) and 24 (b), as required by headings and instructions thereon, information regarding movements and lading of respondent's freight cars on its own line for the period July 1, 1908, to June 30, 1913.

NOTE.—The report should cover 50 box cars, 25 of 60,000 pounds capacity each and 25 of 80,000 pounds capacity each, all of which were in service at the beginning and close of the period. The cars should be selected by consecutive numbers as nearly as possible, variations from consecutive order being explained with the returns. If the respondent did not have equipment answering the above description, cars of different capacity may be selected as far as necessary.

Question No. 40.—State as nearly as possible the amount of the expenditures made by the respondent during the period of five years ending June 30, 1913, for heavier rails, increased strength of bridges, culverts, and other structures, necessitated by use of the present heavy types of equipment.

Question No. 41.—(a) What investigation has been made by the respondent to determine to what extent cost of maintenance of roadbed and bridges has been increased by the introduction and use of heavier types of locomotives and cars? (b) By whom was such investigation made? (c) Give fully such figures as have been compiled as the result of such investigation and the basis for them.

Question No. 42.—By what amount has the respondent's investment in equipment been increased or decreased by reason of the introduction and use of heavier types of locomotives and cars, comparing the present investment with that which would have been necessary to transport the tonnage of the year ended June 30, 1913, with equipment of the types used in 1903?

Question No. 43.—(a) What investigation has been made by the respondent to determine the relative cost of maintaining the heavier locomotives of high tractive power and cars of larger capacity, as compared with the cost of maintaining locomotives and cars of lighter capacity; also as to the relative cost of maintaining all steel or steel underframe cars as compared with all wooden cars? (b) By whom was this investigation made? (c) Give fully such figures as have been compiled as the result of such investigation and the basis for them.

Question No. 44.—What investigation has been made to determine the relative transportation cost per unit of transporting freight in trains hauled by locomotives of high tractive power and cars of large capacity, as compared with the costs for transportation in the types of equipment used in 1903?

Question No. 45.—(a) What investigation and what showing of advantage or disadvantage has been made in the relative cost per unit, including both transportation expenses and maintenance expenses, of the change of policy which brought about the use of locomotives of greater weight and tractive power and cars of larger capacity? (b) By whom was this investigation made?

Question No. 46.—Has the net tonnage (the lading) per car (excluding coal, coke, and ore) increased during the period 1903 to 1913 in greater or less ratio than the tare weight of cars used in the transportation has increased? If possible, give the ratio of lading to tare weight of cars for each of the years named.

Question No. 47.—Give on Form No. 25 the information required, showing in detail the expenses incurred incident to so-

liciting or securing traffic for the respondent in localities not reached by the line of the respondent during the fiscal year ended June 30, 1913. The information furnished should show passenger and freight expenses separately.

Question No. 48.—Describe the measures taken by the respondent company to verify the correctness of charges on waybills taken into account. Gibe (a) the percentage of waybills received which were tested as to correctness of charges by others than station employees during year ended June 30, 1913; (b) the number and gross amount of undercharges discovered; (c) the number and gross amount of overcharges.

Question No. 49.—(a) What investigation (if any) has been made by respondent to determine the saving in operating expense that would be effected by the adoption of universal through billing of its interline shipments? (b) What was the result of such investigation? (c) What proportion of respondent's interline shipments (forwarded and received) is now moving on through billing, and how does this proportion compare with that which obtained in 1908?

Question No. 50.—(a) What investigation (if any) has been made by the respondent to determine the cost of service or services beyond its own tracks involved in placing or "spotting" a car on a private track, for loading or unloading? (b) State specifically the extent and kind of service that was investigated and the different elements of cost that were considered; also show whether the private track service investigated was that upon a single siding or upon a system of plant tracks. (c) Submit in detail the results of such investigation. (d) What has the respondent found to be the approximate cost of a normal or average switching movement involved in placing a car for loading or unloading on a private track?

GROUP D.—FINANCIAL.

Question No. 51.—Give on Form No. 26, as required by headings and instructions thereon, information regarding the respondent company's charges to road and equipment accounts during the period of July 1, 1898, to June 30, 1913, with totals as of the latter date.

Question No. 52.—Give on Form No. 27, as required by headings and instructions thereon, information regarding properties purchased or otherwise acquired during the period July 1, 1898, to June 30, 1913, inclusive.

Question No. 53.—Give on Form No. 28, as required by headings and instructions thereon, information regarding the sources of moneys expended and charged to road equipment account during the period July 1, 1898, to June 30, 1913, inclusive.

Question No. 54.—Give on Form No. 29, as required by headings and instructions thereon, information regarding physical property other than road and equipment owned by the respondent on June 30, 1913.

Question No. 55.—Give on Forms Nos. 30 (a) and 30 (b), as required by headings and instructions thereon, information regarding the securities of other companies owned by respondent as of June 30, 1913, and respondent's income therefrom.

Question No. 56.—Give on Forms Nos. 31 (a) and 31 (b), as required by headings and instructions thereon, a statement showing comparison of securities of other companies owned by the respondent as of June 30, 1898, June 30, 1907, and June 30, 1913.

Question No. 57.—Give on Form No. 32, as required by headings and instructions thereon, information regarding the securities of respondent and of other companies acquired by the respondent during the respective fiscal years ending June 30, 1899, to June 30, 1913, inclusive.

Question No. 58.—Give on Form No. 33, as required by headings and instructions thereon, information regarding the disposition of securities by respondent during the period July 1, 1898, to July 1, 1913.

Question No. 59.—Give on Form No. 34 (a), as required by headings and instructions thereon, information regarding se-

curities of the respondent outstanding at July 1, 1898, or issued during the period July 1, 1898, to June 30, 1913, inclusive; also on Form No. 34 (b), as required by headings and instructions thereon, a recapitulation of the information shown on Form No. 34 (a) with additional information as to securities retired or converted during the period named.

Question No. 60.—Give on Form No. 35, as required by headings and instructions thereon, information regarding the purposes of the issues of securities during the period July 1, 1898, to June 30, 1913, inclusive.

Question No. 61.—Give on Form No. 36, as required by headings and instructions thereon, information regarding the contingent liabilities or obligations of the respondent at June 30, 1913.

Question No. 62.—Give on Form No. 37, as required by headings and instructions, a condensed comparative statement of assets and liabilities, with averages per mile of road owned, for the fiscal years ending June 30, 1898, June 30, 1907, and June 30, 1913.

GROUP E.—CONFLICTING INTERESTS.

Question No. 63.—Give on Form No. 38, as required by headings and instructions thereon, information regarding transactions entered into or performed, in whole or in part, by the respondent company during the year ended June 30, 1913, with parties in whose business any director or officer of the respondent had, at the date of the transaction, or of the contract therefor, any pecuniary interest, either direct or indirect, through holding an official position with such party or having investment in its business or otherwise. The term "officer" as herein used shall be construed to mean any of the officers listed under Question No. 5.

The transactions to be listed should include, among others, such as were entered into or performed pursuant to contracts or agreements, formal or informal, of the following nature:

- (a) Contracts for the purchase or sale of equipment, materials, or supplies.
- (b) Contracts for the purchase, exchange, or sale of stocks, bonds, notes, or other securities.
- (c) Contracts for the purchase or sale of physical property other than equipment, materials, or supplies.
- (d) Contracts for the provision of facilities for shippers, such as sidetracks, etc.
- (e) Contracts for the construction of facilities of respondent.
- (f) Contracts for the apportionment of revenue to so-called "industrial roads" (roads which derive the major portion of their traffic from a single industry).

Note.—It is not intended that the transactions listed shall include those which occur in connection with traffic agreements or the interchange of traffic with transportation companies other than "industrial."

GROUP F.—SLEEPING-CAR OPERATIONS.

Note 1.—The words "sleeping car," as used in the term "sleeping-car operations" in the questions and forms submitted, include standard sleeping, tourist sleeping, parlor, composite, and private and other cars operated by sleeping-car companies to furnish berths or seats to passengers.

Note 2.—The word "contract," wherever used in the questions and forms submitted, includes all contracts or agreements, whether formal or informal, governing sleeping-car operations.

Question No. 64.—Give on Form No. 39, as required by headings and instructions thereon, information regarding contracts between respondent, its subsidiary companies, if any, and sleeping-car companies, covering sleeping-car operations for the period July 1, 1898, to December 31, 1913, inclusive.

Question No. 65.—Give on Form No. 40, as required by headings and instructions thereon, information regarding directors of respondent company and its subsidiaries.

Question No. 66.—Give on Forms Nos. 41 (a) and 41 (b), as required by headings and instructions, information regarding the expenses incident to sleeping-car operations borne (a) by the respondent and (b) by its subsidiaries.

Question No. 67.—Give on Forms Nos. 42 (a) and 42 (b), as required by headings and instructions, information regarding amounts paid by sleeping-car companies to (a) the respondent company and (b) to subsidiaries thereof.

GROUP G.—GENERAL.

Question No. 68.—Does the respondent, to any extent, classify its operating expenses to determine the cost of freight service, passenger service, express service, postal service, or of any particular class of service? If so, state fully the extent and the methods employed in such classification of expenses.

Question No. 69.—(a) Have any investigations been made to determine to what extent freight service, passenger service, express service, and postal service are respectively remunerative to the respondent? (b) By whom were such investigations made? (c) Give fully the figures compiled as to each of such investigations and the basis for them. (d) As to the postal service, show for the year ended June 30, 1913, the amount which was received and the amount which in the judgment of the respondent should have been received as proper remuneration for the service performed.

Question No. 70.—Give on the form following (omitted), under Tables "A" and "B," the data called for with respect to annual, term, and trip passes issued during the periods specified.

Question No. 71.—Give on Form No. 43, as required by headings and instructions thereon, information regarding service performed by the respondent in handling over its lines private cars for other than its own officials and employees during the year ended June 30, 1913.

Question No. 72.—Give on Form No. 44 (a), as required by headings and instructions thereon, a statement of unproductive expenditures for permanent improvements made by the respondent either voluntarily or in compliance with governmental requirements during the period July, 1898, to June, 1913; on Form No. 44 (b) a statement of unproductive expenditures other than for permanent improvements during the same period; and on Form No. 45 a recapitulation of the data reported on Forms Nos. 44 (a) and 44 (b).

Question No. 73.—Give on Form No. 46, as required by headings and instructions thereon, information regarding charges to the various accounts of the respondent for depreciation of equipment for the fiscal years ended June 30, 1908, to June 30, 1913, inclusive.

Question No. 74.—Give on Form No. 47, as required by headings and instructions thereon, information regarding charges to the accounts of the respondent covering equipment renewals on account of equipment retired or otherwise disposed of for the respective fiscal years ended June 30, 1908, to June 30, 1913, inclusive.

Question No. 75.—Give on Form No. 48, as required by headings and instructions thereon, a list of directors, officers, and employees in the service of the respondent who received during the year ended June 30, 1913, salaries or other remuneration for services rendered amounting to \$10,000 or over, and the amounts of such salaries or remuneration received by each.

Question No. 76.—Give on Form No. 49, as required by headings and instructions thereon, a descriptive list of all items charged by the respondent company to accounts entitled "Other expenses" (Classification of Operating Expenses) during the period July 1, 1907, to December 1, 1913.

Question No. 77.—Give on Form No. 50, as required by headings and instructions thereon, information regarding payments made by the respondent company for influencing legislation, assisting political campaigns, special legal service, entertainment of public officials, and for influencing public opinion through the press, during the period July 1, 1907, to December 1, 1913.

Question No. 78.—Give on Form No. 51, as required by headings and instructions thereon, information regarding expenditures made or incurred by the respondent during the period July 1, 1908, to the date of filing response, for the purpose of securing publicity in relation to the need of higher rates for transportation service.

Freight Car Maintenance Record, 1902-1912-1913.

NAME OF ROAD	Year.	Density of Traffic		Maintenance of Freight Train Cars Per Mile and Per Ton Mile								Main-tenance Per Ton Mile (Mills)	In-crease Per Cent over 1902
		Average Number of Tons of Revenue Freight Handled Over Each Mile of Road	Increase Per Cent over 1902	Per Car Mile			Average No. Tons of Revenue Freight Per		Average Capacity of Freight Cars in Service Tons	Average No. of Tons of Revenue Freight per Loaded Car Mile			
				Number of Car Miles	Total Ex-pense	Per Mile Run (Cts.)	Train Load	Increase Per cent over 1902					
Atchison, Topeka & S. F.	1902	585,683		293,199,525	\$1,645,305	.561	243.45		25.11	13.81	.583		
	1912	715,297	22.13	540,998,814	4,210,975	.770	326.44	34.09	32.98	14.62	.748	28.30	
	1913	762,668	30.22	568,691,159	5,141,551	.904	350.36	43.91	34.10	15.55	.820	40.65	
Atlantic Coast Line.....	1902	240,744		63,448,345	366,925	.578	165.50		23.62	10.20	.844		
	1912	403,473	67.59	214,832,531	2,231,853	1.030	210.44	27.06	28.95	12.77	1.223	44.90	
	1913	441,647	83.45	229,048,793	2,618,475	1.143	224.13	35.42	29.27	13.19	1.286	52.37	
Baltimore & Ohio.....	1902	2,321,316		558,288,733	2,708,791	.485	406.53		31.72	20.14	.361		
	1912	2,803,648	20.82	816,810,525	7,566,655	.920	554.67	36.44	40.10	23.36	.606	67.86	
	1913	3,211,865	38.36	856,581,519	7,890,822	.921	619.97	52.50	41.16	25.41	.551	52.63	
Boston & Maine.....	1902	715,234		176,436,081	1,036,971	.588	201.41		21.11	11.83	.640		
	1912	1,096,591	53.30	230,111,341	2,443,351	1.061	264.87	31.51	29.98	14.86	.993	55.15	
	1913	1,208,513	68.96	237,369,834	3,164,698	1.330	291.56	44.76	30.36	15.70	1.163	81.72	
Central R. R. of N. J....	1902	1,897,481		95,061,296	782,449	.823	439.50		28.58	22.47	.593		
	1912	3,301,764	74.06	134,712,515	1,879,733	1.390	513.78	16.90	37.29	27.17	.850	43.34	
	1913	3,671,643	93.50	147,688,543	2,121,891	1.437	547.20	24.50	38.40	27.91	.855	44.18	
Chesapeake & Ohio.....	1902	1,973,762		202,970,716	1,414,564	.697	509.35		31.99	23.72	.443		
	1912	2,957,056	44.75	349,709,635	3,508,198	1.003	756.46	48.51	43.57	30.34	.524	18.30	
	1913	2,886,968	46.32	547,915,093	3,842,350	1.104	843.50	65.60	43.88	29.77	.574	29.59	
Chicago & Alton.....	1902	981,629		74,857,227	271,834	.363	315.96		30.97	17.65	.301		
	1912	1,576,270	60.59	120,416,023	1,286,355	1.060	423.63	34.07	39.92	21.19	.796	164.45	
	1913	1,722,975	75.95	121,907,874	1,366,989	1.121	483.20	52.93	40.29	22.34	.773	129.66	
Chicago & N. W.....	1902	710,231		371,643,552	1,567,375	.442	267.13		25.87	15.55	.381		
	1912	654,882	77.79	469,080,969	3,764,638	.820	298.94	11.91	34.15	16.87	.731	91.86	
	1913	787,902	11.21	512,353,041	5,061,122	.979	347.97	30.25	34.99	18.38	.798	108.66	
Chicago, Bur. & Q.....	1902	499,948		428,655,946	3,030,225	.707	220.52		24.83	13.02	.763		

NAME OF ROAD	Year.	Density of Traffic		Maintenance of Freight Train Cars Per Mile and Per Ton Mile								Main-tenance per Ton Mile (Mills)	In-crease Per Cent over 1902
		Average Number of Tons of Revenue Freight Handled Over Each Mile of Road		Per Car Mile			Average No. Tons of Revenue Freight Per		Average Capacity of Freight Cars in Service Tons	Average No. of Tons of Revenue Freight per Loaded Car Mile			
			Increase Per Cent Over 1902	Number of Car Miles	Total Ex-pense	Per Mile Run (Cts.)	Train Load	Increase Per cent over 1902					
Chicago, Mil. & St. P....	1912	845,900	69.19	620,437,626	6,596,016	1.060	437.75	98.51	37.87	18.20	.859	12.59	
	1913	965,083	93.03	671,763,107	7,884,874	1.174	483.83	179.40	38.85	19.10	.897	17.55	
	1902	590,696		420,277,310	1,470,898	.350	249.91		25.29	13.34	.369		
	1912	679,745	15.07	487,790,022	4,068,407	.830	288.16	15.30	31.20	14.80	.797	115.98	
Chicago, Rock Isl. & P..	1913	772,495	30.77	631,636,841	5,527,861	.875	346.95	38.75	34.00	16.40	.744	102.18	
	1902	468,773		219,358,307	997,738	.455	184.06		24.15	11.93	.541		
	1912	582,893	24.34	423,662,004	2,640,482	.620	276.87	50.42	35.67	15.14	.599	10.72	
Del., Lackawanna & W..	1913	656,012	39.94	451,097,334	3,345,747	.742	294.98	60.26	36.41	15.67	.674	24.58	
	1902	2,681,602		167,998,966	1,115,498	.664	374.69		26.37	18.57	.521		
	1912	3,819,443	42.43	248,063,028	2,466,770	.990	574.05	53.21	33.09	21.79	.683	31.09	
Erie	1913	4,466,173	66.55	269,830,593	2,717,981	1.007	641.22	71.40	33.59	22.97	.635	21.88	
	1902	2,189,141		353,260,984	1,492,261	.422	380.63		26.71	17.01	.361		
	1912	2,955,855	35.02	421,495,395	3,714,410	.880	533.39	40.13	38.67	20.21	.632	75.06	
Great Northern	1913	3,351,101	53.07	431,464,229	4,371,792	1.013	595.55	56.46	39.16	21.47	.656	81.72	
	1902	551,997		198,530,301	694,786	.350	389.55		27.90	15.12	.303		
	1912	845,317	53.14	403,338,012	3,191,057	.790	601.11	74.84	36.34	21.94	.512	68.97	
Illinois Central	1913	993,445	79.97	483,773,780	3,668,216	.758	634.62	62.91	37.05	23.02	.481	67.96	
	1902	1,041,121		394,703,470	2,416,494	.612	274.74		30.85	14.88	.543		
	1912	1,303,979	25.24	504,801,568	6,149,775	1.210	356.09	29.62	39.22	17.94	.990	82.32	
Lehigh Valley	1913	1,550,646	48.94	558,024,325	6,736,995	1.207	407.04	48.16	39.89	19.26	.912	67.95	
	1902	2,464,523		261,230,017	2,176,689	.833	466.83		29.07	19.42	.637		
	1912	3,321,310	34.71	312,495,229	3,110,691	.990	558.55	19.65	36.41	22.84	.650	2.04	
†Minneapolis & St. Louis.	1913	4,005,862	62.54	354,292,205	3,852,327	.933	542.22	26.88	36.38	24.42	.663	4.08	
	1902	318,639		18,044,834	106,146	.588	255.77		24.41	13.61	.519		
	1912	385,458	20.97	42,108,927	348,369	.820	257.49	.67	30.83	17.10	.693	33.52	
New York Cent. & H. R..	1913	571,209	79.26	66,962,632	450,511	.834	304.99	19.20	31.10	18.12	.497	†4.29	
	1902	1,939,620		636,686,542	2,646,614	.416	341.56		27.75	14.79	.413		
	1912	2,700,620	39.24	852,270,024	7,009,586	.850	438.70	28.44	37.30	17.16	.725	75.59	
*N. Y., New Haven & H.	1913	3,038,779	56.66	935,270,777	8,591,294	.919	497.84	45.75	37.98	18.25	.759	83.77	
	1902	712,532		180,735,707	1,582,258	.875	217.58		23.56	10.65	1.095		
	1912	1,157,251	62.41	221,009,677	2,625,884	1.180	291.75	34.13	32.51	15.52	1.121	2.37	
Norfolk & Western:.....	1902	1,879,494		220,591,244	1,324,746	.601	475.73		30.25	22.45	.420		
	1912	3,994,718	112.54	447,470,755	3,965,240	.880	692.43	47.65	45.28	30.12	.494	17.60	
	1913	4,378,016	132.40	477,185,542	4,413,452	.925	763.84	60.56	46.54	30.57	.498	18.57	
Northern Pacific	1902	657,505		296,201,713	1,288,505	.435	346.37		27.41	15.34	.390		
	1912	838,358	29.03	353,231,274	2,943,956	.830	510.54	47.39	36.07	18.95	.583	49.48	
	1913	995,578	51.36	457,019,784	3,776,655	.863	541.62	56.37	36.79	19.74	.606	55.38	
Pennsylvania	1902	3,478,106		925,192,716	7,230,171	.834	501.54		32.79	21.86	.552		
	1912	5,101,095	46.66	1,211,549,240	13,618,996	1.120	676.20	34.82	45.34	26.83	.664	20.29	
	1913	5,658,605	62.69	1,294,903,304	15,818,468	1.222	700.80	39.73	46.12	27.63	.693	25.54	
Philadelphia & Reading..	1902	2,827,071		x	1,447,206	x	282.15		29.47	x	.509		
	1912	4,721,168	66.99	305,006,626	4,220,229	1.380	508.72	80.30	36.01	25.12	.881	73.08	
	1913	5,351,454	89.29	332,267,276	4,408,029	1.027	635.38	89.43	39.45	25.06	.807	58.56	
St. Louis & San Fran....	1902	516,173		150,717,536	807,726	.536	190.44		25.44	14.63	.560		
	1912	550,749	6.79	231,004,643	1,862,173	.800	262.28	37.72	37.41	16.24	.714	27.50	
	1913	633,906	22.81	255,304,440	2,194,851	.860	287.90	51.17	37.46	17.19	.730	30.36	
Southern Pacific	1902	725,599		298,193,035	1,908,677	.640	331.85		28.45	18.09	.570		
	1912	694,678	†4.26	364,418,996	3,238,760	.880	430.11	29.61	41.15	20.06	.751	31.76	
	1913	752,508	3.71	389,156,315	3,342,422	.859	431.12	32.93	42.16	17.78	.702	23.16	
Southern Railway	1902	397,162		268,434,521	2,556,408	.952	188.37		x	13.55	.954		
	1912	593,506	46.92	416,594,280	4,315,240	1.030	250.04	32.74	35.72	14.53	1.026	7.54	
	1913	650,617	63.82	433,077,985	4,987,978	1.152	259.52	37.77	36.16	14.86	1.090	14.26	
Toledo, St. L. & W.....	1902	794,031		33,144,728	123,737	.373	285.59		25.76	14.84	.346		
	1912	1,318,951	66.11	47,375,724	262,136	.540	412.30	44.37	32.24	17.83	.441	27.45	
	1913	1,581,630	99.12	51,923,095	235,535	.454	456.06	59.69	31.73	18.91	.331	†4.33	
Union Pacific	1902	663,301		191,062,792	883,380	.462	318.99		27.98	14.62	.445		
	1912	980,604	49.19	295,482,157	1,601,814	.540	410.51	28.38	40.52	16.08	.463	4.04	
	1913	1,093,158	64.80	315,776,274	1,565,777	.496	441.89	38.53	41.54	16.83	.401	†9.89	
Wabash	1902	798,771		180,436,420	732,376	.406	284.66		29.62	15.01	.376		
	1912	1,243,703	55.70	254,231,086	1,792,382	.706	357.75	25.68	36.34	17.70	.573	52.39	
	1913	1,480,374	83.34	278,877,776	1,745,719	.626	395.33	38.89	37.60	18.83	.469	24.73	
Average	1902					.569	310.94		†27.43	16.02	.521		
	1912					.918	426.21		36.61	19.61	.725		
	1913					.967	467.30		37.51	20.58	.716		
Increase % over 1902.	1912		41.67			61.3		37.10	33.16	22.41		39.15	
	1913		63.26			69.9		50.28	36.75	28.46		37.43	

*1913 figures not yet filed.

†28 roads.

xNo data shown for 1902.

†Decrease.

Railway Construction in 1913.

According to official information received by us up to the hour of going to press, there were 2873.90 miles of new main line and branch track built in the United States during the year 1913. This is not complete as several roads are yet to be heard from; and it is impossible to get everything so close to the end of the year. According to our revised and complete report for 1912 (published February 15, 1913) there were 3703.81 miles built in the United States in 1912. In 1911 there were built 3695.46 miles; in 1910, 4955.63 miles; and in 1909, 4140.52. Making allowances for additional mileage yet to be reported it is evident that the record for 1913 is the lowest for five years.

In Canada our record shows new mileage laid in 1913 to have been 2565.26. In 1912 it was 2315.46 miles; in 1911, 1905.62 miles; in 1910, 1894.79 miles; in 1909, 588.47 miles.

We also have received reports of the laying of 2598.10 miles of auxiliary track in the United States in 1913, and 381.16 miles in Canada. This mileage includes second, third and fourth track, sidings, spurs, yards, etc., which while not appearing in mileage reports is just as much an addition to the railway facilities of the country. As some roads have not yet made up their 1913 figures, their total will probably be considerably increased later.

The record by states and in detail is as follows:

NEW TRACK RECORD BY STATES FOR 1913.

Alabama	105.19	Nebraska	30.89
Arkansas	203.49	Nevada	9.15
Arizona	17.24	New Jersey	1.20
California	127.43	New Mexico	12.93
Colorado	53.10	North Carolina	126.59
Florida	92.61	North Dakota	138.68
Georgia	120.40	Ohio .....	.65
Idaho	16.50	Oklahoma	37.00
Illinois	59.76	Oregon	36.55
Indiana	8.96	Pennsylvania	24.29
Iowa	42.00	South Carolina	78.70
Kansas	40.83	Tennessee	57.02
Kentucky	62.50	Texas	436.85
Louisiana	57.35	Utah	4.50
Maine	8.38	Virginia	41.54
Maryland	8.50	Washington	190.11
Massachusetts	8.20	West Virginia	32.36
Michigan	45.71	Wisconsin	20.35
Minnesota	11.57	Wyoming	55.54
Mississippi	45.50		
Missouri	31.75	Total in United States..	2873.90
Montana	372.63	Total in Canada.....	2565.26

Alabama.

Alabama & Northwestern—Vaugale to Sweetwater.....	8.00
Birmingham & Southwestern—Tallahassee to Eclectic....	14.00
Birmingham Ensley & Bessemer.....	8.00
Baskett Lumber & Mfg. Co.....	5.00
Birmingham Selma & Pensacola.....	4.00
Gulf Florida & Alabama—Local to Broughton.....	20.00
Kentucky Lumber Co., Sulligent.....	2.00
Louisville & Nashville—Athens to Tenn. Line.....	15.50
Mobile & Baldwin County	2.00
Mobile & Ohio—Mann to Damee	7.94
Montgomery & Chattanooga.....	7.00
Pierce Development Co., Bridgeport.....	5.00
St. Louis & San Francisco—Empire to Sipsey.....	4.75
Vredenburg Sawmill Co.....	12.00

Arkansas.

Ashley Drew & Northern	40.68
Black Mountain & Eastern	10.00
Butler County	10.50
Chicago Rock Island & Pacific—(Malvern & Camden)..	54.81
Kentark Land & Timber Co., Hunnaker	3.00
Kansas City & Memphis	6.00

G. B. Lambert Co.—Elaine.....	7.50
Memphis Dallas & Gulf—Murfreesboro to Hot Springs..	22.00
Missouri Pacific—Marianna to Bridge Junction.....	46.50
Pine Bluff, Sheridan & Southern.....	1.00
Warren Johnsville & Saline River.....	2.00

Arizona.

Arizona Eastern	2.94
El Paso & Southwestern—Lewis Springs to Ft. Huachuca	14.30

California.

Atchison, Topeka & Santa Fe—Minkler Southern Cut- ler to Minkler (17 M. Cutler to Exeter 18 M.)... 35.00	
Southern Pacific—Central Pacific, Fernley-Lassen Branch 48,962 M. Colusa & Hamilton 28.853 M.....	82.43
Trona	10.00

Colorado.

Denver & Salt Lake—Steamboat Springs to Craig.....	40.60
San Luis Central	12.50

Florida

Atlantic Coast Line—Archer to Morristown.....	20.00
Bagdad Land & Lumber Co.....	4.00
Charlotte Harbor & Northern	4.00
Deep Lake Co., Everglade to Allen's River.....	2.50
Gulf Florida and Alabama—West Pensacola to Goulding.	2.50
Florida East Coast—Kissimmee Valley Div.....	15.00
Madison Southern	1.75
St. Petersburg & Gulf	8.00
Seaboard Air Line—Mulberry to Barton 8.42 M. Junction to Royster Mine 3.44 M.....	11.86
South Georgia—Perry to Hampton Springs.....	5.00
Tampa & Gulf Coast—Lake Fern to Tampa Northern Junc.	18.00

Georgia.

Atlantic Coast Line	2.00
Brinson	13.00
Elberton & Eastern—Elberton to Tignall.....	21.80
Georgia Coast & Piedmont	18.60
Green County	1.00
Hawkinsville & Western—Grovania to Perry.....	9.00
Ocala Southern—Fitzgerald to Rochelle	24.00
Pelham & Havana	4.00
Waycross & Western	21.00
Zickgraf Lumber Co.—Arcola to Black Creek.....	6.00

Idaho

Chicago Milwaukee & St. Paul	15.00
Nezperce & Idaho	1.50

Illinois

Chicago & Northwestern—St. L. P. & N. W. 46.74 M. Macoupin Co. 4.66.....	51.40
Chicago & Alton—Eldred Extension	6.36
Rock Island Southern.....	2.00

Indiana

Chicago, Terre Haute & Southeastern	2.23
Illinois Central—Extension S. of Bloomington.....	6.73

Iowa.

Cedar Rapids & Iowa City	15.00
Waterloo, Cedar Falls & Northern—La Porte City to Urbana	24.00
Chicago & Northwestern—Iowa Southern	3.00

Kansas.

Atchison, Topeka & Santa Fe—Dodge City & Cimarron Valley Moscow to Elkhart	40.83
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Kentucky.

Big Sandy & Kentucky River.....	9.50
Chesapeake & Ohio (Elkhorn & Beaver Valley Ry.)....	21.00

Kentucky Rock Castle & Cumberland—Heidelberg to Mc-	
Kee	9.00
Owingsville & Olympia	9.00
Rockcastle Lumber Co.—Martin Co.....	14.00
Louisiana.	
Alexandria & Western	14.00
Grant Timber & Mfg. Co.	4.00
Louisiana & Arkansas	10.00
Newell Lumber Co., Eunice	8.50
Oberlin Hampton & Eastern	5.00
Ouachita & Northwestern	2.60
St. Elmo, Belle Helene & Louisiana Eastern.....	4.25
Southern Ry. & Nav. Co.	3.00
Zwolle & Eastern—Blue Lake Junct. to Sanderson.....	6.00
Maine.	
Aroostook Valley—Carson to Caribou.....	7.13
Bangor & Aroostook	1.25
Maryland.	
Canton Co.	8.50
Massachusetts	
Boston & Maine	8.20
Michigan.	
Chicago Milwaukee & St. Paul.....	21.00
Detroit Terminal	4.21
East Jordan & Southern (in logging woods).....	6.00
Grand Trunk—Cass City—Bad Axe Line 13.25 m.; Bay City 1.25 m.	14.50
Minnesota.	
Minneapolis, St. Paul & Sault Ste. Marie—Iron Hub to Iron Mt. Mine 8.21 m.; Ironton to Riverton 3.36 m..	11.57
Mississippi.	
Batesville & Southwestern	2.00
Finkbine Lumber Co.....	8.50
Hand-Jordan Co., Purvis	6.00
Meridian & Memphis	29.00
Missouri.	
Butler County—Linstead to Broseley	9.25
Missouri Pacific	1.00
Shelby Northwestern	21.50
Montana.	
Chicago, Milwaukee & St. Paul	209.00
Great Northern—Plentywood to Scobey 44.65 m.; Montana Eastern Snowden to Sidney 18.70 m.; Power to Bynum 43.09 Great Falls & Teton Co. Ry.....	106.44
Minneapolis, St. Paul & Sault Ste. Marie—N. Dak. State line to Whitetail	57.19
Nebraska.	
Union Pacific—Gehring to West of Haig 8.43 m.; Hastings to Gibbon 26.46 m.....	30.89
Nevada.	
Southern Pacific—Central Pacific, Fernley-Lassen Branch.	9.15
New Jersey.	
Central Rd of N. J.	1.10
Pennsylvania Rd.—Change at Rahway .....	.10
New Mexico.	
El Paso & Southwestern—Whitewater to Tyrone.....	12.93
North Carolina.	
Black Mountain	18.00
Carolina & Yadkin River	16.00
Durham & South Carolina—(Bonsal to Duncan)	10.00
Elkin & Allegheny	3.00
Southern Aluminum Co.—Whitney.....	3.00
Norfolk Southern—Raleigh, Charlotte & So. Ry.—Raleigh to Silvaola 4.86 m.; Cumnock revision, 96 m.; Mt. Gilead to Charlotte, 51.77 m.....	57.59
Watauga & Yadkin River.....	15.00
Waynesville Lumber & Timber Co.....	4.00

North Dakota.

Great Northern—Mobile to Int. Boundary 18.69; Montana Eastern Ry. to Arnegard 30.40 m.....	49.09
Midland Continental—Homer to Wimbledon.....	26.00
Minneapolis, St. Paul & Sault Ste. Marie—Ambrose to Montana state line.....	28.59
Northern Pacific—Stanton to Orlando.....	35.00

Ohio.

Fairport, Painesville & Eastern.....	.65
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Oklahoma.

Cheyenne Short Line—Cheyenne to Strong City.....	7.50
Oklahoma New Mexico & Pacific.....	25.00
Pawhuska & North Eastern.....	3.50
Sand Springs	1.00

Oregon.

Booth-Kelly Lumber Co.....	2.00
Great Southern—Dufur to Tariend.....	11.00
Oregon-Washington Rd. & Nav. Co.....	4.10
Salem, Falls City & Western.....	1.24
Southern Pacific—Willamette Pacific from Eugene West, 18.155 m.; Oregon Eastern, Oakridge West, .055 m.	18.21

Pennsylvania.

Buffalo, Rochester & Pittsburg—Lucerne Jct. to Luciusboro	5.40
Johnstown & Stony Creek.....	1.75
Montour	4.00
New York Cent. & H. R.—Boardman Branch, 2.09 m.; Emigh Run, .32 m.....	2.41
Pennsylvania Rd.—Mt. Eagle Cut-off and Extension Hillman Branch, 5.99 m.; Bostoria Branch, 1.44 m.; Penna., Monon & Southern Rd., 2.39 m.; Apollo, Jeanette & Turtle Creek Branches, .91 m..	10.73

South Carolina.

Bamberg, Ehrhardt & Walterboro.....	14.00
Marion & Southern	6.00
Northwestern Rd. of So. Carolina.....	4.00
Orangeburg—Raymond to Orangeburg.....	7.70
South Carolina, Western—Lydia to Timmonsville, 15 m.; Florence to Poston, 32 m.....	47.00

Tennessee.

Carolina, Clinchfield & Ohio.....	3.20
Gulf, Texas & Western.....	17.35
Louisville & Nashville.....	8.02
Southern—(Knoxville)	5.35
Tennessee	6.50
Tennessee Western (L. & N.).....	16.60

Texas.

Burrs, Ferry, Browndell & Chester.....	3.25
Fidelity Lumber Co.....	10.00
Gulf, Texas & Western.....	17.35
Houston & Brazos Valley.....	3.50
Houston & Texas Central—Eureka to Stella, 9.5 m.; Stone City to Giddings, 39.27 m.....	46.77
Kansas City, Mexico & Orient of Texas.....	46.64
Lufkin, Hemphill & Gulf.....	10.00
Nacogdoches & Southeastern.....	2.20
Orange & Northeastern—Vinton to Orange.....	11.00
Paris & Mt. Pleasant—Bogata to Mt. Pleasant.....	27.00
Pecos & Northern Texas—(A. T. & S. F.) Lubbock to Texico.....	87.30
Quanah, Acme & Pacific.....	42.00
San Antonio, Fredericksburg & Northern.....	25.00
San Antonio, Uvalde & Gulf—Pleasanton to Mathis..	77.00
San Benito & Rio Grande Valley—Lomita to Monte Christo	21.34
Scholten Bros. Cedar Co.....	6.50

Utah.

Denver & Rio Grande—Increase acc't of new construction Soldier Summit to Detour.....	4.50
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Virginia.		Canada.	
Lyndhurst Lumber Corporation—Lipscomb.....	6.00	Algoma Central & Hudson Bay	48.49
Mill Creek-Hotchkiss to Wilderness.....	12.00	Canadian Northern Ontario—Bet. Montreal and Hawkes-	
Norfolk & Western	12.82	bury, Que., 10 M. Ottawa to Capreol, Ont., 120 M.	
Southern	2.72	Ruel to Port Arthur, Ont., 406 M. Sydenham to Otta-	
Virginia Carolina.....	8.00	wa, Ont., 54 M.	590.00
Washington.		Canadian Northern	501.00
Chicago, Milwaukee & St. Paul.....	48.00	Canadian Pacific—Eastern Lines: Interprovincial &	
Great Northern—Wenatchee to Orville.....	111.65	James Bay Ry., Lumsderis Mills to Opemican, 10	
Meskill & Columbia River.....	2.50	M.; Campbellford Lake Ontario & Western Ry.,	
Northern Pacific—Tocomo to Tenino.....	11.21	Glen Fay to Agincourt 182.65.....	192.65
North Yakima & Valley.....	1.95	Canadian Pacific—Western Lines: Snowflake West 10 M.	
Oregon-Washington Rd. & Nav. Co.....	14.80	Virden-McAuley 23 M. Estevan N. W. 47 M. Boisse-	
West Virginia.		vain-Lauder 35 M. Kerrobert N. E. 22 M. Swift Cur-	
Chesapeake & Ohio (8.6 m. up Spruce Fork; 3 m.		rent-Bassano 60.8 M. Weyburn Stirling 162 M. Suf-	
Gauley & Meadow River Ry.; 7.8 m. Logan &		field S. W. 32.3 M. Gleichen-Shepard 25 M. Alberta	
South)	19.40	Central 40 M. Lacombe East 8 M. Kootenay Central	
George Craig & Sou., Winterburn.....	2.00	19.7 M. Whitewater-Kaslo 16 M.....	504.60
Norfolk & Western	3.96	Great Northern. V. V. & E. Ry. & Nav. Co.—Kilgard to	
Twin Mountain & Potomac—Barkville to Twin Mt..	7.00	Lewis Landing	5.05
Wisconsin.		Grand Trunk Pacific	564.00
Chicago, St. Paul, Minn. & Omaha—Kaiser to Park Falls	6.00	Intercolonial, Georges River to Sydney Mines	8.80
Fairchild & Northeastern (Strader to Allen).....	11.00	Northern Pacific, Midland Ry. of Manitoba, Winnipeg	
Wisconsin & Northern .....	.35	Terminals	6.40
Wisconsin-Northwestern (logging branches).....	3.00	Pacific Great Eastern.....	18.00
Wyoming.		Temiskaming & Northern—Elk Lake Branch 28.54 M.;	
Chicago, Burlington & Quincy (Power River to Cas-		Iroquois Falls Branch 7.25 M.....	35.79
per)	53.00	Transcontinental-Quebec 88.26 M.; Manitoba 2.22 M....	90.48
Union Pacific—Lion Junction to Lion.....	2.54	Total for Canada	2,565.26

Auxiliary Track Built in 1913

Second, Third, Fourth, Sidings, Spurs, Yards, etc.

We have received official information of the building of the following track in 1913, which is not main line but auxiliary:

Alabama & Northwestern.....	.57	Canadian Pacific—Eastern Lines—Second track, Agin-	
Arizona Eastern	5.58	court to Leaside Jct., 12.7 m.; Islington to Guelph	
Atchison, Topeka & Santa Fe—Second track, Cactus to		Jct., 29.2 m.; Lake Superior Division, 69.9 m.....	111.80
Flagstaff, Ariz., 43.3 m.; Ash Fork to Yampi, 49.61		Canadian Pacific—Western Lines—Second track, Ber-	
m.; Colorado River to Needles, 11.49 m.; Summit to		gen N. E., 20 m.; Kennay-Virden, 35 m.; White-	
Cayon, 12.64 m.; Calwo to Fresno, 3.25 m.....	120.29	wood-Grenfell, 8 m.; Indian Head-Regina, 21.6 m.;	
Atlanta & West Point.....	1.78	Regina-Pasqua, 12 m.; Caron-Java, 66.7 m.; Ruby	
Atlantic Southern	5.00	Creek-Hammond, 59 m.	238.30
Augusta Southern .....	.15	Carolina, Clinchfield & Ohio.....	5.00
Baltimore & Ohio—Second track Penna., 2:003 m.; N.		Central of Georgia.....	12.97
Y., 1.66 m.; Ohio, 3.08 m.; Indiana, 12 m.; Third		Central Rd. of New Jersey—Second track, 1.10 m.;	
track, West Va., 4.64 m.; Penna., 6.70 m.;.....	18.26	sidings, yards, etc., 53 m.....	54.10
Baltimore & Ohio Chicago Terminal.....	2.50	Charleston & Western Carolina.....	5.30
Bangor & Aroostook.....	1.93	Chesapeake & Ohio—Side and yard track.....	27.50
Bauxite & Northern.....	.25	Chicago & Alton.....	24.61
Bessemer & Lake Erie, Second track.....	2.06	Chicago & Northwestern—Second track, 1.03 in Illi-	
Big Sandy & Kentucky River.....	.25	nois, .61 in Wis. Third track, .32 in Ill.; Sidings,	
Bingham & Garfield.....	6.23	67.09	69.05
Birmingham & Northwestern.....	.50	Chicago & Eastern Illinois.....	23.40
Birmingham, Columbus & St. Andrews.....	.27	Chicago, Burlington & Quincy—Second track in Illi-	
Birmingham, Ensley & Bessemer.....	1.00	nois, 34.79 m.; in Wisconsin, 48.10 m.; in Missouri,	
Black Mountain	1.00	2.11 m.; total, 85 m. Third track in Illinois, 18.85 m.....	103.85
Booth-Kelly Lumber Co.....	1.00	Chicago, Indiana & Southern.....	8.40
Boston & Albany—Second track, .75 m.; Third track,		Chicago, Indianapolis & Louisville.....	5.00
2.4 m.; Sidings, etc., 2.66 m.....	5.81	Chicago Junction	4.40
Buffalo & Susquehanna.....	.45	Chicago, Milwaukee & St. Paul—Second track, Minn.,	
Buffalo Creek & Gauley.....	.19	40 m.; S. Dakota, 101 m.; Iowa, 150 m.; Third	
Buffalo, Rochester & Pittsburg—Second track, Roches-		track, Ill., 11 m.; Fourth track, Ill., 11 m.; Yards,	
ter to Scottsville, 12.09 m.; Yards, sidings, etc.,		sidings, etc. (Puget Sound Lines not included)...	438.50
24.92 m.	37.01	Chicago, St. Paul, Minneapolis & Omaha—Second track	
Cambria & Indiana.....	1.00	Northline to Knapp	30.29
		Chicago, Terre Haute & Southeastern.....	9.90
		Cleveland, Cincinnati, Chicago & St. Louis.....	3.55
		Crosbyton Southplains .....	.13

Cumberland Valley	14.30	Norfolk Southern	4.00
Dayton, Lebanon & Cincinnati.....	1.00	North Yakima & Valley.....	1.69
Delaware & Hudson.....	1.51	Northern Pacific	131.50
Delaware, Lackawanna & Western—Second track 1.45 m.; third track, 3.16 m.; sidings, etc., 11.49.....	16.10	Orangeburg	1.50
Denver & Rio Grande—Second track, 6.20 m.; sidings, 20.91 m.	20.91	Oshawa .....	.44
Detroit Terminal	4.09	Paris & Mt. Pleasant.....	5.00
Duluth & Iron Range.....	3.16	Pascagoula, Moss Point, Northern.....	.21
Elgin, Joliet & Eastern.....	23.93	Pennsylvania Rd.	79.65
Elkin & Allegheny.....	1.25	Pennsylvania Southern	2.00
Eureka & Nevada.....	.55	Philadelphia & Reading—Third track, 3.7 m.; fourth track, 6.6 m.; Sidings, yards, etc., 30.1 m.....	40.40
Fairport, Painesville & Eastern.....	.33	Philadelphia, Baltimore & Wilmington—Second track, .01 m.; Third track, 11.11 m.; Fourth track, .69 m.; Sidings, etc., 4.07 m.....	15.88
Galveston, Harrisburg & San Antonio.....	15.00	Quincy Western .....	.50
Great Falls & Teton County (Great Northern).....	4.60	Richmond Belt .....	.27
Great Northern—Second track, Congo to Wawina, Minn., 23.39 m.; Ardley to Still Creek, B. C., 7.12 m.	30.51	Rutland	1.00
Greenwich & Johnsonville.....	1.01	St. Joseph & Grand Island.....	.41
Gulf Florida & Alabama.....	3.00	St. Louis Southwestern—Second track, 15.3 m.; Sid- ings, etc., 7.41 m.....	22.71
Hocking Valley	18.70	Salem, Falls City & Western.....	.88
Houston & Texas Central.....	13.00	Salt Lake City & Ogden Ry.....	9.50
Houston, East & West Texas.....	7.90	San Benito & Rio Grande Valley.....	2.50
Iberia & Vermillionville.....	.50	San Luis Central.....	1.00
Illinois Central	28.73	San Pedro & Los Angeles.....	4.13
Illinois Southern .....	.93	Seaboard Air Line—Second track, Hamlet to Cognac	7.00
Indian Creek Valley.....	.50	Sioux City Terminal.....	.53
Indiana Harbor Belt.....	19.05	Southern Pacific—Second track, California, 39.212 m.; Oregon, .025 m.; Nevada, 38.761 m.; Sidings, yards, etc., 84.51 m.	162.51
Kansas City, Mexico & Orient (Kansas & Oklahoma)	.75	Southern Ry. in Mississippi.....	.95
Kansas City, Mexico & Orient of Texas.....	2.25	Spokane & Inland Empire.....	.25
Kansas City Terminal.....	13.50	Spokane International	2.39
Kishacoquillas Valley .....	.25	Spokane, Portland & Seattle.....	6.00
Lackawanna & Wyoming Valley.....	1.00	Sumpter Valley .....	.25
Lake Shore & Michigan Southern—Second track, Wagon Works to Alexandria, O.; 3.45 m.; Third track, Sandusky, O., 2.89 m.; Fourth track Madi- son to Saybrook, 10.02 m., Millbury, .75 m.; San- dusky, 2.41 m.; Amherst, 1.66 m.; Yards, sidings, etc.	112.11	Sunset Ry.—A. T. & S. F.....	4.99
Lake Superior Terminal & Transfer.....	.50	Susquehanna & New York.....	1.18
Lehigh & Hudson.....	.08	Tallulah Falls .....	.32
Live Oak, Perry & Gulf.....	4.90	Tampa & Gulf Coast.....	.25
Macon, Dublin & Savannah.....	5.00	Tavares & Gulf.....	.25
Marshall & East Texas.....	.58	Temiskaming & Northern	7.48
Meridian & Memphis.....	2.50	Tennessee & Cumberland River.....	.50
Michigan Central—Sidings, etc., in U. S., 14.82 m.; in Canada, 3.29 m.; Logging branches in U. S., 14.65 m.; Yards in U. S., 83.28 m.....	116.04	Texas & New Orleans.....	6.00
Minkler Southern	1.40	Texas, Oklahoma & Eastern.....	.62
Minneapolis & St. Louis.....	4.61	Toledo & Ohio Central.....	7.37
Mississippi Eastern .....	.07	Toledo, Peoria & Western.....	2.03
Mt. Hope Mineral.....	.41	Tonopah & Tide Water.....	.06
Nacozari .....	.37	Toronto, Hamilton & Buffalo—Second track, 5.9 m.; sidings, etc., 15 m.....	20.90
Nashville, Chattanooga & St. Louis—Second track, 9.3 m.; Sidings, etc., 12.83 m.....	22.13	Transcontinental	62.74
Natchez & Southern.....	.14	Uintah .....	.28
Natchez, Columbia & Mobile.....	1.50	Ulster & Delaware.....	5.95
New Brunswick Coal & Rd. Co.....	2.00	Union Rd.	5.40
New Jersey, Indiana & Illinois.....	.34	Union Pacific—Second track Julesburg to Pine Bluffs 61.98 m.; sidings, yards, etc., 25 m.....	86.98
New York Central & H. R.—Second track, Corning & Southern, 6.79 m.; Third track, Oscawana to Mon- trose, 1.92 m.; Rhinecliff to Barrytown, 5.70 m.; E. Syracuse to Syracuse Jct., 6.27 m.; Fourth track, Oscanawa to Montrose, 1.91 m.; Rhinecliff to Bar- rytown, 5.68 m.; Yards and sidings, 120 m.....	141.52	Ursina & North Fork.....	.28
New York, Penna. & Ohio.....	.20	Wabash	90.00
Niagara Junction .....	.81	Wabash-Pittsburg Terminal .....	.57
Norfolk & Western—Second track in Va., 51.19 m.; West Va., .33 m.; Ohio, .36 m.; Sidings, yards, etc., 50.75 m.	102.63	Warren & Ouachita.....	1.34
		Waterloo, Cedar Falls & Northern—Second track, 2 m.; Sidings, etc., 2 m.....	4.00
		Waupaca—Green Bay .....	.75
		West Side Belt (Pittsburg).....	1.96
		Wheeling Terminal .....	.18
		Wildwood & Delaware Bay Short Line.....	1.13
		Wrightsville & Tenille.....	.40
		Zanesville & Western.....	.36
		Total, United States	2,598.10 miles
		Total, Canada	381.16 miles

New Construction for 1914.

The Railway Review has official information of work contemplated, planned or already undertaken, for the year 1914, as stated below.

The Arizona Eastern R. R. will renew the rails on 27 miles of the Hayden division, complete a new office and store building in Phoenix, started last year, and complete the construction of a new water supply plant and pipe line, at Phoenix, started last year.

The Atchison, Topeka & Santa Fe Ry. will extend its block signal system over 125.57 miles of road.

The Atlantic Southern Ry., Geo. W. Coffin, general manager, at Atlantic, Iowa, contemplates establishing a station at Tennessee, four miles from Villisca, putting in one-half mile of side-track, erecting stock chute, coal sheds etc. It is also intended to reconstruct the Grant, Iowa, yard, and \$15,000 has been appropriated for this work. It will also build a new freight and passenger depot at Villisca, Iowa, at an approximate cost of \$6,000. During January ground will be broken for the erection of a machine shop and light plant at an approximate cost of \$10,000.

The Baltimore & Ohio R. R. has under way, to be completed during the year 10½ miles of road from Orleans Road to Magnolia and from Kessler's Curve to Little Cacapon, W. Va., and 0.6 mile of new line from Magnolia to Kessler's Curve, Md.

It is expected that interlocking plants will be installed at the following points, all of the work to be done by the company's forces: Green Spring, W. Va., electro-pneumatic, 50 levers; Little Cacapon, W. Va., electro-mechanical, 64 levers; Doe Gulley, W. Va., electro-mechanical, 64 levers; Fostoria, Ohio, power (2 plants), 150 levers; Deshler, Ohio, power, 50 levers; Magnolia, W. Va., electro-mechanical, 24 levers. New interlocking plants may also be built, at possibly 6 or 8 other points now tentatively under consideration.

The Baltimore & Ohio Chicago Terminal R. R. will probably elevate tracks on 1 mile of road, introduce automatic block signals on 2 miles of road, and build a double-track bascule bridge on the Whiting branch.

The Batesville & Southwestern R. R., Mr. Elliott Land, traffic manager, at Memphis, Tenn., will build 1½ miles of new main track, with a yard and sidings at Yorkona River, otherwise known as Crowder, Miss.

The Big Sandy & Kentucky River Ry., W. H. Dawkins, vice-president, at Ashland, Ky., will build 21 miles of main line track.

The Birmingham, Columbus & St. Andrews Ry., Mr. A. D. Campbell, receiver, at Chipley, Fla., will extend its line from the south end some 10 or 12 miles.

The Birmingham, Tuscaloosa Ry. & Utilities Co., Geo. I. Brown, general manager, Birmingham, Ala., expects to electrify its entire mileage and extend its line from Tuscaloosa to Bessemer, Ala., 45.5 miles. Surveys have recently been completed, with maximum grades of 0.7 per cent and maximum curvature of 4 degrees.

The Booth-Kelly Lumber Co., Eugene, Oregon, will build 8 miles of railway.

The Cairo & Kanawha Ry., Charleston, W. Va., may build three or four small bridges.

The Carolina, Clinchfield & Ohio Ry. will complete its Elkhorn extension by laying 31.6 miles of track. Five water stations, one coaling station and one turntable will be erected.

The Central of Georgia Ry. has under construction 24 miles of track in a gravity yard at Macon, Ga.

The Central R. R. of New Jersey, will continue operations on a considerable schedule of new work already under way.

The Chartiers Southern Ry. (address P. R. R. Station, Pittsburgh, Pa.), will build 18.65 miles of main track and 2 miles of sidings.

The Chesapeake & Ohio Ry. will erect, at Peru, Ind., a 24-lever electro-mechanical interlocking plant, at its crossing with the Wabash Ry.

The Chicago & Eastern Illinois R. R. has the following program of new construction: Truss span (230 ft.) and 82½ ft. plate girder span, at Clinton, Ind., to replace part of a bridge washed out by flood; shop buildings, at Oaklawn, Ill.; new truss spans at Rogers, Ind., to replace part of a bridge washed out by flood; now constructing, and expect to place in service, in 1914, 32.4 miles of double track automatic block signals between "VG" Tower at Villa Grove, Ill., and Sullivan, Ill.; now constructing a mechanical interlocking plant of 28 working levers at Princeton, Ind., to govern crossing of the C. & E. I. R. R. by the Southern Ry.

The Chicago & Northwestern Ry. has under way automatic block signal installation on 70 miles of road, from Fond du Lac, Wis., to Duck Creek, Wis., and from Missouri Valley to Sioux City, Ia., 76 miles. This work is scheduled for completion during the year.

The Chicago, Indianapolis & Louisville Ry. contemplates building a 24-lever interlocking plant at Haskells, Ind.

The Chicago, Milwaukee & St. Paul Ry. will install alternating current automatic block signals on 15 miles of road between Butte and Finlen, Mont., and place a crossing alarm bell at Lewistown, Mont.

The Cumberland Valley Ry. will erect an all-electric interlocking plant (24 levers) at the east end of Chambersbury yard, with necessary automatic signals to protect 3 miles of new double track road.

The Delaware & Hudson Co. will install block signals on 23 miles of road.

The Elgin, Joliet & Eastern Ry. has the following schedule of new construction: Side-track to new shaft at Bunsen Coal Co., near Westville, Ill., 4½ miles of track; 11.3 miles of slag ballast to be put in on main tracks; 48 miles new steel rail to lay, most of it of 100-lb. section; steel coal chute, 300 tons capacity, at E. Joliet; steel water tank, 200,000 gallons capacity at E. Joliet; steel water tank 100,000 gallons capacity at Lake Zurich; 267 sets steel switch ties to be laid.

The Elkin & Allegheny Ry., Elkin, N. C., will begin grading operations on new roadbed in the direction of Sparta. This will be heavy work, in the mountains, and probably not more than 3 or 4 miles will be completed during the year. In February, 1914, a mile of track will be laid beyond Veneer.

The Fairchild & Northeastern Ry., Fairchild, Wis., W. Foster, vice-president, will build 3½ miles of road, from Allen to Cleghorn, Wis.

The Fort Smith, Poteau & Western Ry., headquarters at Witteville, Okla., will place rock ballast on 1½ miles of track.

The Grand Trunk Ry. will install block signals on 2 miles of road at the Victoria Jubilee bridge.

The Gulf, Florida & Alabama Ry., Pensacola, Fla., will construct the following extension: 50 miles northward, from north end of present main line to a junction with the Southern Ry., with sidings, spurs, telephone system, way stations, etc., steel bridge and masonry substructure over the Alabama river; 1225-ft. shedded pier, 100 ft. wide, at Pensacola, Fla.; 1225 ft. coaling pier at Pensacola, Fla.; widen present pier from 44 ft. to 68 ft. and extend the same, full width, for 865 ft., Pensacola, Fla.; locomotive coaling station and engine house, Pensacola, Fla.; 600-car capacity yard at marine terminal, Pensacola, Fla.; yard and division facilities at junction with Southern Ry.; permanent passenger station and general offices at Pensacola, Fla.

The Intercolonial Ry., of Canada, has under way the following new construction: Nelson, N. B., to Derby Junction, diversion of line, 2.67 miles; St. Romauld, Quebec, to Chaudiere Junction, double tracking 3.75 miles; Pt. Tupper, N. S., to Sydney, N. S., grade revision 91 miles; Oxford Junction, N. S., to Painsec, N. B., double track, 73.7 miles; Halifax Ocean terminals; passenger station at Sussex, N. B.; automatic blocks from Halifax, N. S., to Windsor Junction, 13.9 miles; from Moncton, N. B., to Painsec Junction, 7.2 miles; from St. John, N. B., to Hampton, N. B., 22 miles. There is in contemplation for 1914, the construction of a line from North Sydney, N. S., to a point near Leitches Creek, 4.3 miles.

The Kansas, Oklahoma & Southwestern Ry., B. J. Dalton, chief engineer, Lawrence, Kans., has graded 32 miles of roadbed on a new project, but for the present the work has been suspended.

The Kansas City Terminal Ry. expects to install two electro-pneumatic interlocking plants at its new station in Kansas City, and equip 5 miles of double-track road with alternating current automatic block signals. There is also the following program of construction: First track, 3.0 miles; second track, 3.0 miles; third track, 0.7 mile; fourth track, 0.7 mile; fifth track, 0.4 mile; sixth track, 0.4 mile; seventh track, 0.1 mile; eighth track, 0.1 mile; coach and engine yard tracks, 2.0 miles; siding, yard tracks, etc., 0.5 mile; subway, at Ninth Street, Hardesty Avenue, East 12th Street, Fifteenth Street, Indiana Avenue, Southwest Boulevard, and West 12th Street; viaducts at Olive Street, The Pasco, Tracey Avenue, Forest Avenue, Harrison Street, Charlotte Street, Holmes Street, Main Street, Extension, Broadway, Pennsylvania Avenue, and St. Louis Avenue, Prospect and Troost Avenues; freight houses at Fifteenth Street and at Sheffield, Mo.; interlocking towers at Grand Avenue and Pennsylvania Avenue; engine house, 16 stalls, at Southwest boulevard; steam tunnel, 5 x 7 ft. inside, 3600 ft. long; 3800 ft. of concrete retaining wall, average height 21 ft., all at Kansas City, Mo.

The Lehigh & Hudson River Ry., Warwick, N. J., M. Rutherford, vice-president, will establish automatic block signals on its entire line. The work is now proceeding.

The Lehigh & New England R. R. will install automatic block signals on 4 miles of road and revise and enlarge its interlocking plant at Augusta, N. J. A power interlocking plant will be built at Catasauqua, Pa.

The Lehigh Valley R. R. will install automatic block signals (N. C. Motor, 3-position, upward) on 58.29 miles of single track, between Van Etten Junction and Geneva Junction, N. Y.; on 1.2 miles of double track between the same points; and on 16.72 miles of single track between Rochester and Honeoye Falls, N. Y. A 68-lever power interlocking plant will be built at South Wilkes-Barre, Pa.

The Louisville & Nashville R. R. will establish automatic block signals on 185.75 miles of road, from Covington to Corbin, Ky., and on 15 miles of road, from Maplewood to Brentwood, Tenn.

The Meridian & Memphis Ry., Meridian, Miss., will build 3 miles of track, with overhead crossings and terminal connections.

The Midland Continental R. R., H. Hurning, chief engineer, Jamestown, N. Dak., will build 140 miles of railroad.

The Mill Valley & Mt. Tamalpais Scenic Ry., Mill Valley, Cal., will extend its line $\frac{3}{4}$ mile.

The Missouri, Kansas & Texas Ry. has made estimates on block signals for 65 miles of road, to be installed this year.

The Montour R. R., Coraopolis, Pa., will complete a 34-mile extension and reconstruct several small bridges on its old line.

The Nashville, Chattanooga & St. Louis Ry., will build an

84-lever electric interlocking plant at Aulon, Tenn., near Memphis. The Illinois Central and Louisville & Nashville roads also are interested in the work.

The Natchez, Columbia & Mobile R. R., Norfield, Miss., will reduce grades and fill trestles, by steam shovel.

The New Brunswick Coal & R. R. Co. will construct 75 concrete culverts, two steel bridges and replace two existing bridges with arches, filling in the remainder of the openings.

The Alabama & Vicksburg R. R. will install block signals on about 40 miles of line.

The New York, Chicago & St. Louis R. R. will build a new roundhouse at Ft. Wayne, Ind.

The New York, Westchester & Boston Ry. has under consideration the construction of 8.4 miles of additional second track and six passenger stations.

The Norfolk & Portsmouth Belt R. R. will build $1\frac{1}{2}$ miles of sidings.

The Norfolk & Western Ry. contemplates building a branch 5.3 miles long, from Mile Post 25.56 up Jacobs fork and Cucumber creek, to reach coal operations.

The Orangeburg Ry., Orangeburg, S. C., will build depots at Raymond and Wolfton, S. C.; will fill in ten trestles and reduce grades to 1 per cent. A telephone system will be installed for dispatching trains. A passenger car and engine shed will be built at Orangeburg and a "Y" at North, S. C., and another at Orangeburg.

The Oregon Short Line R. R. will install block signals on 37 miles of road, double track, polarized; and a Type "F" interlocking plant (U. S. & S. Co.) at McCammon Idaho—11 levers, 8 working and 3 spare.

The Oregon-Washington R. R. & N. Co. has authorized and is now working on the following: single-track automatic block signals on 180 miles of road between Umatilla, Oregon and Spokane, Wash.; forty-seven-lever electro-pneumatic interlocking plant at Seattle, Wash., where the lines of this company cross those of the Northern Pacific and C., M. & P. S. railways; remodeling present 52-lever General Railway Signal Company's electric interlocking plant at the crossing of this company's line with the Northern Pacific at Spokane, Wash., capacity of the machine to be increased to 64 levers, to take care of additional tracks and a connection with the C. M. & St. P. Ry.; twenty-eight-lever mechanical interlocking plant at Centralia, Wash., where the lines of this company cross the Northern Pacific Ry.; twenty-four-lever electric interlocking plant at Black River Jct., Wash., where the lines of this company cross those of the C., M. & P. S. Ry.; all interlocking plants to be equipped with route and approach locking.

The Pawhuska & Northeastern Ry. will build 37 miles of road from Pawhuska, Okla., to Conly, Kans.

The Pennsylvania R. R. expects to complete the automatic signals on the Middle division, on the main line between New York and Pittsburgh, there still being 64 miles operated under manual block; and also the automatic signals between Philadelphia and Washington, there being about six miles still under manual block. Work is now progressing on the latter installation.

The Pine Bluff & Northern Ry., Little Rock, Ark., expects to begin building a line to Pine Bluff early in 1914. Litigation over a bridge across the Arkansas river, at Pine Bluff, has been closed in favor of the railroad company.

The Portland & Southeastern Ry., Portland, Ark., will rebuild 13 miles of road.

The Puget Sound & Willapa Harbor Ry., with office at Railway Exchange, Chicago, C. A. Goodnow, president, which is building 66 miles of road from Maytown to Raymond, Wash., expects to complete the line this year.

The Temple, Northwestern & Gulf Ry. expects to construct 35 miles of road, completing the line from Temple to Gatesville, Tex.

The Railway Supply Man's Point of View.

Railway Business.

Railway business is not conducted by railway men alone. A railway cannot be constructed, equipped or operated without calling in a thousand different lines of industry. If the business of the modern world is absolutely dependent upon railway transportation, the railway is equally dependent. It cannot exist without calling on nearly all other industries for supplies and upon all of them for business. With the first survey of the line, instruments and supplies are called into requisition, tools are required for breaking the ground; ties, rails—everything used must come from field, forest, mine and factory.

There is no such thing as independence. The solidarity of the world of industry is a fact; and the army of industry is one with various divisions, brigades, regiments and companies. The railway staff and line properly considered includes the supply force. An army, it is said, "travels on its belly." This is equally true of the railway system. It cannot turn a wheel without consuming natural products of the land, in all stages from the raw material to the most refined appliance. The railway cannot be considered therefore from any point of view independently of the great railway supply industry. If a new railway is pushed out into a wild and undeveloped country, the construction force must keep the line back of it open. A modern city cannot exist more than a very few days shut in upon itself and with all communication with the outside world sealed up. Even a few days brings suffering and death. Its water, its food, its fuel, are needed daily. The alimentation of the city is a continuing need which brooks no interruption. Just so with a railway; it must be fed daily and regularly. Should even its current supply of lubricating oil run out and no more be obtainable, the running of trains must stop. A coal miners' strike drives it to distant supplies; and should it become general, would stop all trains in a short time.

Very few lines of the supplies consumed by railways are in the nature of luxuries. Some could be struck off the storekeeper's list and yet the road be operated. The public demands comforts in travel which are not absolutely necessities of transportation; for men could be carried in cattle cars, and watered and fed from the troughs. But in modern life, luxuries have become necessities; and from a business standpoint, cannot be dispensed with. Of a multitude of things the railway company buys just as all other consumers buy. But there is a distinct and large line of materials, appliances and machinery which are distinctively railway supplies. The men who produce these either in their simplest natural form or in the most highly developed application, and who sell them to those who operate the railways, are in a very real sense a part of the general railway army of the world. They work for the railways just as much as those who are on the direct pay-roll; but, of course, receive their pay not in the form of wage, but of contract price.

As there is this actual solidarity of interest, there should also be mutuality accompanying it. Solidarity is a fact which no one can dispute or cut loose from. Mutuality, brotherhood, is sentiment; and can, either be cultivated or ignored. If there is such thing as fraternity among railway men, it may and should include the supply people who are working to the same general end, from a public and community standpoint.

That great good may come from co-operation of this sort, we firmly believe; and that there is a field for the cultivation of fairness and pulling together, we hope to evidence through this new department in a railway journal entitled "The Railway Supply Man's Point of View." It is not pretended that this is a wholly uncultivated field or that its cultivation is

going to revolutionize anybody or anything. But here is an intellectual exchange in which the buyer and the seller may meet as they do on the floors of the great mercantile exchanges. The Review offers right-of-way over its interchange tracks to all who build and operate the great network of arteries and veins of the land, whatever their special point of contact or angle of view.

The Railway Supply Man's Point of View.

By A. Box Car.

The railway supply man's point of view is a permanent department in this publication. A. Box Car is a real individual, with a wide acquaintance and a long experience in the railway supply business. The railway supply man's point of view is important and of interest to both the railway supply manufacturer and to railway officers. The fact that the railway supply man's point of view is to be discussed by a railway supply man who is actively engaged in the railway supply business should guarantee the value of what is said.—The Editor.

The railway supply man and the part he plays in modern railroading is little known and still less appreciated by the general public. The part that he is playing, that he has played in the development of modern transportation, is of tremendous importance. It is to him that the railroads put many of their questions and many of their problems, and it is from him that they get the answer, and an answer that is satisfactory.

Modern transportation stands second among the industries in the world. Railroads are an absolute necessity in modern civilization. They have often been referred to as "the arteries of life commercial." Certainly if modern transportation were paralyzed but for a few days its effect upon the inhabitants of the country at large would be felt almost immediately.

A part, and an important part, of the great industry of modern transportation is the manufacturing of equipment which makes possible this modern transportation. We do not pretend to know everything in regard to railroading, but as supply men we have our own point of view, and we believe that that point of view may be of value to that splendid and intelligent group of men who are managing our railroad systems. We know them better perhaps than they know themselves. We certainly appreciate them and what they are doing better than do the great outside world who do not come into the close contact with them that we do. We appreciate better than any one else their many problems and difficulties; we appreciate the ability with which they grapple and solve the questions of transportation; and we also appreciate their weaknesses and shortcomings. And while we are more tolerant with them because we are working with them so closely, yet we do have our own point of view, and we believe that our point of view is of value.

Possibly there is no better means of illustrating and explaining our point of view than to give in each issue our viewpoint as regards some certain and particular problem in railroad service, and to tell of some particular well known supply man whose life has been devoted to the solving for railroad officials of some particular problem of railway operation.

It is our desire to have communications, stories, hints, suggestions, reminiscences, questions, etc., from railway supply men and from railway men. Many railway men who bump up against the supply people constantly, can give interesting experiences and views. Experiences can be narrated impersonally, and many things which have never found their way into print, would be interesting and valuable.

The following subjects are suggestive and many of them exceedingly important:

Manufacturing by Railway Companies.

Patents, and the Respect Due Them.

Getting Around Patents.

Proposed Changes in Patent Laws.
 Proper Attention to Appliances in Service.
 Neglect of Records of Trial or Experimental Orders.
 Reciprocity in Favors.
 Magnitude of Business as Influencing Prices.
 Cost as Influenced by Irregularity of Business—Feast or Famine.
 Taking Chances on Delivery Dates.
 Guaranties.
 The Establishment Behind the Product.
 Can Railway Supplies be Operated as a "Side Line?"
 Manufacturing Plants; Attention Given to Bettering Condition of Employees, etc.
 Salesmanship—Courtesy and Bluff.
 Is Business Getting Onto the Merit Basis?
 Publicity Versus Gum Shoe.
 Exhibitions—their Value and their Limitations.
 Attitude of Supply Men Toward Restrictive and Unwise Railway Legislation.
 The Men Who Make the Things the Railways Must Have.
 The Current News of the Industry.
 The Buying Power of Railways, etc., etc.
 Best Methods in Publicity Work.
 Inspection Systems, Methods and Experiences.

These topics are only suggestive, and many others will occur to readers from time to time. We solicit articles and letters, brief or otherwise, pertaining to the subjects in which railway supply men are most interested.

Letters from Supply Men.

"I think the articles outlined in your program are very interesting and will be fruitful reading for all. The theme has been well thought out by your editorial department. The Railway Supply Man's Point of View is a subject of common discussion between most of the supply men, but much of it is possibly lacking in value for publication purposes. Nearly every concern or salesman that caters especially to railroads, maintains either in office or in mind, a photographic gallery of heroes; their tenure of office being governed by their purchasing power of his commodity.

"The world's trade has been conducted on the two fundamental principles of "buyer" and "seller." Their relations to one another may vary in different lines of industry a trifle, but their usefulness to the various industries which they represent is principally indicated in the sum total of their results. All rules have their exceptions, like pink eyed cats and two headed calves, but in the long run an accurate knowledge of your business, industry and integrity are just as effective in securing business in the railroad field as in any other." W.

"One of the best known and most powerful railway magnates of this country expressed a doubt as to the efficacy of railroad officers attending the mechanical conventions at Atlantic City. By chance, however, in visiting Atlantic City during the convention period, he became an eye witness to the magnificent display of railway appliances made by the supply firms. He saw and was conquered, immediately appreciating the enormous educational value of such exhibits and the possibilities of individual improvement by conversation with the army of supply men experts; he promptly wired for the attendance at Atlantic City of mechanical men on all the railroads under his jurisdiction.

"The railroad supply business is, unquestionably, a business of education. The highest price, the best informed, and the most successful men are selected by the manufacturers and supply houses to be their representatives. The investment in such high class representatives is expensive but at the same time it is a great benefit, both to the supply firms as well as to the railroads. A great many of the most successful men in railroading—men of the highest authority—have left the railroad service, attracted by the higher salaries of the supply business.

"The supply men can be very properly styled 'specialists.' They make a special study of the work they are engaged in

The busy railroad man has his time almost entirely occupied in routine duties and rendering decisions and finds it not only very economical but expeditious to discuss technical points with the railway supply representative, advanced understanding of the subject matter is thereby obtained for his own personal use and satisfaction in the least time possible." Mc.

"The new department, 'The Railway Supply Man's Point of View' ought to prove to be worth while and it undoubtedly will. Having been at both viewpoints, the railway man's and the supply man's, I am convinced that while there is no antagonism between the two kinds of occupation, nevertheless there are few rough spots which it may be well to smooth out and the new department which you are to start ought to be of very great assistance. There must always be two viewpoints one, that of the buyer and the other that of the seller. It is true also that it is just as important to have sellers as it is to have buyers; the one cannot exist without the other. No railroad is self-sustaining, therefore, if a road should find it to be impossible to buy because there were no sellers it would find itself in as bad a fix as one which had no funds with which to purchase.

"The continual effort of the seller to make his wares a little more attractive than those of his competitor, keeps him in close touch with the demands and with the progress of his competitors; the buyer usually recognizes these facts and feels obligated to himself and to his principals to keep thoroughly posted, even to the extent of seeking interviews with sellers rather than merely granting interviews to them.

"It appears to me that the two viewpoints may be described concisely as follows: The manufacturer endeavors to interpret the needs of those whom he expects may be his customers and then tries to meet those needs as fully as possible and in an attractive manner; the railroad interprets its own needs and then tries to get them filled as completely as possible. No doubt, it will be the object of the new department to enlarge upon these and other ideas, and it ought to be interesting and instructive." M.

Railway Service As a Training School for Railway Supply Business.

The art of salesmanship is a composite one; difficult to define and more difficult to teach. To an unusual extent it depends upon natural gifts and insight into character. Like the poet, the good salesman "is born, not made." To study the subject intelligently, one must follow the analytic rather than the synthetic method; that is, take some instance of success and try to ascertain what has contributed to it and what were its most important elements. Until within a few years students of law began and ended with text books and lectures. Now the best schools follow the case method. The reports of important cases are taken up and studied, and thus the principles of law as applied in typical decisions are learned. If it were possible to study the successful railway supply salesman in this way the results ought to be good provided the student has the natural adaptations fundamentally necessary.

But salesmanship is by no means the only qualification for success in the railway supply business. Nor will ability in shop management, in economical and efficient production, even when united with good salesmanship, insure permanent success. There is needed in the organization of a railway supply establishment, a practical knowledge of the field in which the product is to be used. There have been many failures because appliances and materials which looked good theoretically, were not adapted to the actual needs of service.

A little and true story will illustrate. When William Ewart, the inventor of the link-belt, or detachable drive chain, was a young man, he had such a natural inclination to mechanics that he declined the college course his father had planned for him, and proposed to become a machinist. His father sent him with a letter to his personal friend, the

elder Barney of the Barney & Smith Car Co., at Dayton. Mr. Barney perceiving that the young man had constructive ideas, advised him not to enter a machine shop but to go out in the field somewhere, where machinery was being used, and watch the practical experience with it with a view to ascertaining its defects and studying to remedy them. As a result, he went to work for a dealer in agricultural implements in Iowa. During the harvest season he noted that the farmers were compelled frequently to leave their machines in the field while they drove to town to buy lace leather to mend their belts. He set to work to devise a substitute for leather belts; and his original link-belt was the basis upon which a great industry was built.

A railway man who is observing, knows what is happening to track and equipment, and where the weak points are in railway operation. That knowledge is and ought to be invaluable when he enters the manufacturing field. Knowing what his appliances or material will have to meet, he ought to be able to save time, money and disagreeable experience in developing them in service. Moreover, as he comes in contact with railway men after he has got over on the other side of the fence, he is able to interchange experiences and ideas in a mutually helpful manner.

Not every man educated in railway work can adapt himself to the supply business. It is just as it is with college education—it cannot overcome all natural defects or lack of adaptability; but it is a tremendous advantage when added to the right natural foundation.

A considerable number of men who start in railway work eventually transfer to the supply field. Some go from high positions to high positions; and others from and to various grades. A little study of these men will be of interest and we are therefore beginning a series of portraits and brief sketches in this line.

ARTHUR L. HUMPHREY,

Vice-President and General Manager, Westinghouse Air Brake Co.

Everyone who knew A. L. Humphrey when he was in railway service, knew that the Westinghouse people had made no mistake when they prevailed upon him to take hold of the brakes; and certainly he made no mistake in going with

so great an establishment. One of the most gratifying things in life is to be in a congenial business, and one which is doing great things for humanity and making history. Mr. Humphrey is not only a practical man, but he is a clear thinker, a fluent writer, and a convincing speaker; with experience in legislative halls as well as in the roundhouse. He has held the throttle of material and intellectual locomotives; and he knew the advantages of a steady hand and absolutely reliable braking apparatus in all kinds of emergencies.

Born at Buffalo in 1860, he entered railway service at the early age of 14, as machinist apprentice on the Burlington & Missouri River Rd. Successively he was machinist, fireman, engineer and roundhouse foreman and division master mechanic, until in 1900 he became superintendent of motive power of the Colorado Midland of which George W. Ristine was president. Then he was successively superintendent of motive power of the Colorado & Southern and the Chicago & Alton—quitting the latter position to become western manager of the Westinghouse Air Brake Co., Aug. 1st, 1902. In June, 1905, he became general manager of the company and in 1909 was also made vice-president.

It has been his ambition to keep railway brake equipment up to the increasing demands of service and even to anticipate them. There is no standing still, no resting on past laurels in that concern. Its management is characterized by breadth of view and engineering achievement. Mr. Humphrey's whole active life had been spent in a west that was really "wild and woolly" in those days. He had to deal with tremendous grades and sharp curves and men who were not the easiest in the world to handle and "lick into shape." The school has been a good one for railway presidents and operating officials. Call the roll in the great east and learn where they won their first spurs! We shall see also that the qualities thus brought out and developed, have been invaluable in building up and maintaining railway manufacturing establishments.

C. E. LEE,

General Manager, Commercial Acetylene Railway Light & Signal Co.

There is nothing invidious or specially planned in the order of these brief sketches. Mr. Lee is a comparatively new arrival in the railway supply field; and after having been



A. L. Humphrey, Vice President and General Manager, Westinghouse Air Brake Co.



C. E. Lee, General Manager, Commercial Acetylene Railway Light & Signal Co.

hailed before state and federal commissions so much of the time during the last ten years of his railway connection, feels some relief in that respect. There is pending legislation, however, on signals and headlights which may tend to at least keep him in touch with the "rulers of the land." He always realized the obligations of the railroads to the supply men "for about everything worth while," and so when the time came that his railway experience could be utilized to advantage in the supply line he, like many another, listened to the winning song of the siren and guided his bark into new waters. He still wears the smile which wouldn't come off even on the carpet of public commissioners who "wanted to know, you know," and flashes signals of good cheer and safety first.

Mr. Lee's railway experience began at the age of 17 as a telegraph operator on the old Boston Clinton Fitchburg and New Bedford Rd. Things were in the making in those days on the New England railways, 36 years ago, but the brew was not as thick and turbulent as it has been in 1913. In 1879 he became train dispatcher on the Worcester, Nashua & Rochester and Boston & Maine roads. From this he rose to division superintendent, assistant general manager and finally general superintendent of the B. & M.; which position he resigned in September, 1912, to take his present position in the supply business.

Now his talk is of "the light that never fails," though when with old railway friends he recalls the "light of other days." The "distinctive flashlight" compels attention, especially when flashed by a man who was on the road so long.

L. T. CANFIELD,

Vice-President, Union Draft Gear Co., Chicago.

Canfield has a "point of view" and everyone who knows him knows that point. If any man ought to know he "ort to," for he has had enough to do with freight cars to wear out any man of less positive character. He knows that the draft-gear is the vital part of a car and he can trace every case of damage right to that nerve center. And if you don't believe if he can show you right on the cars in service, on a testing plant, with a model, or with only a pencil and a piece of paper. His experience as a car man was so long and intimate, that he is often called in as an expert, without any pay but "thank you!" to diagnose car troubles.

He is the original "car insurance" man and his policy is a Cardwell gear put right where the car "gets the axe." His obsession is the "relation of things" in a freight car and he can interlock cause and effect indissolubly if you give him half a chance. The railway man who gives that chance soon says, "Don't shoot! I'll come down!"

We stopped keeping tab on the number of Cardwell gears that have been applied, some time ago. They are "converting blows into pushes" all over the land—so that the Union draft gear has certainly "got into the push" all right.

Mr. Canfield entered railway service at the early age of 18, in 1879, in the shops of the Indianapolis, Cincinnati & Lafayette Rd., then he was in the Big Four shops in car work and from that locomotive fireman, car inspector and foreman. From 1889, for nine years, he was foreman and division master car builder of the Rock Island. Then for a year he was a supply man; and from 1899 until Dec. 31st, 1903, master car builder of the Delaware, Lackawanna & Western. So he knows what spring gear did and is doing and what friction gear means to railway net revenues. From January 1st to August 1st, 1903, he was with the Standard Railway Equipment Co. at New York; and from March, 1904, to April 17th, 1905, with the American Car & Foundry Co. at the Berwick, Pa., shops, in which place he superintended the building of the first all-steel passenger car in this country. From April, 1905, to February, 1908, he was with the same company in their foreign work, at Man-

chester, England, he superintended the building of steel passenger cars for the London Tube Lines—the first all steel passenger cars in that country; and at Naples, Italy, freight



L. T. Canfield, Vice President, Union Draft Gear Co.

equipment for the Italian State Railways. Returning to this country in 1908, he acted as salesman for the same company in connection with the New York office where he had considerable to do with business for the Government Panama Railroad. For a portion of 1909 he was employed by the Cast Iron Wheel Makers' Association investigating cast iron wheel failures. He left this situation to become vice-president of the Union Draft Gear Co.

Supply Trade News.

—**Mudge & Company**, Railway Exchange Bldg., Chicago, Ill., have announced the termination, effective January 1st, of their contract for the manufacture and sale of Garland ventilators and other Garland devices. Mr. Thomas H. Garland has resigned as vice-president of Mudge & Company and will devote his time to the manufacture, sale and improvement of the Garland ventilator as well as the other devices of which he is the inventor. Mr. George W. Bender, who has been general manager of Mudge & Company in charge of their manufacturing department, has also been placed in full charge of the sales department. Mr. Robert M. Smith, general sales manager, having resigned.

—**The Light Inspection Car Company**, Hagerstown, Ind., announces its reorganization under the name of the Teetor-Hartley Motor Co., effective January 1, 1914. The management remains the same.

—**Mr. W. A. Allen**, formerly with the Carnegie Steel Co., has been employed as commercial engineer for the R. D. Nuttall Company, Pittsburg, Pa. Mr. Allen's experience in the manufacture, selection and treatment of materials fits him for this important position. The R. D. Nuttall Company is a large manufacturer of gears, both for the railway field and industrial work.

—**The American Abrasive Metals Co.** were awarded a gold medal diploma for their Feralum safety treads, which are used extensively for anti-slip surfaces on steps, walks, etc., at the first International Exposition of Safety and Sanitation which was held recently in New York City.

—**Robert M. Smith**, formerly general sales manager of Mudge & Co., has opened a sales agency in New York City under his own name.

—**The Pittsburg Steel Products Co.**, Pittsburg, Pa., has opened a St. Louis office with A. F. McCoolle as manager of sales and C. F. Palmer as supervisor. The office is located at 1933 Railway Exchange building.

—**Frank M. Gilmore**, president of the E. D. E. Co., as stated in our issue of December 20, died at his home in Chicago on December 18. Mr. Gilmore was born in Boston in 1864 and had been a resident of Chicago since 1891. His railroad connections date back for a number of years, having been mechanical engineer of the Metropolitan West Side Elevated Ry. for several years, in the employ of A. Sorg, Jr., for three years, and of the H. W. Johns-Manville Co. for six years. He became president of the E. D. E. Company about two years ago.

Equipment and Structures.

Locomotives.

—The American R. R. of Porto Rico has ordered 4 consolidation (2-8-0-C) locomotives from the American Locomotive Co. These will have cylinders, 14 and 20x20 in.; driving wheels, 37 in., and a total weight in working order of 83,000 lbs.

—The Maine Central R. R. has ordered 4 consolidated (2-8-0), 3 mikado (2-8-2) and 3 Pacific (4-61-2) locomotives from the American Locomotive Co.

Freight Cars.

—The Union Pacific R. R. is expected to place orders this week for 5000 freight cars.

—The Grand Trunk Ry., it is said, has ordered 500 flat cars from the Pressed Steel Car Co. and 500 stock cars from the National Steel Car Co.

—The Florida East Coast Ry. is expected in the market for about 2000 ventilated box cars.

Passenger Cars.

—The Grand Trunk Ry., according to report, has ordered 50 passenger cars from the Canadian Car & Foundry Co., 5 mail cars from the Pressed Steel Car Co., 32 passenger cars from the Osgood-Bradley Car Co., 4 dining cars and 5 parlor cars from the Pullman Company and 10 baggage cars from the National Steel Car Co.

—The Chicago elevated lines have ordered 124 cars from the Cincinnati Car Co.

PERSONAL.

Horace R. McCormick has been appointed auditor of disbursements of the Philadelphia & Reading Ry., and other lines of the Reading Company, succeeding Josiah E. Price, retired from service.

Gordon Chambers has been appointed assistant real estate agent of the Reading Company and its subsidiaries, including the Philadelphia & Reading Ry.

B. C. Prince, assistant general freight agent of the Seaboard Air Line Ry., at Jacksonville, Fla., has been appointed assistant to vice-president, with office at Norfolk, Va., effective January 1.

M. Merryman has been appointed general storekeeper of the Western Maryland Ry., with office at Hagerstown, Md.

T. F. Lowry has been appointed superintendent of the Minnesota division of the Northern Pacific Ry., vice A. J. Sovereign, who has been granted an indefinite leave of absence, after 35 years of continuous service with the company.

F. R. Bartles has been appointed superintendent of the Fargo division of the Northern Pacific Ry., vice T. F. Lowry, transferred to Minnesota division.

T. H. Beacom, assistant general manager of the first district of the Chicago, Rock Island & Pacific Ry., at Des Moines, Iowa, has been appointed general manager of the third district, with headquarters at El Reno, Okla., succeeding C. W. Jones.

F. J. Easley, assistant general manager of the third district of the Chicago, Rock Island & Pacific Ry., has been appointed assistant general manager of the first district, with office at Des Moines, succeeding T. H. Beacom.

L. A. Lambert, formerly special accountant of the Baltimore & Ohio R. R., has been advanced to auditor of miscellaneous receipts and accounts.

J. P. O'Malley, formerly chief clerk to the auditor of merchandise receipts, Baltimore & Ohio R. R., has been appointed assistant of that department.

A. G. Whittington, former division superintendent of the International & Great Northern Ry., and since the death of Henry Martin, acting general manager, was, on Decem-



Frederic A. Delano, Recently Elected President of the Chicago, Indianapolis & Louisville Ry.

ber 29, elected second vice-president and general manager of the company, succeeding Mr. Martin.

S. Lorimer has been appointed general stationer of the St. Louis & San Francisco R. R., with headquarters at St. Louis, Mo., succeeding C. J. Windsor, resigned to engage in other business.

L. C. Gilman, assistant to president of the Great Northern Ry., has been elected president of the Spokane, Portland & Seattle Ry., also of the other lines of the North Bank system, to succeed Joseph H. Young, resigned.

Joseph Greene, for 25 years auditor of disbursements of the Pennsylvania Railroad, retired from active service on December 31, having been connected with the railroad for almost half a century.

G. E. Scott, assistant purchasing agent of the Missouri, Kansas & Texas Ry., has been appointed acting purchasing agent with office at St. Louis, Mo., succeeding G. A. Hickok, resigned.

W. C. Hurst, general superintendent of the Eastern district of the Pere Marquette R. R., has resigned to become vice-president and general manager of the Chicago, Peoria & St. Louis R. R., with headquarters at Springfield, Ill. Mr. Hurst was formerly general superintendent of the latter road.

John Howe Peyton, who has been assistant to the president and chief engineer of construction of the Louisville & Nashville R. R. for the past two years, has been elected president and general manager of the Nashville, Chattanooga & St. Louis Ry., to succeed the late John W. Thomas, Jr., as noted in our issue of last week. Mr. Peyton is of English descent and his ancestors settled in the eastern part of Virginia in the 17th century. His father's name was William Preston Peyton. During his boyhood his father was in very reduced circumstances, hence his educational advantages were limited to five years spent at Roanoke College, Salem, Va., where he took the ordinary academic course, but never had the technical engineering training. In 1881, when 17 years of age, he secured a position as a rodman on a corps of engineers under Gen. Gabriel C. Wharton, an old ex-Confederate general, and since that time he has devoted himself almost exclusively to engineering work. In 1897 he had an office in Charleston, W. Va., and was doing general engineering and contracting work. When war was declared

with Spain he closed up his office and took service in one of the volunteer regiments of engineers as a private. Mr. Peyton was with the regiment when it was engaged on the construction of the camp at Montauk Point, L. I. A few months later he was sent on a commission to the Philippine Islands by the bishops of the American Episcopal Church to secure information about the moral and religious conditions in our new possessions in the far East. In 1902 he entered the service of the Louisville & Nashville R. R. as a locating engineer and has remained with that company almost constantly since that date. In 1904 he became principal locating engineer and in 1907 he issued the first edition of The



John Howe Peyton, Who Has Been Elected President of the Louisville & Nashville R. R.

American Transportation Problem, dealing with a comparison between transportation facilities afforded by inland waterways and modern railroads. A second edition of this book was issued in the fall of 1909. In 1910 he became assistant to the president of the road and in 1912 became assistant to president and chief engineer of construction. During the past two years he has had charge of the construction of about 500 miles of railroad, all of which are low-grade lines—200 miles of which are double track. The double-track

line now being completed—between Nashville, Tenn., and Birmingham, Ala., is built in accordance with the most modern standards. For the 125 miles, extending from Nashville, Tenn., to Decatur, Ala., the maximum is four-tenths of one per cent, compensated for curvature, and the maximum curve is three degrees with the exception of three or four, four degree curves. For the reach of line from Decatur, Ala., to Birmingham, Ala., the maximum grade is five-tenths of one per cent, compensated for curvature. There will be only nine open span bridges between Nashville, Tenn., and Decatur, Ala., and only seven between Decatur and Birmingham, Ala. In the same reach of the old track of the L. & N., there were about 150 bridges of various types of trusses crossing waterways. A great majority of the streams are now provided for with arch culverts and nearly all grade crossings of public highway have been eliminated. The whole will be in operation by the end of May, 1914.

Robert Stevens Parsons, who has been appointed general manager of the Ohio grand division of the Erie Railroad, with headquarters at Cleveland, Ohio, as noted in our issue of December 20, was born at Hohokus, N. J. He graduated from Rutgers College, class of 1895, and in 1898 he received the degree of C. E. from Rutgers. Mr. Parsons entered railroad service in 1895 as a rodman with the Erie Railroad. He was subsequently assistant engineer, division engineer and engineer maintenance of way. In 1906 he was appointed assistant general superintendent, in 1907, superintendent of the Susquehanna division of the Erie, and in 1910, superintendent of the New York division. Mr. Parsons became general manager of the Erie Railroad, lines east, January, 1913. He assumed his new office at Cleveland on January 1. He is a member of the American Society of Civil Engineers.

Ind.

ENGINEERING.

W. F. Steffens, acting chief engineer of the Chesapeake & Ohio Ry., has resigned to accept service with another company.

R. L. Cooper has been appointed chief engineer of the Ft. Dodge, Des Moines & Southern R. R., with headquarters at Boone, Iowa. He was previously engineer of the Conn Construction Co.

W. K. Walker, general roadmaster of the Missouri Pacific Ry. at Wichita, Kan., has been appointed engineer in charge of the South Omaha improvements, including a new yard and a viaduct, which the company has under construction.

MECHANICAL.

R. C. Hyde has been appointed master mechanic of the Minnesota division of the Rock Island Lines, with headquarters at Manly, Iowa, vice F. W. Williams, resigned.

W. J. Eddy has been appointed master mechanic of the Louisiana division of the Rock Island Lines, with headquarters at El Dorado, Ark., vice R. C. Hyde, promoted.

W. F. Drysdale, mechanical engineer of the Northern Railway of Costa Rica at Limon, Costa Rica, has resigned to engage in other business.

F. J. Harper has been appointed traveling piece work supervisor of the St. Louis & San Francisco R. R., with headquarters at Springfield, Mo.

Cars and Locomotives Ordered in 1913.

Annual Report of Locomotives, Passenger and Freight Cars, Ordered or Built in the United States and Canada During the Past Year.

The Railway Review presents in this issue its annual tabular statement of railway rolling stock ordered during the year 1913. In comparison with the total number of cars and locomotives built during each of several recent years, it is evident that there has been a falling off in the number of freight cars ordered. Passenger car and locomotive building activities have likewise fallen somewhat short of the average for the past three or four years, although the slump is not nearly as marked as in the case of freight cars.

The preparation of figures such as we publish herewith, is a work of great magnitude. There is sometimes an incompre-

hensible aversion to giving information, both general and special; and there is more or less lack of accuracy in reporting. We get our information as far as possible from official sources; and of course use our best judgment in view of our experience in reconciling differences.

Our figures show that 3560 locomotives, 144,843 freight cars and 3212 passenger cars were ordered during 1913. In 1912 there were ordered 4782 locomotives, 239,900 freight cars and 3606 passenger cars.

In 1911 there were ordered 3036 locomotives; in 1910, 3976;

in 1909, 3350; in 1908, 1182; in 1907, 3482; in 1906, 5642; in 1905, 6265.

In 1912 orders were placed for 3606 passenger cars; in 1911, 281; in 1910, 135,911; in 1909, 185,445; in 1908, 62,669; in 1907, 3060; in 1910, 3497; in 1909, 3980; in 1908, 1319; in 1907, 1791; 151,711; in 1906, 310,615; and in 1905, 341,315.

FREIGHT CARS.

†Indicates 1914 delivery. *Indicates report not confirmed.

Purchaser	No.	Type	Capacity	Body	Underframe	Draft Rig.	Truck	Builder
Alabama & Vicksburg Ry.	1	Wk.-Tank	.....	Comp.	Steel	.....	.....	Company's Shops
Alden Speare's Sons Co.	1	Tank	100,000	Steel	Steel	.....	.....	American Car & Fy. Co.
Algoma Steel Corp.	19	Flat	100,000	Wood	Steel	Yost	Arch bar	Canadian Car & Fy. Co.
Aliquippa & Southern	20	Hopper	200,000	Steel	Steel	Friction	.....	Summers S. Car. Co.
Allis-Chalmers, Bullock, Ltd.	1	Lidgerwood	60,000	Wood	Wood	Miner T.	Arch bar	Canadian Car & Fy. Co.
American Agricultural Chem. Co.	10	Tank	100,000	Steel	Steel	.....	.....	American Car & Fy. Co.
American Brass Co.	1	Flat	100,000	Wood	Steel	.....	.....	Pressed S. Car Co.
American Molasses Co.	10	Tank	100,000	Steel	Steel	.....	.....	American Car & Fy. Co.
American Refining Co.	20	Tank	60,000	Wood	Steel	.....	.....	American Car & Fy. Co.
American Refrigerator Transit Co.	2003	Refrig.	60,000	Wood	Steel	Miner	.....	American Car & Fy. Co.
American Sheet & Tin Plate Co.	2	Flat	100,000	Steel	Steel	.....	.....	American Car & Fy. Co.
American Sugar Refining Co.	6	Box	80,000	Wood	Steel	.....	.....	American Car & Fy. Co.
Amsinck & Co., G.	6	Flat	40,000	Steel	Steel	McEwen	.....	American Car & Fy. Co.
Amsinck & Co., G.	6	Box	40,000	Wood	Steel	McEwen	.....	American Car & Fy. Co.
Anaconda Copper Min. Co.	†32	Dump	120,000	Steel	Steel	Friction	Arch bar	Fullman Co.
Ann Arbor.	2	Box	80,000	Wood	Steel	Farlow	Bettendorf	American Car & Fy. Co.
Antrim Iron Co.	20	Flat	60,000	Wood	Wood	Spring	Arch bar	Central Loco. & C. Wks.
Archer Daniels Linseed Co.	3	Tank	10,000g.	Steel	Steel	Friction	Arch bar	German-American Car
Arizona & New Mexico.	24	Box	100,000	Wood	Steel	Spring	Arch bar	American Car & Fy. Co.
Arizona & New Mexico.	6	Flat	80,000	Wood	Wood	Spring	Arch bar	Company's Shops
Arizona Eastern.	3	Tank	12,500g.	Steel	Steel	Spring	Vulcan	Pressed Steel Car Co.
Arizona Eastern.	100	Box	100,000	Wood	Steel	Spring	Vulcan	American C. & F. Co.
Arms Palace Horse Car Co.	12	Horse	60,000	Wood	Steel	Waugh	Bettendorf	Company's Shops
Ascension Red Cypress Co.	8	Log	50,000	Wood	Steel	Spring	Arch bar	Kilby Loco. & Mach.
Atchison, Topeka & Santa Fe.	50	Dump	80,000	Steel	Steel	Miner F.	.....	Western Wh. Scraper
Atchison, Topeka & Santa Fe.	900	Refrig.	60,000	Wood	Steel	Miner	Andrews	American Car & Fy. Co.
Atchison, Topeka & Santa Fe.	950	Automobile	80,000	Wood	Steel	Miner	Andrews	American Car & Fy. Co.
Atchison, Topeka & Santa Fe.	900	Gen. Serv.	100,000	Wood	Steel	Miner	Andrews	American Car & Fy. Co.
Atlanta & West Point	1	Caboose	.....	Wood	Wood	Spring	Arch bar	Company's Shops
Atlanta & West Point	6	Flat	60,000	Wood	Wood	Spring	Arch bar	Company's Shops
Atlanta & West Point	1	Flat	80,000	Wood	Wood	Spring	Arch bar	Company's Shops
Atlanta & West Point	10	Flat	80,000	Wood	Steel	Friction	Andrews	Company's Shops
Atlanta & West Point	1	Coal	80,000	Wood	Wood	Spring	Arch bar	Company's Shops
Atlanta, Birmingham & Atlantic	4	Caboose	.....	Wood	Wood	Spring	Arch bar	Georgia C. & Loco. Wks.
Atlantic Coast Line.	25	Phosphate	100,000	Steel	Steel	Far.-West.	Cast Stl.	Pressed S. Car. Co.
Atlantic Coast Line.	50	Ballast	100,000	Wood	Steel	Far.-West.	Arch bar	Rodger Bal. Car. Co.
Atlantic Coast Line.	925	Box	60,000	Wood	Steel	Far.-West.	Arch bar	Barney & Smith
Atlantic Coast Line.	300	Flat	80,000	Wood	Steel	Far.-West.	Arch bar	Barney & Smith
Atlantic Coast Line.	100	Automobile	60,000	Wood	Steel	Far.-West.	Arch bar	Barney & Smith
Atlantic Coast Line.	25	Caboose	.....	Wood	Wood	Spring	Arch bar	Company's Shops
Baltimore & Ohio	2122	Gondola	100,000	Steel	Steel	Friction	Buck.-And.	Cambria Steel Co.
Baltimore & Ohio	500	Hopper	100,000	Steel	Steel	Friction	Andrews	Pressed Steel Car Co.
Baltimore & Ohio	500	Hopper	100,000	Steel	Steel	Farlow	Buckeye	American Car & Fdy. Co.
Baltimore & Ohio	500	Hopper	100,000	Steel	Steel	Friction	Andrews	Standard Steel Car Co.
Baltimore & Ohio	500	Hopper	100,000	Steel	Steel	Friction	Buckeye	Cambria Steel Co.
Bangor & Aroostook	68	Hopper	60,000	Wood	Steel	Friction	.....	Middletown Car Co.
Bangor & Aroostook	13	Box	60,000	Wood	Steel	Friction	.....	Middletown Car Co.
Bear Creek Mill Co.	6	Log	60,000	Wood	Wood	.....	.....	American Car & Fdy. Co.
Berg Distilling Co., D.	1	Tank	60,000	Steel	Steel	.....	.....	American Car & Fdy. Co.
Berwind-White Coal Co.	100	Hopper	100,000	Steel	Steel	Friction	Arch bar	Cambria Steel Co.
Berwind-White Coal Co.	†100	Hopper	100,000	Steel	Steel	Friction	Arch bar	Cambria Steel Co.
Beth, Chili Iron Mines.	1	Flat	100,000	Wood	Steel	.....	.....	Pressed Steel Car Co.
Bethlehem Steel Co.	65	Coke	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Bethlehem Steel Co.	25	Flat	100,000	Wood	Steel	.....	.....	Pressed Steel Car Co.
Bingham & Garfield.	†25	Ore	120,000	Steel	Steel	Friction	.....	Pressed Steel Car Co.
Bingham & Garfield.	†25	Gondola	100,000	Steel	Steel	Friction	.....	Standard Steel Car Co.
Birmingham & Northwestern	7	Gondola	80,000	Wood	Wood	Spring	Arch bar	Central Loco. & C. Wks.
Birmingham & Northwestern	7	Flat	80,000	Wood	Wood	Spring	Arch bar	Central Loco. & C. Wks.
Birm., Col. & St. A.	4	Box	60,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Blackwood Coal & Coke	10	Hopper	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Borough Development Co.	30	Gondola	.....	Wood	Wood	.....	.....	Mt. Vernon C. Mfg. Co.
Boston & Albany.	20	Caboose	.....	Wood	Steel	.....	.....	Company's Shops
Boston & Maine.	†500	Box	60,000	Wood	Steel	Friction	Arch bar	Kelth Car & Mfg. Co.
Boston & Maine.	†500	Gondola	100,000	Steel	Steel	Friction	Arch bar	Pressed Steel Car Co.
Brinson Ry.	100	Flat	60,000	Wood	Wood	Spring	Steel	Georgia Car & Loco. Co.
Brinson Ry.	4	Stock	60,000	Wood	Wood	Spring	Steel	Georgia Car & Loco. Co.
Brown, W. Harry.	4	Coke	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Buffalo, Rochester & Pitts.	1000	Hopper	100,000	Steel	Steel	Spring	Andrews	Cambria Steel Co.
Buffalo, Rochester & Pitts.	5	Caboose	.....	Wood	Wood	Friction	Ped. Rigid	Company's Shops
Buffalo, Rochester & Pitts.	1	Caboose	.....	Comp.	Steel	Spring	Andrews	Company's Shops
Butler County.	10	Flat	80,000	Wood	Steel	Spring	Arch bar	American Car & Fdy. Co.
Butler County.	5	Box	80,000	Wood	Steel	Spring	Arch bar	American Car & Fdy. Co.
Byrd Matthews Lbr. Co.	15	Flat	60,000	Wood	Steel	Spring	Arch bar	Kilby Loco. & Mach. Co.
Camacho Roldan & Van S.	10	Stock	44,000	Wood	Steel	.....	.....	American Car & Fdy. Co.
Canadian Copper Co.	25	Flat	80,000	Steel	Steel	Spring	Simplex	Pressed Steel Car Co.
Canadian Copper Co.	25	Gondola	100,000	Steel	Steel	Spring	Simplex	Hart-Otis Car Co.
Canadian Northern	200	Flat	80,000	Wood	Steel	Spring	Arch bar	National Steel Car Co.
Canadian Northern	500	Flat	60,000	Wood	Wood	Spring	Arch bar	Crossen Car Co.
Canadian Northern	150	Stock	60,000	Wood	Wood	Spring	Arch bar	Crossen Car Co.
Canadian Northern	300	Ballast	60,000	Wood	Wood	Spring	.....	Hart-Otis Car Co.
Canadian Northern	1300	Box	60,000	Wood	Wood	Spring	.....	Canadian C. & F. Co.
Canadian Northern	500	Box	60,000	Wood	Wood	Spring	.....	Nova Scotia Car Co.
Canadian Northern	593	Box	60,000	Wood	Wood	Spring	Arch bar	National Steel Car Co.
Canadian Northern	75	Ore	80,000	Steel	Steel	Spring	Arch bar	Canadian C. & F. Co.
Canadian Northern	75	Caboose	.....	Wood	Wood	Spring	Arch bar	Company's Shops
Canadian Northern	50	Caboose	.....	Wood	Wood	Spring	Arch bar	Mt. Vernon Car Mfg. Co.
Canadian Northern Ontario	15	Refrig.	60,000	Wood	Wood	Miner S.	Arch bar	Mt. Vernon Car Mfg. Co.
Canadian Northern Quebec	10	Refrig.	60,000	Wood	Wood	Miner S.	Arch bar	Mt. Vernon Car Mfg. Co.
Canadian Pacific	15	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Canadian Pacific	6	Flat	150,000	Wood	Steel	Spring	Simplex	Canadian C. & F. Co.
Canadian Pacific	1000	Box	80,000	Comp.	Steel	Miner S.	Simplex	Canadian C. & F. Co.
Canadian Pacific	7	Flat	60,000	Comp.	Wood	Spring	Simplex	Company's Shops
Canadian Pacific	500	Box	80,000	Comp.	Steel	Spring	Simplex	Company's Shops
Canadian Pacific	155	Stock	60,000	Comp.	Comp.	Spring	Simplex	Company's Shops
Canadian Pacific	1	Refrig.	80,000	Wood	Comp.	Spring	Simplex	Company's Shops
Canadian Pacific	228	Vans	.....	Wood	Steel	Spring	Simplex	Company's Shops
Canadian Pacific	3	Store Sup.	.....	Wood	Comp.	Spring	Simplex	Company's Shops
Canadian Pacific	8	Work	.....	Wood	Wood	Spring	Simplex	Company's Shops
Canadian Steel Foundries.	4	Ballast	80,000	Wood	Comp.	Yost	Arch bar	Canadian C. & F. Co.
Canal Lumber Co.	6	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Cape Breton C. I. & Ry. Co.	20	Hopper	80,000	Steel	Steel	.....	Arch bar	Canadian C. & F. Co.
Cape Breton C. I. & Ry. Co.	5	Hopper	30,000	Wood	Wood	.....	Arch bar	Canadian C. & F. Co.
Cape Breton C. I. & Ry. Co.	30	Hopper	60,000	Wood	Wood	Miner T.	Arch bar	Canadian C. & F. Co.
Carlton & Coast	25	Log	80,000	Wood	Wood	.....	.....	Tuohy Bros.
Carlton & Coast	2	Box	50,000	Wood	Wood	.....	.....	Company's Shops

Purchaser	No.	Type	Capacity	Body	Underframe	Draft Rig.	Truck	Builder
Carnegie Steel Co.	40	Flat	100,000	Wood	Steel	.....	.....	Pressed Steel Car Co.
Carolina, Clinch. & Ohio	†300	Stock	.....	Wood	Steel	.....	.....	Pressed Steel Car Co.
Central Fruit Despatch	500	Refrig.	60,000	Wood	Steel	Friction	Vulcan	American C. & F. Co.
Central of Georgia	500	Vent. Box	80,000	Wood	Steel	Friction	Vulcan	American C. & F. Co.
Central of Georgia	24	Flat	80,000	Steel	Steel	Friction	Prsd. Stl.	Company's Shops.
Central Pacific	50	Stock	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Central Pacific	200	Gondola	100,000	Wood	Steel	Spring	Andrews	Pullman Co.
Central Pacific	400	Box	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Central Pacific	150	Automobile	80,000	Wood	Steel	Spring	Vulcan	American C. & F. Co.
Central Pacific	100	Flat	100,000	Wood	Steel	Spring	Bettendorf	Standard Steel Car Co.
Central Refining Co.	5	Caboose	.....	.....	Steel	Spring	Bettendorf	Bettendorf Co.
Central San Antonio	20	Tank	60,000	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Central San Antonio	18	Cane	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Central San Antonio	2	Flat	.....	Steel	Steel	.....	.....	American C. & F. Co.
Chanute Refining Co.	30	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Chanute Refining Co.	10	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Chanute Refining Co.	16	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Charleston & W. Carolina	5	Caboose	.....	Wood	Wood	Spring	Arch bar	Company's Shops.
Charleston M. & M. Sup. Co.	4	Log	20,000	Wood	Wood	.....	.....	American C. & F. Co.
Chesapeake & Ohio	†2000	Coal	147,000	Steel	Steel	Friction	Vulcan	Standard Steel Car Co.
Chicago & Illinois Mid.	*250	Coal	.....	.....	.....	.....	.....	Haskell & Barker.
Chicago & Alton	1000	Gondola	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Chicago & Alton	1000	Box	.....	.....	.....	.....	.....	American C. & F. Co.
Chicago & Alton	†500	Stock	80,000	Comp.	Steel	Spring	Andrews	Pullman Co.
Chicago & Alton	200	H-B. Gond.	.....	.....	.....	.....	.....	Bettendorf Co.
Chicago & Alton	200	Flat	.....	.....	.....	.....	.....	Bettendorf Co.
Chicago & Alton	400	Gondola	.....	.....	.....	.....	.....	Western S. C. & F. Co.
Chicago & North-Western	†1000	Gondolas	100,000	Wood	Steel	Friction	.....	Western S. C. & F. Co.
Chicago & North-Western	†1000	Gondolas	100,000	Wood	Steel	Waugh	Andrews	American C. & F. Co.
Chicago & North-Western	500	Gondolas	100,000	Wood	Steel	Miner	Andrews	American C. & F. Co.
Chicago & North-Western	55	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Chicago & Western Ind.	300	Ballast	100,000	Wood	Comp.	Spring	Arch bar	Haskell & Barker.
Chicago, Burlington & Quincy	†500	Gondola	100,000	Steel	Steel	Spring	Andrews	Haskell & Barker.
Chicago, Burlington & Quincy	100	Tank	12,000g	Steel	Steel	Cardwell	Andrews	American C. & F. Co.
Chicago, Burlington & Quincy	100	Box	80,000	Wood	Comp.	Spring	Arch bar	Company's Shops.
Chicago, Burlington & Quincy	3000	Box	80,000	Wood	Comp.	Spring	Arch bar	Haskell & Barker.
Chicago, Burlington & Quincy	250	Box	80,000	Comp.	Steel	Spring	Arch bar	Haskell & Barker.
Chicago, Burlington & Quincy	500	Auto	80,000	Comp.	Steel	Spring	Arch bar	Haskell & Barker.
Chicago, Burlington & Quincy	250	Ballast	100,000	Wood	Comp.	Spring	Arch bar	Haskell & Barker.
Chicago, Burlington & Quincy	500	Flat	100,000	Steel	Steel	Spring	Arch bar	Haskell & Barker.
Chicago, Burlington & Quincy	3000	Gondola	100,000	Steel	Steel	Spring	Andrews	American C. & F. Co.
Chicago, Burlington & Quincy	2000	Gondola	100,000	Steel	Steel	Spring	Andrews	Haskell & Barker.
Chicago, Burlington & Quincy	620	Stock	60,000	Wood	Comp.	Spring	Arch bar	Company's Shops.
Chicago, Burlington & Quincy	100	D. D. Stock	60,000	Wood	Comp.	Spring	Arch bar	Company's Shops.
Chicago, Burlington & Quincy	25	Caboose	.....	Wood	Steel	Spring	.....	Company's Shops.
Chicago, Burlington & Quincy	50	Dump	20 yds.	Steel	Steel	Spring	Arch bar	Kilbourne-Jacobs.
Chicago, Burlington & Quincy	†2000	Box	80,000	Wood	Comp.	Spring	Arch bar	Haskell & Barker.
Chicago, Ind. & Louis.	1000	Gondola	100,000	Steel	Steel	Cardwell	Andrews	Haskell & Barker.
Chicago, Ind. & Louis.	287	Flat	100,000	Wood	Steel	Cardwell	Andrews	Haskell & Barker.
Chicago Mill & Lbr. Co.	100	Flat	80,000	Wood	Steel	Farlow	.....	American C. & F. Co.
Chicago, Milwaukee & St. P.	300	Coe	100,000	Wood	Wood	Friction	.....	Company's Shops.
Chicago, Milwaukee & St. P.	3455	Box	80,000	Wood	Steel	Friction	.....	Company's Shops.
Chicago, Peoria & St. L.	400	Coal	100,000	Steel	Steel	Miner	.....	American C. & F. Co.
Chicago, Peoria & St. L.	200	Box	80,000	Wood	Steel	Miner	.....	American C. & F. Co.
Chicago, Rock Island & Pacific	1500	Box	80,000	Comp.	Steel	Spring	Bettendorf	Western S. C. & F. Co.
Chicago, Rock Island & Pacific	500	Coal	100,000	Steel	Steel	Spring	Bettendorf	Standard Steel Car Co.
Chicago, Rock Island & Pacific	50	Caboose	.....	Wood	Steel	Spring	Bettendorf	Whipple Car Co.
Chicago Short Line	15	G. S. Gond.	100,000	Steel	Steel	.....	.....	Western S. C. & F. Co.
Christmas Is. Phosphate Co.	10	Flat	.....	.....	.....	Miner	.....	American C. & F. Co.
Cincinnati, N. O. & Tex. Pac.	50	Hopper	100,000	Steel	Steel	Spring	Vulcan	Cambria Steel Co.
Cincinnati, N. O. & Tex. Pac.	100	Gondola	100,000	Steel	Steel	Spring	Vulcan	Cambria Steel Co.
Cincinnati, N. O. & Tex. Pac.	100	Box	60,000	Wood	Steel	Miner-T.	Vulcan	American C. & F. Co.
Cincinnati, N. O. & Tex. Pac.	100	Auto.	60,000	Wood	Steel	Miner-T.	Vulcan	American C. & F. Co.
Cincinnati, N. O. & Tex. Pac.	200	Box	60,000	.....	.....	.....	.....	Lenoir Car Wks.
Cincinnati, N. O. & Tex. Pac.	150	Box	100,000	.....	.....	.....	.....	Cambria Steel Co.
City Ice Delivery Co.	1	Ice	80,000	Wood	.....	.....	.....	American C. & F. Co.
Cleve., Clin. & St. Louis	1000	Gondola	100,000	Steel	Steel	Friction	C. S. Frame	American C. & F. Co.
Cold Blast Transport	200	Refrig.	60,000	Wood	Steel	Friction	Arch bar	Haskell & Barker.
Colombian National	5	Gondola	40,000	Wood	Steel	.....	.....	American C. & F. Co.
Colombian National	4	Flat	40,000	Wood	Steel	.....	.....	American C. & F. Co.
Colombian National	4	Hopper	40,000	Steel	Steel	.....	.....	American C. & F. Co.
Colombian National	10	Box	40,000	Steel	Steel	.....	.....	American C. & F. Co.
Colombian National	8	Stock	40,000	Wood	Steel	.....	.....	American C. & F. Co.
Colombian National	5	Box	40,000	Steel	Steel	.....	.....	American C. & F. Co.
Comm. Bank of Spanish Am.	5	Gen. Serv.	30,000	Steel	Steel	.....	.....	American C. & F. Co.
Electrica Ferro de Chili	20	Flat	30,000	Wood	Wood	.....	.....	American C. & F. Co.
Constantine Refining Co.	2	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Cornplanter Refining Co.	1	Tank	8,000g	Steel	Steel	Friction	Bolster	German-Amer. Car. Co.
Corrigan McKinney & Co.	4	Gondola	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Cosden & Co., J. S.	130	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Cosden & Co., J. S.	70	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Cotton Belt Lbr. Co.	16	Log	40,000	Wood	Wood	.....	.....	American C. & F. Co.
Crystal Oil Works	100	Box	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Cuba Company	300	Flat	80,000	Wood	Wood	Cardwell	.....	American C. & F. Co.
Cuba Company	200	Box	60,000	Wood	Wood	Cardwell	.....	American C. & F. Co.
Cuban Central	15	Box	30,000	Comp.	Steel	Spring	Arch bar	Gregg Co.
Cuban Central	30	Flat	30,000	Comp.	Steel	Spring	Arch bar	Gregg Co.
Cumberland Valley	5	Flat	100,000	Steel	Steel	Friction	Arch bar	Penna. R. R. Shops.
Cumberland Valley	11	Box	100,000	Comp.	Steel	Friction	Arch bar	Penna. R. R. Shops.
Cumberland Valley	20	Gondola	100,000	Wood	Steel	Friction	Arch bar	Pressed Steel Car Co.
Davis, M. L.	5	Log	40,000	Wood	Wood	.....	.....	American C. & F. Co.
Dayton & Troy Electric	†4	Box	60,000	Wood	Wood	Spring	M. C. B.	Barney & Smith.
Denver & Salt Lake	100	Box	80,000	Wood	Steel	Cardwell	.....	American C. & F. Co.
Denver & Salt Lake	25	Stock	80,000	Wood	Steel	Cardwell	.....	American C. & F. Co.
Denver & Salt Lake	300	Gen. Serv.	.....	.....	.....	.....	.....	Western S. C. & F. Co.
Dickey Campbell & Co.	30	Log	30,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Dold Packing Co., Jacob	25	Tank	80,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Dold Packing Co., Jacob	25	Tank	80,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Dominican Central	12	Box	40,000	Comp.	Steel	Spring	Arch bar	Gregg Co.
Dominican Central	6	Gondola	40,000	Comp.	Steel	Spring	Arch bar	Gregg Co.
Dominion Coal Co.	15	Hopper	30,000	Wood	Wood	.....	.....	Canadian C. & F. Co.
Donora Southern	30	Gondola	140,000	Steel	Steel	Friction	.....	Standard Steel Car Co.
Donora Southern	20	Coke	140,000	Steel	Steel	Friction	Arch bar	Standard Steel Car Co.
Duluth & Iron Range	200	Ore	100,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Duluth & Iron Range	800	Ore	100,000	Steel	Steel	Friction	.....	Summers S. Car Co.
Duluth & Northeastern	30	Flat	60,000	Wood	Wood	Spring	Arch bar	Central Loco. & C. Wks.
Duluth & Northern Minn.	2	Caboose	.....	Wood	Wood	Spring	Arch bar	Peteler Car Co.
Duluth Missabe & Nor.	1000	Ore	100,000	Steel	Steel	.....	.....	Western S. C. & F. Co.
Duluth Rainy Lake & Win.	5	Caboose	.....	Wood	Wood	Spring	.....	Mt. Vernon Car Mfg. Co.
Duluth Rainy Lake & Win.	400	Box	60,000	Wood	Wood	Spring	Arch bar	Mt. Vernon Car Mfg. Co.
Duluth Rainy Lake & Win.	75	Refrig.	60,000	Wood	Wood	Spring	Arch bar	Mt. Vernon Car Mfg. Co.
Duluth Rainy Lake & Win.	200	Flat	80,000	Wood	Steel	Spring	Arch bar	Mt. Vernon Car Mfg. Co.
Duluth, S. S. & Atlantic	400	Ore	100,000	Steel	Steel	Cardwell	Andrews	American C. & F. Co.
Duluth, S. S. & Atlantic	100	Flat	80,000	Steel	Steel	Cardwell	Andrews	American C. & F. Co.
Dungannon Lbr. Co.	5	Log	20,000	Wood	Wood	.....	.....	American C. & F. Co.
Dupont Ry. & Land Co.	5	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
East Broad Top R. R. & Coal	4	Box	60,000	Steel	Steel	Miner	Vulcan	Company's Shops.
East Broad Top R. R. & Coal	1	Box	60,000	Wood	Steel	Miner	Vulcan	Company's Shops.

Purchaser	No.	Type	Capacity	Body	Underframe	Draft Rig.	Truck	Builder
East Broad Top R. R. & Coal.....	2	Flat	60,000	Steel	Steel	Miner	Vulcan	Company's Shops.
East Broad Top R. R. & Coal.....	‡30	Hopper	60,000	Steel	Steel	Miner	Vulcan	Pressed Steel Car Co.
East Carolina Lbr. Co.....	50	Log	30,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Eastern Refining Co.....	15	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
East Jersey R. R. & Term.....	15	Tank	80,000	Steel	Steel	Cardwell	Arch bar	American C. & F. Co.
Edison Illum. Co.....	10	Dump	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Elgin, Joliet & Eastern.....	2	Tank	.....	Steel	Steel	.....	.....	Pressed Steel Car Co.
Elk & Little Kanawha.....	20	Log	40,000	Wood	Wood	.....	.....	American C. & F. Co.
El Paso & Southwestern.....	50	Ballast	100,000	Steel	Steel	Cardwell	Andrews	Rodger Ballast Car Co.
El Paso & Southwestern.....	*500	Automobile	.....	.....	.....	.....	.....	Standard Steel Car Co.
El Paso & Southwestern.....	*200	Stock	.....	.....	.....	.....	.....	Standard Steel Car Co.
El Paso & Southwestern.....	*200	Gondola	.....	.....	.....	.....	.....	Standard Steel Car Co.
Emery, A. H.....	1	Automobile	100,000	Wood	Steel	West.	.....	American C. & F. Co.
Empire Oil Works.....	5	Tank	10,700g.	Steel	Steel	Friction	Arch bar	Penn. Tank Car Co.
Empire Steel & Iron Co.....	6	Hopper	100,000	Steel	Steel	.....	.....	Cambria Steel Co.
Empire Zinc Co.....	5	Ore	100,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Ensign Oil Co.....	2	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Enterprise Lbr. Co.....	10	Log	60,000	Wood	Steel	Spring	Arch bar	Filby Loco. & Mach. Co.
Erie Railroad.....	1500	Box	80,000	Wood	Steel	Miner	Andrews	American C. & F. Co.
Erie Railroad.....	1000	Hopper	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Erie Railroad.....	500	Box	.....	.....	.....	.....	.....	Western S. C. & F. Co.
Erie Railroad.....	*1500	Box	.....	.....	.....	.....	.....	Standard Steel Car Co.
Erie Railroad.....	500	Hopper	100,000	Steel	Steel	Friction	.....	Standard Steel Car Co.
Erie Railroad.....	500	Gondola	100,000	Wood	Steel	Friction	.....	Standard Steel Car Co.
Evans & Howard.....	10	Coal	.....	Steel	Steel	.....	.....	Mt. Vernon Car Mfg. Co.
Executive Coun. of Ia.....	1	Fish	.....	Wood	Steel	Miner	.....	American C. & F. Co.
Fassett Lbr. Co.....	10	Log	.....	Wood	Wood	.....	Arch bar	Canadian C. & F. Co.
Federal Light & P. Co.....	4	G. S. Gond.	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Flynn Lbr. Co.....	10	Log	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Ft. Dodge, Des Moines & Sou.....	200	Box	60,000	Wood	Wood	.....	.....	Haskell & Barker.
Ft. Dodge, Des Moines & Sou.....	300	Box	60,000	Wood	Wood	.....	.....	Haskell & Barker.
Foster Lbr. Co.....	20	Log	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Gaffey Petrol. Co., J. M.....	175	Tank	80,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Gainesville Midland.....	20	Box	60,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Galveston, H. & S. A.....	500	Box	100,000	Wood	Steel	Friction	Bettendorf	Standard Steel Car Co.
Galveston, H. & S. A.....	200	Stock	80,000	Wood	Steel	Spring	Andrews	Pullman Co.
Galveston, H. & S. A.....	100	Gondola	100,000	Steel	Steel	Friction	Bettendorf	Pressed Steel Car Co.
Galveston, H. & S. A.....	100	Tank	12,500g.	Steel	Steel	Friction	Vulcan	Pressed Steel Car Co.
Galveston, H. & S. A.....	100	Box	100,000	Wood	Steel	Friction	Vulcan	American C. & F. Co.
Galveston, H. & S. A.....	5	Caboose	.....	.....	Steel	Spring	Andrews	Standard Steel Car Co.
Gardner Extract Co.....	2	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
General Roofing Co.....	2	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
General Roofing Co.....	1	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Georgia & Florida.....	100	Flat	60,000	Wood	Wood	Spring	Arch bar	Central Loco. & C. Wks.
Georgia Railroad.....	6	Box	.....	Wood	Steel	.....	.....	Company's Shops.
Germania Refining Co.....	4	Tank	8,200g.	Steel	Steel	.....	.....	Penna. Tank C. Co.
Germania Refining Co.....	2	Tank	10,600g.	Steel	Steel	.....	.....	Penna. Tank C. Co.
Grand Rapids & Indiana.....	10	Caboose	60,000	Wood	Steel	Westing.	Arch bar	Penna. R. R. Shops.
Grand Rapids & Indiana.....	60	Gondola	100,000	Steel	Steel	Westing.	Arch bar	Cambria Steel Co.
Grand Rapids & Indiana.....	85	Flat	100,000	Steel	Steel	Westing.	Arch bar	Pressed Steel Car Co.
Grand Trunk.....	2000	Box	80,000	Comp.	Steel	Miner	Arch bar	Eastern Car Co.
Grand Trunk.....	1000	Gondola	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Grand Trunk.....	3000	Box	100,000	Comp.	Steel	.....	.....	Western S. C. & F. Co.
Grand Trunk.....	500	Stock	.....	Comp.	Steel	.....	.....	National Steel Car Co.
Grand Trunk.....	2000	Box	80,000	Comp.	Steel	Miner	.....	Canadian C. & F. Co.
Grand Trunk.....	*500	Flat	.....	.....	.....	.....	.....	Pressed Steel Car Co.
Grayling Lbr. Co.....	20	Log	.....	.....	.....	.....	.....	.....
Great Eastern Lbr. Co.....	10	Log	60,000	Steel	Steel	Farlow	.....	American C. & F. Co.
Great Northern Ry.....	40	Tank	100,000	Wood	Steel	.....	.....	Company's Shops.
Great Northern Ry.....	65	Caboose	.....	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Great Southern Lbr. Co.....	50	Flat	80,000	.....	Steel	Farlow	.....	American C. & F. Co.
Great West O. R. & P. Line.....	10	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Griffin, J. M.....	6	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Gulf Florida & Ala.....	*50	Flat	60,000	Wood	Steel	.....	.....	.....
Guantanamo Sug. Co.....	2	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Gulf Refining Co.....	175	Tank	8,000	Steel	Steel	Friction	Arch bar	American C. & F. Co.
Gulf Refining Co.....	25	Tank	8,000	Steel	Steel	Friction	Arch bar	Allegheny Fdry. Co.
Hamilton Ridge Lbr. Co.....	28	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Hardaway Con. Co.....	24	Flat	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Hassinger Lbr. Co.....	1	Log	80,000	.....	.....	Miner	.....	American C. & F. Co.
Hassinger Lbr. Co.....	1	Caboose	.....	.....	.....	.....	.....	American C. & F. Co.
Havana Central.....	450	Flat	40,000	Wood	Steel	Farlow	Arch bar	American C. & F. Co.
Havana Central.....	250	Box	60,000	Wood	Steel	Farlow	Arch bar	Standard Steel Car Co.
Havana Central.....	50	Gondola	60,000	Steel	Steel	Cardwell	Arch bar	Pressed Steel Car Co.
Henderson, Wm.....	10	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Hilton Dodge Lbr. Co.....	10	Log	50,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Hocking Valley.....	750	Gondola	115,000	Steel	Steel	Friction	Bettendorf	Ralston Steel Car Co.
Hocking Valley.....	250	Gondola	115,000	Steel	Steel	Friction	Vulcan	Ralston Steel Car Co.
Hopkins & Co., Ltd., F. H.....	1	Lidgerwood	60,000	Wood	Wood	Miner-T.	Arch bar	Canadian C. & F. Co.
Hopkins & Co., Ltd., F. H.....	1	Lidgerwood	.....	Wood	Wood	Yost	Arch bar	Canadian C. & F. Co.
Hopkins & Co., Ltd., F. H.....	1	Lidgerwood	60,000	Wood	Steel	Spring	Andrews	Pullman Co.
Houston & Tex. Central.....	200	Stock	80,000	Steel	Steel	Friction	Vulcan	Pressed Steel Car Co.
Houston & Tex. Central.....	100	Tank	12,500g.	Wood	Steel	Friction	Vulcan	American C. & F. Co.
Houston & Tex. Central.....	100	Box	100,000	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Houston & Tex. Central.....	10	Caboose	.....	Wood	Steel	Friction	Vulcan	American C. & F. Co.
Houston E. & W. Texas.....	200	Box	100,000	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Houston E. & W. Texas.....	5	Caboose	.....	Wood	Wood	Yost	Arch bar	Canadian C. & F. Co.
Illinois Central.....	500	Gondola	100,000	Steel	Steel	Spring	Vulcan	Pullman Co.
Illinois Central.....	500	Gondola	100,000	Steel	Steel	Friction	Bettendorf	Pullman Co.
Illinois Central.....	300	Furniture	80,000	Wood	Steel	Miner	Bettendorf	American C. & F. Co.
Illinois Central.....	500	Stock	80,000	Wood	Steel	Miner	Bettendorf	American C. & F. Co.
Illinois Central.....	500	Furniture	80,000	Wood	Steel	Miner	Bettendorf	American C. & F. Co.
Illinois Central.....	500	Refrlg.	80,000	Wood	Steel	Miner	Vulcan	American C. & F. Co.
Illinois Central.....	900	Vent.-Box	80,000	Wood	Steel	Miner	Bettendorf	American C. & F. Co.
Illinois Central.....	100	Vent.-Box	80,000	Wood	Steel	Miner	Pedestal	American C. & F. Co.
Intercolonial Ry.....	50	Box	60,000	Wood	Wood	Spring	Arch bar	Company's Shops.
Intercolonial Ry.....	20	Caboose	60,000	Wood	Wood	Spring	Pedestal	Company's Shops.
Intercolonial Ry.....	250	Box	80,000	Wood	Comp.	Spring	Arch bar	Canadian C. & F. Co.
Intercolonial Ry.....	250	Box	60,000	Wood	Comp.	Spring	Arch bar	Canadian C. & F. Co.
Intercolonial Ry.....	500	Box	60,000	Wood	Comp.	Spring	Arch bar	Nova Scotia Car Co.
Intercolonial Ry.....	‡20	Caboose	.....	Wood	Comp.	Spring	Pedestal	Nova Scotia Car Co.
International & Gt. Nor.....	400	Stock	60,000	Wood	Steel	Farlow	Steel	American C. & F. Co.
International & Gt. Nor.....	200	Gondola	80,000	Steel	Steel	Cardwell	Steel	American C. & F. Co.
International & Gt. Nor.....	200	Box	60,000	Wood	Steel	Farlow	Steel	American C. & F. Co.
International & Gt. Nor.....	200	Vent.-Box	60,000	Wood	Steel	Farlow	Steel	American C. & F. Co.
International of Cent. Am.....	20	Ballast	55,000	Steel	Steel	Spring	Arch bar	Ralston Steel Car Co.
International of Cent. Am.....	30	Flat	40,000	Steel	Steel	Spring	Arch bar	Magor Car Co.
International of Cent. Am.....	50	Box	40,000	Steel	Steel	Spring	Arch bar	Gregg Co.
International of Cent. Am.....	110	Fruit	40,000	Steel	Steel	Spring	Arch bar	Youngst'n C. & Mfg. Co.
Interstate R. R.....	2	Box	.....	Wood	Steel	.....	.....	Western S. C. & F. Co.
Jamaica Gov. Ry.....	*10	Box	60,000	.....	.....	.....	Bettendorf	.....
Kanotax Refining Co.....	1	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Kanotax Refining Co.....	2	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Kanotax Refining Co.....	7	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Kanotax Refining Co.....	1	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Kansas City Refr. Co.....	20	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Kansas City Refr. Co.....	12	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Kansas City Southern.....	7	Caboose	.....	Wood	Wood	Spring	.....	Company's Shops.

Purchaser	No.	Type	Capacity	Body	Underframe	Draft Rig.	Truck	Builder
Keith Car Co.....	75	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Keith Car Co.....	48	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Kelly's Creek Coll. Co.....	1	Frt. & Pass.	.....	Wood	Wood	.....	.....	American C. & F. Co.
Kendall Refining Co.....	5	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Kennedy Mfg. & Eng. Co.....	1	Flat	80,000	Wood	Steel	.....	.....	American C. & F. Co.
Kent Lbr. & Brick Co.....	5	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Kentwood & Eastern.....	15	Log	30,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Kentwood, Greensburg & S.....	20	Flat	40,000	Wood	Wood	Spring	Arch bar	Company's Shops.
Kewaunee, G. B. & West.....	100	Box	80,000	Wood	Comp.	Spring	.....	Haskell & Barker.
Kirby Lbr. Co.....	15	Log	40,000	Wood	Wood	.....	.....	American C. & F. Co.
Laclede Gas Light Co.....	1	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Lakeside & Marblehead.....	2	Dump	40,000	Steel	Steel	Spring	Arch bar	American C. & F. Co.
Lansing Co.....	10	Log	40,000	Wood	Wood	.....	.....	Orenstein-Arthur Koppel.
Lautz Bros. & Co.....	2	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Lehigh & New England.....	‡500	Hopper	100,000	Steel	Steel	Farlow	Arch bar	Pressed Steel Car Co.
Lehigh & New England.....	‡200	Gondola	80,000	Steel	Steel	Miner	Arch bar	Cambria Steel Co.
Lehigh Valley R. R.....	1000	Box	80,000	Wood	Steel	Spring	Andrews	Pullman Co.
Lehigh Valley R. R.....	1000	Coal	100,000	Steel	Steel	Spring	Arch bar	Standard Steel Car Co.
Lehigh Valley R. R.....	50	Flat	100,000	Steel	Steel	Spring	.....	Company's Shops.
Lehigh Valley R. R.....	25	Flat	80,000	Steel	Steel	Spring	.....	Company's Shops.
Lehigh Valley R. R.....	10	Well	220,000	Steel	Steel	Spring	.....	Company's Shops.
Lehigh Valley R. R.....	88	Dump	.....	Wood	Steel	Spring	.....	W. J. Oliver.
Lehigh Valley R. R.....	1	Scale Test	.....	Steel	Steel	Spring	.....	Company's Shops.
Lehigh Valley R. R.....	40	Caboose	.....	Wood	Steel	Spring	.....	Company's Shops.
Lehigh Valley R. R.....	‡60	Caboose	.....	Wood	Steel	Spring	.....	American C. & F. Co.
Lehigh Valley R. R.....	‡1000	Coal	100,000	Steel	Steel	Spring	Arch bar	Middletown Car Co.
Libby, McNeill & Libby.....	75	Refrig.	60,000	Wood	Steel	.....	.....	Swift & Co.
Lidgerwood Mfg. Co.....	1	Skid	100,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Linde Air P. Co.....	4	Furni.	80,000	Comp.	Steel	Friction	Bettendorf	Pullman Co.
Live Oak, Perry & Gulf.....	‡75	Flat	60,000	Steel	Steel	Spring	Arch bar	Magor Car Co.
Live Oak, Perry & Gulf.....	100	Flat	60,000	Wood	Steel	.....	.....	American C. & F. Co.
Live Poultry Transp.....	50	Poultry	40,000	Wood	Steel	Cardwell	.....	American C. & F. Co.
Live Poultry Transp.....	20	Poultry	40,000	Wood	Steel	.....	.....	.....
Lone Star Brew. Co.....	4	Refrig.	60,000	.....	Steel	.....	Arch bar	American C. & F. Co.
Louisiana & Arkansas.....	140	Flat	80,000	Wood	Steel	Farlow	Vulcan	American C. & F. Co.
Louisiana & Arkansas.....	40	Coal	100,000	Wood	Steel	Farlow	Vulcan	American C. & F. Co.
Louisiana & Arkansas.....	30	Flat	60,000	.....	Steel	Miner	Arch bar	Company's Shops.
Louisiana & Arkansas.....	20	Flat	60,000	.....	Wood	Miner	Arch bar	Company's Shops.
Louisiana & Nor. West.....	‡1	Flat	.....	.....	.....	.....	.....	Pressed Steel Car Co.
Louisiana Cent. Lbr. Co.....	50	Log	60,000	Wood	Wood	.....	.....	American C. & F. Co.
Louisiana Ry. & Nav.....	25	Flat	60,000	.....	Steel	Cardwell	Arch bar	American C. & F. Co.
Louisville & Nashville.....	2500	Hopper	100,000	Steel	Steel	Farlow	Steel S. F.	Pressed Steel Car Co.
Louisville & Nashville.....	500	H. B. Gond.	100,000	Steel	Steel	Farlow	Steel S. F.	Mt. Vernon Car Mfg. Co.
Louisville & Nashville.....	100	Ballast	100,000	Wood	Steel	.....	.....	American C. & F. Co.
Louisville & Nashville.....	600	Hopper	100,000	Wood	Steel	Farlow	.....	Company's Shops.
Louisville & Nashville.....	200	Ore	100,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	950	Box	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	200	Automobile	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	200	Flat	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	80	Caboose	.....	Wood	Steel	Farlow	Arch bar	Company's Shops.
Louisville & Nashville.....	600	Gondola	100,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	150	Stock	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	‡600	Box	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	‡200	Vent.-Box	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	‡100	Refrig.	80,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	‡200	D. E. Gond.	100,000	Wood	Steel	Farlow	Steel S. F.	Company's Shops.
Louisville & Nashville.....	‡25	Caboose	.....	Wood	Steel	Farlow	Arch bar	Company's Shops.
Magnolia Petroleum Co.....	25	Tank	100,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Maine Central.....	50	Flat	60,000	.....	Steel	Friction	.....	Company's Shops.
Maine Central.....	‡10	Caboose	.....	Wood	Steel	.....	Arch bar	American C. & F. Co.
Mankin & Crouch.....	4	Log	20,000	Wood	Wood	.....	.....	American C. & F. Co.
Mann-McCann Co.....	1	Spreader-G.	60,000	Wood	Wood	.....	.....	American C. & F. Co.
Marden Orth & Hast. Co.....	2	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Martin Co., D. B.....	2	Tank	8,000 g	Steel	Steel	Friction	Arch bar	German-Amer. Car. Co.
Matthiessen & Heg, Zinc Co.....	3	Tank	100,000	.....	Steel	Friction	Arch bar	German-Amer. Car. Co.
Mendoza & Laroza.....	4	Flat	55,000	Wood	Steel	.....	.....	American C. & F. Co.
Mengel Box Co.....	15	Log	40,000	Wood	Wood	.....	.....	American C. & F. Co.
Merrimac Chemical Co.....	1	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Mexican Ry.....	10	Tank	.....	Steel	Steel	.....	.....	Pressed Steel Car Co.
Midland Valley R. R.....	20	Gondola	100,000	Steel	Steel	Friction	.....	Mt. Vernon Car Mfg. Co.
Milliken Refining Co.....	203	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Mill Power Supply Co.....	4	Caboose	.....	Wood	Steel	.....	.....	Western S. C. & F. Co.
Mills Timb. & T. Co., B. C.....	14	Log	30,000	Wood	Wood	.....	Arch bar	Crossen Car Co.
Milwaukee Ref. Trans. & C. Co.....	2	Refrig.	60,000	Wood	Wood	Spring	Arch bar	Company's Shops.
Mineral Range.....	100	Rock	100,000	Steel	Steel	Cardwell	Andrews	American C. & F. Co.
Minneapolis & St. L.....	‡400	Box	80,000	Wood	Steel	Farlow	Bettendorf	Haskell & Barker.
Minneapolis & St. L.....	‡50	Auto.	80,000	Wood	Steel	Farlow	Bettendorf	Haskell & Barker.
Minneapolis & St. L.....	‡50	Flat	80,000	Wood	Steel	Farlow	Bettendorf	Haskell & Barker.
Minneapolis, St. P. & S. S. M.....	550	Box	80,000	Comp.	Steel	Miner	Bettendorf	American C. & F. Co.
Minneapolis, St. P. & S. S. M.....	500	Ore	100,000	Steel	Steel	Cardwell	Bettendorf	American C. & F. Co.
Minnesota Steel Co.....	10	Flat	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Missouri, Kansas & Texas.....	*1000	Stock	.....	.....	.....	.....	.....	.....
Mobile & Ohio.....	‡24	Gondola	100,000	Steel	Steel	Miner-S.	Vulcan	Pressed Steel Car Co.
Mobile & Ohio.....	‡23	Caboose	.....	Wood	Steel	Miner-S.	Arch bar	Lenoir Car Works.
Mond Nickel Co.....	12	Ballast	100,000	Steel	Steel	.....	.....	Hart-Otis Car Co.
Monongahela.....	1	Work	60,000	Wood	Comp.	Spring	Fox	Company's Shops.
Monongahela Connecting.....	9	Hopper	200,000	Steel	Steel	.....	.....	Company's Shops.
Montana, Wyo. & Sou.....	15	Box	80,000	Wood	Wood	Spring	Diamond	Mt. Vernon Car Mfg. Co.
Montana, Wyo. & Sou.....	25	Gondola	100,000	Wood	Steel	Spring	Diamond	Mt. Vernon Car Mfg. Co.
Moore Timb. Co.....	5	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Morgan's L. & T.....	100	Gondola	100,000	Steel	Steel	Friction	Bettendorf	Pressed Steel Car Co.
Morgan's L. & T.....	4	Caboose	.....	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Mutual Oil Co.....	25	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
McCahan Sug. Ref. Co.....	6	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Mac Kenzie, Mann & Co.....	75	Hopper	80,000	Steel	Steel	Miner T.	Arch bar	Canadian C. & F. Co.
Nashville, Chatt. & St. L.....	200	Box	80,000	Wood	Steel	Far.-West.	Andrews	American C. & F. Co.
Nashville, Chatt. & St. L.....	100	Gondola	100,000	Wood	Steel	Far.-West.	Andrews	American C. & F. Co.
Nashville, Chatt. & St. L.....	50	Stock	80,000	Wood	Steel	Far.-West.	S.-Gall.	American C. & F. Co.
National Rys. of Mex.....	5	Tank	.....	Steel	Steel	.....	.....	Pressed Steel Car Co.
Newburgh & South Shore.....	125	Ore	100,000	Steel	Steel	West. F.	Arch bar	Western S. C. & F. Co.
Newburgh & South Shore.....	‡50	Gondola	100,000	Steel	Steel	West. F.	Arch bar	Ralston Steel Car Co.
New England C. & Coke.....	250	Hopper	.....	Steel	Steel	.....	.....	Haskell & Barker.
New Haven Gas Ltg. Co.....	2	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
New Jersey Zinc.....	12	G. S. Gond.	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
New Orleans, Nat. & Nat.....	10	Flat	80,000	Steel	Steel	Spring	.....	Kilby Loco. & Mach. Co.
New Orleans, Nat. & Nat.....	20	Gondola	80,000	Wood	Wood	Spring	.....	Fitzhugh-Luthur Co.
New York, Chl. & St. L.....	20	Caboose	.....	Wood	Wood	Spring	Arch bar	Company's Shops.
New York, Phil. & Nor.....	‡36	Ven. Box	100,000	Wood	Steel	Westing.	Arch bar	American C. & F. Co.
New York, Phil. & Nor.....	50	Gondola	100,000	Wood	Steel	Friction	Arch bar	Ralston Steel Car Co.
New York, Susq. & West.....	500	Box	100,000	Comp.	Steel	.....	.....	Western S. C. & F. Co.
Nona Mills Co.....	15	Log	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Norfolk & Western.....	500	Hopper	115,000	Steel	Steel	Farlow	Andrews	American C. & F. Co.
Norfolk & Western.....	125	Flat	100,000	Wood	Steel	Farlow	Andrews	American C. & F. Co.
Norfolk & Western.....	125	Flat	100,000	Wood	Steel	Sessions	Andrews	American C. & F. Co.
Norfolk & Western.....	500	Hopper	115,000	Steel	Steel	Sessions	Andrews	American C. & F. Co.
Norfolk & Western.....	2000	Hopper	115,000	Steel	Steel	Friction	Andrews	Company's Shops.
Norfolk & Western.....	500	Box	80,000	Comp.	Steel	Friction	Andrews	Mt. Vernon Car Mfg. Co.
Norfolk & Western.....	‡1000	Hopper	115,000	Steel	Steel	Friction	Andrews	Company's Shops.

Purchaser	No.	Type	Capacity	Body	Underframe	Draft Rig.	Truck	Builder
Norfolk & Western.....	†700	Gondola	180,000	Steel	Steel	Friction	.....	Company's Shops.
Norfolk & Western.....	150	Gondola	180,000	Steel	Steel	Friction	.....	Company's Shops.
Norfolk Southern.....	160	Flat	80,000	Wood	Steel	Farlow	.....	American C. & F. Co.
Norfolk Southern.....	300	Vent. Box	60,000	Wood	Steel	.....	.....	Mt. Vernon Car Mfg. Co.
Norfolk Southern.....	6	Caboose	.....	Wood	Steel	Friction	Arch bar	Mt. Vernon Car Mfg. Co.
Northern Central.....	4	Caboose	.....	Wood	Steel	Friction	.....	Penn. R. R. Shops.
Northern Pacific.....	1000	Flat	70,000	Wood	Steel	Spring	Arch bar	Company's Shops.
Northwestern Iron Co.....	8	Coke	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Norwood Lbr. Co.....	6	Log	30,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Ocean Shore.....	15	Box	60,000	Wood	Steel	Spring	Arch bar	American C. & F. Co.
Ocean Shore.....	5	Box	80,000	Wood	Steel	Spring	Arch bar	American C. & F. Co.
Ocean Shore.....	20	Gondola	80,000	Steel	Steel	Spring	Arch bar	American C. & F. Co.
Ohio & Colo. Smeltg. & Rfg. Co..	4	G. S. Gond.	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Ohio River & Western.....	20	Box	60,000	Wood	Wood	Spring	.....	P. F. W. & C. Ry. Shops.
Ohio River & Western.....	20	Gondola	60,000	Wood	Wood	Spring	.....	P. F. W. & C. Ry. Shops.
Ontonagon R. R.....	32	Log	30,000	Wood	Wood	Spring	.....	Company's Shops.
Quachita & Northwestern.....	10	Log	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Oregon & California.....	100	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Oregon & California.....	100	Box	100,000	Steel	Steel	Spring	Vulcan	American C. & F. Co.
Oregon Short Line.....	250	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Oregon Short Line.....	200	Hopper	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Oregon Short Line.....	30	Caboose	.....	Wood	Wood	Spring	Arch bar	Standard Steel Car Co.
Oregon Short Line.....	†150	Stock	80,000	Wood	Steel	Spring	Arch bar	Pullman Co.
Oregon Short Line.....	600	Box	100,000	Wood	Steel	Spring	Bettendorf	Pullman Co.
Oregon Short Line.....	2	Ballast	.....	Wood	Steel	Spring	Arch bar	Rodger Bal. Car Co.
Ore.-Wash. R. R. & Nav.....	1000	Box	100,000	Wood	Steel	Spring	Bettendorf	Pullman Co.
Ore.-Wash. R. R. & Nav.....	150	Stock	80,000	Wood	Steel	Spring	Arch bar	Pullman Co.
Ore.-Wash. R. R. & Nav.....	10	Caboose	.....	Wood	Wood	Spring	Arch bar	Standard Steel Car Co.
Pacific Electric.....	10	Stock	80,000	Wood	Steel	Spring	Arch bar	Pullman Co.
Pacific Electric.....	10	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Pacific Electric.....	100	Dump	100,000	Steel	Steel	Spring	Vulcan	Pressed Steel Car Co.
Pacific Electric.....	90	Box	100,000	Wood	Steel	Spring	Vulcan	American C. & F. Co.
Pacific Electric.....	60	Flat	100,000	Wood	Steel	Spring	Bettendorf	American C. & F. Co.
Pacific Great Eastern.....	44	Box	.....	Comp.	Steel	.....	.....	National Steel Car Co.
Pacific Great Eastern.....	67	Flat	.....	Wood	Steel	.....	.....	National Steel Car Co.
Pacific Great Eastern.....	4	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Paper Makers Chemical Co.....	2	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Paris & Mt. Pleasant.....	1	Caboose	.....	Wood	Wood	.....	.....	American C. & F. Co.
Peninsular.....	22	Log	80,000	Wood	Steel	Spring	.....	Seattle Car & Fdy. Co.
Peninsular.....	12	.....	80,000	Wood	Steel	Spring	.....	Seattle Car & Fdy. Co.
Penna. Oil Prod. Ref. Co.....	20	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Pennsylvania Lines West.....	1500	Hopper	110,000	Steel	Steel	Westing.	Arch bar	Standard Steel Car Co.
Pennsylvania Lines West.....	1500	Hopper	110,000	Steel	Steel	Friction	Arch bar	Cambria Steel Co.
Pennsylvania Lines West.....	500	Refrig.	100,000	Comp.	Steel	Westing.	Arch bar	American C. & F. Co.
Pennsylvania Lines West.....	500	Gondola	100,000	Wood	Steel	Westing.	Arch bar	Railston Steel Car Co.
Pennsylvania Lines West.....	500	Gondola	100,000	Wood	Steel	Westing.	Arch bar	American C. & F. Co.
Pennsylvania Lines West.....	600	Box	100,000	Comp.	Steel	Westing.	Arch bar	American C. & F. Co.
Pennsylvania Lines West.....	600	Box	100,000	Comp.	Steel	Westing.	Arch bar	Standard Steel Car Co.
Pennsylvania Lines West.....	500	Box	100,000	Comp.	Steel	Westing.	Arch bar	Western S. C. & F. Co.
Pennsylvania Lines West.....	500	Coke	130,000	Steel	Steel	Westing.	Arch bar	Pressed Steel Car Co.
Pennsylvania Railroad.....	500	Refrig.	90,000	Wood	Steel	Friction	.....	Company's Shops.
Pennsylvania Railroad.....	1000	Refrig.	100,000	Wood	Steel	Westing.	.....	American C. & F. Co.
Pennsylvania Railroad.....	200	Flat	100,000	Steel	Steel	Friction	.....	Company's Shops.
Pennsylvania Railroad.....	25	Flat	150,000	Steel	Steel	Friction	.....	Company's Shops.
Pennsylvania Railroad.....	94	Gun	150,000	Steel	Steel	Friction	.....	Company's Shops.
Pennsylvania Railroad.....	1500	Coke	105,000	Steel	Steel	Friction	.....	Pressed Steel Car Co.
Pennsylvania Railroad.....	500	Gondola	100,000	Wood	Steel	Westing.	.....	American C. & F. Co.
Pennsylvania Railroad.....	664	Gondola	100,000	Wood	Steel	Friction	.....	Standard Steel Car Co.
Pennsylvania Railroad.....	537	Hopper	105,000	Steel	Steel	Friction	.....	Pressed Steel Car Co.
Pennsylvania Railroad.....	4000	Hopper	105,000	Steel	Steel	Friction	Arch bar	Cambria Steel Co.
Pennsylvania Railroad.....	17	Cabin	.....	Wood	Steel	Friction	.....	Company's Shops.
Perley & Crockett.....	20	Log	30,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Phelps Dodge & Co.....	1	Tank	50,000	Steel	Steel	.....	.....	American C. & F. Co.
Philadelphia & Reading.....	10	Cabin	.....	Wood	Steel	Spring	.....	Company's Shops.
Philadelphia & Reading.....	4	Cabin	.....	Wood	Steel	Spring	.....	Company's Shops.
Philadelphia & Reading.....	5	Welb	135,000	Steel	Steel	Friction	Arch bar	Company's Shops.
Philadelphia & Reading.....	†1	Air B. Instr.	.....	Steel	Steel	Friction	Arch bar	Company's Shops.
Philadelphia, Balt. & Washington.	2	Cabin	.....	Wood	Steel	.....	.....	Penn. R. R. shops.
Philadelphia Quartz Co.....	10	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Pickering Lbr. Co., W. R.....	40	Log	60,000	Wood	Wood	.....	.....	American C. & F. Co.
Piedmont & Northern.....	17	Ballast	100,000	Wood	Steel	Friction	.....	Rodger Ballast Car Co.
Piedmont & Northern.....	4	Caboose	.....	.....	.....	.....	.....	Western S. C. & F. Co.
Pierce-Fordyce Gil Assn.....	100	Tank	100,000	Steel	Steel	Friction	Arch bar	American C. & F. Co.
Pittsburgh & Lake Erie.....	500	Coke	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Pittsburgh & Shawmut.....	500	Hopper	100,000	Steel	Steel	Miner	Diamond	American C. & F. Co.
Pittsburgh Crucible Steel Co.....	†12	Flat	200,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Pittsburgh, Shawmut & Nor.....	8	Caboose	.....	Wood	Steel	Spring	Diamond	Russell Snow Plow Co.
Pittsburgh Steel Co.....	15	Gondola	150,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Polnsett Lbr. Co.....	10	Log	60,000	Wood	Wood	.....	.....	American C. & F. Co.
Poltevent & Favre Lbr. Co.....	70	Log	60,000	Wood	Wood	.....	.....	American C. & F. Co.
Polar Wave Ice & Fuel Co.....	6	Ice	80,000	Wood	Wood	Miner	.....	American C. & F. Co.
Poplarville Saw Mill Co.....	6	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Portland, Eugene & Eastern.....	50	Box	100,000	Wood	Steel	Spring	Vulcan	American C. & F. Co.
Portland, Eugene & Eastern.....	20	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Portland, Eugene & Eastern.....	40	Flat	100,000	.....	Steel	Spring	Bettendorf	Bettendorf Co.
Railway Storage Battery Co.....	2	Stor.-Bat.	.....	Steel	.....	.....	.....	American C. & F. Co.
Richmond Cedar Wks.....	20	Log	40,000	.....	Steel	Spring	Arch bar	Kilby Loco. & Mach. Co.
Rio Grande & Eagle Pass.....	1	Box	60,000	Wood	Wood	.....	Arch bar	Company's Shops.
Rio Grande & Eagle Pass.....	1	Ash	40,000	Wood	Wood	.....	Arch bar	Company's Shops.
Riverside Oil Co.....	10	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Riverside Western Oil Co.....	10	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Rock Castle Lbr. Co.....	20	Log	20,000	Wood	Wood	.....	.....	American C. & F. Co.
Rosman Tanning Extract Co.....	7	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
St. Lawrence Bridge Co.....	4	Flat	80,000	Wood	Steel	Miner	Arch bar	Canadian C. & F. Co.
St. Lawrence Bridge Co.....	4	S. P. Flat	80,000	Wood	Steel	Miner	Arch bar	Canadian C. & F. Co.
St. Louis & Belleville E.....	20	Hopper	80,000	Wood	Steel	Miner	.....	American C. & F. Co.
St. Louis, Peoria & Northw't'n.....	1000	Gondola	100,000	Wood	Steel	Waugh	Arch bar	American C. & F. Co.
St. Louis Southwestern.....	†405	Gen. Serv.	100,000	Wood	Steel	Miner-F.	S.-Gall.	American C. & F. Co.
Salt Lake & Ogden.....	1	Caboose	.....	Wood	Wood	Spring	.....	Company's Shops.
Salt Lake & Ogden.....	1	Milk	.....	Wood	Wood	Spring	.....	Company's Shops.
Salt Lake & Ogden.....	1	Work	60,000	Wood	Wood	Spring	Bald.	Company's Shops.
San Diego & Southeastern.....	30	Flat	60,000	Wood	Wood	Spring	Arch bar	Company's Shops.
Schenk & Sons Co., F.....	5	Refrig.	60,000	Wood	Steel	Farlow	.....	American C. & F. Co.
Scioto Valley Tract. Co.....	2	Box	60,000	Wood	Wood	Spring	.....	Barney & Smith.
Seaboard Air Line.....	125	Flat	80,000	Wood	Steel	Farlow	Vulcan	American C. & F. Co.
Seaboard Air Line.....	125	Flat	80,000	Wood	Steel	Sessions	Vulcan	American C. & F. Co.
Seaboard Air Line.....	500	Box	.....	Wood	Steel	.....	.....	Pressed Steel Car Co.
Seaboard Air Line.....	*250	Hopper	.....	Steel	Steel	.....	.....	Standard Steel Car Co.
Sherman Bros.....	4	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Mach. Co.
Sherman Cotton Oil Prov. Co.....	10	Tank	60,000	Steel	Steel	Friction	.....	German-American C. Co.
Simmons & Prichard.....	2	Log	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Snyder & Co., C. U.....	79	Tank	100,000	Steel	Steel	.....	.....	Summers Steel Car Co.
South Buffalo Ry.....	39	Dump	100,000	Steel	Steel	Friction	Arch bar	Standard Steel Car Co.
South Buffalo Ry.....	135	Gondola	100,000	Steel	Steel	Friction	Arch bar	Standard Steel Car Co.
South Buffalo Ry.....	50	Gondola	100,000	Steel	Steel	Friction	Arch bar	Standard Steel Car Co.
South Buffalo Ry.....	85	Hopper	100,000	Steel	Steel	Friction	Arch bar	Standard Steel Car Co.
South Buffalo Ry.....	10	Flat	100,000	Steel	Steel	Friction	Arch bar	Standard Steel Car Co.

Purchaser	No.	Type	Capacity	Body	Underframe	Draft Rig.	Truck	Builder
Southern Ry.	100	Hopper	100,000	Steel	Steel	Miner	Andrews	Lenoir Car Co.
Southern Ry.	150	Stock	60,000	Steel	Steel	Miner	S.-Gall.	Lenoir Car Co.
Southern Ry.	52	Gondola	100,000	Steel	Steel	Miner	Andrews	Lenoir Car Co.
Southern Ry.	420	Gondola	100,000	Steel	Steel	Miner	Andrews	Mt. Vernon Car Mfg. Co.
Southern Ry.	507	Gondola	100,000	Steel	Steel	Miner-T.	Vulcan	American C. & F. Co.
Southern Ry.	800	Gondola	100,000	Steel	Steel	Miner-T.	Vulcan	American C. & F. Co.
Southern Ry.	345	Hopper	100,000	Steel	Steel	Miner-T.	Andrews	Pressed Steel Car Co.
Southern Pacific.	100	Stock	80,000	Wood	Steel	Spring	Andrews	Pullman Co.
Southern Pacific.	300	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Southern Pacific.	100	Box	100,000	Wood	Steel	Spring	Vulcan	American C. & F. Co.
Southern Pacific.	500	Box	100,000	Wood	Steel	Spring	Bettendorf	Standard Steel Car Co.
Southern Pacific.	250	Automobile	80,000	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Southern Pacific.	100	Flat	100,000	.....	Steel	Spring	Bettendorf	Bettendorf Co.
Southern Pacific.	10	Caboose	.....	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Southern Pacific of Mex.	50	Box	100,000	Wood	Steel	Spring	Andrews	American C. & F. Co.
Southern Pacific of Mex.	40	Stock	80,000	Steel	Steel	Spring	Andrews	Pullman Co.
Southern Tank Car Line.	40	Tank	100,000	Steel	Steel	Cardwell	Steel	German-American C. Co.
Standard Oil Co.	20	Rack	60,000	Wood	Steel	.....	.....	American C. & F. Co.
Stewart Sugar Co.	8	Flat	60,000	.....	Steel	Spring	Dia.	Youngstown C. & F. Co.
Stout Lbr. Co.	15	Log	40,000	Wood	Wood	.....	.....	American C. & F. Co.
Sun Company	15	Tank	80,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Surry Lbr. Co.	28	Box	.....	Wood	Wood	.....	Arch bar	Mt. Vernon Car Mfg. Co.
Swift Refrig. Transport. Co.	*250	Refrig.	.....	.....	.....	.....	.....	Company's Shops.
Sydney & Louisburg	25	Hopper	30,000	Wood	Comp.	Spring	.....	Canadian C. & F. Co.
Tacoma Eastern	200	Log	80,000	Wood	Wood	Friction	Bettendorf	C., M. & St. P. Shops.
Tacoma Eastern	100	Log	80,000	Wood	Wood	Friction	Bettendorf	Seattle Car & Fdy. Co.
Taylor Lowenstein & Co.	18	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Texas & New Orleans.	200	Stock	80,000	Wood	Steel	Spring	Andrews	Pullman Co.
Texas & New Orleans.	100	Gondola	100,000	Steel	Steel	Friction	Bettendorf	Pressed Steel Car Co.
Texas & New Orleans.	100	Work	100,000	Steel	Steel	Spring	Bettendorf	Bettendorf Co.
Texas & New Orleans.	6	Caboose	.....	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Texas Long Leaf Lbr. Co.	12	Log	60,000	Wood	Wood	.....	.....	American C. & F. Co.
Thompson Bros. Lbr. Co.	18	Log	50,000	Wood	Wood	.....	.....	American C. & F. Co.
Tidewater & Western	1	Stock	40,000	Wood	Wood	Spring	Diamond	Company's Shops.
Tidewater & Western	5	Flat	40,000	Wood	Wood	Spring	Diamond	Company's Shops.
Titusville Oil Wks.	2	Tank	140,000	Steel	Steel	Spring	.....	Penn. Tank Car Co.
Toledo & Ohio Central	1000	Gen. Serv.	100,000	Steel	Steel	Friction	.....	Ralston Steel Car Co.
Toledo, St. Louis & Western.	*1000	Box	80,000	Wood	Steel	.....	.....	Haskell & Barker
Toronto, Hamilton & Buffalo	1000	Box	80,000	Wood	Steel	Friction	Metal	National Steel Car Co.
Toronto, Hamilton & Buffalo	100	Flat	80,000	Wood	Steel	Friction	Metal	National Steel Car Co.
Toronto, Hamilton & Buffalo	150	Hopper	100,000	Steel	Steel	Friction	Metal	National Steel Car Co.
Toronto, Hamilton & Buffalo	10	Flat	80,000	Wood	Steel	Friction	Metal	Canadian C. & F. Co.
Toronto, Hamilton & Buffalo	50	Hart	80,000	Wood	Steel	Friction	Metal	Hart-Otis Car Co.
Tremont & Gulf.	65	Flat	80,000	Wood	Steel	Spring	Bettendorf	Bettendorf Co.
Tremont & Gulf.	1	Caboose	.....	Wood	Steel	.....	.....	American C. & F. Co.
Trinity & Brazos Valley.	12	Box	60,000	Wood	Wood	Spring	Arch bar	Pullman Co.
Trujillo Ry.	40	Flat	30,000	Wood	Steel	.....	.....	American C. & F. Co.
Truman Cooperage Co.	5	Log	40,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & Maeh. Co.
Union Railroad.	†296	Gondola	100,000	Steel	Steel	Friction	Arch bar	Pressed Steel Car Co.
Union Carbide Co.	4	Hopper	100,000	Steel	Steel	.....	.....	Pressed Steel Car Co.
Union Oil Co.	18	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Union Oil Co. of Pa.	4	Tank	100,000	Steel	Steel	Cardwell	.....	American C. & F. Co.
Union Pacific.	500	Work	100,000	Steel	Steel	Spring	Bettendorf	Bettendorf Co.
Union Pacific.	1500	Box	100,000	Wood	Steel	Spring	Bettendorf	Pullman Co.
Union Pacific.	450	Stock	80,000	Wood	Steel	Spring	Andrews	Pullman Co.
Union Pacific.	100	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Pressed Steel Car Co.
Union Pacific.	400	Automobile	80,000	Wood	Steel	Spring	Andrews	Standard Steel Car Co.
Union Pacific.	25	Caboose	.....	Wood	Wood	Spring	Andrews	Standard Steel Car Co.
United Fruit Co.	50	Flat	30,000	.....	Steel	Spring	Reg. Dia.	Youngstown C. & Mfg.
United Fruit Co.	†100	Flat	60,000	.....	Steel	Spring	Reg. Dia.	Youngstown C. & Mfg.
United Fruit Co.	†83	Flat	40,000	.....	Steel	Spring	Reg. Dia.	Youngstown C. & Mfg.
United Rys. of Havana.	240	Box	30,000	Wood	Steel	Farlow	Diamond	Standard Steel Car Co.
United Rys. of Havana.	450	Flat	20,000	Wood	Steel	Farlow	Diamond	American C. & F. Co.
United Rys. of Havana.	50	Gondola	30,000	Steel	Steel	Farlow	Diamond	Pressed Steel Car Co.
United States Government.	3	Gondola	.....	Steel	Steel	.....	.....	Mt. Vernon Car Mfg. Co.
United States Government.	2	Flat	.....	Wood	Steel	.....	.....	Mt. Vernon Car Mfg. Co.
United States Government.	1	Box	.....	Wood	Wood	.....	.....	Mt. Vernon Car Mfg. Co.
U. S. Steel Products Co.	8	Flat	100,000	.....	Steel	.....	.....	Pressed Steel Car Co.
Vandalia Railroad.	200	Box	100,000	Comp.	Steel	Friction	Arch bar	Western S. C. & F. Co.
Vandalia Railroad.	100	Refrig.	100,000	Wood	Steel	Westing.	Arch bar	American C. & F. Co.
Vandalia Railroad.	14	Caboose	.....	Wood	Wood	Spring	Pedestal	Company's shops.
Vandalia Railroad.	1	Caboose	.....	Wood	Steel	Friction	Pedestal	Company's shops.
Vansant, Kitchen & Co.	6	Log	20,000	Wood	Wood	.....	.....	American C. & F. Co.
Vera Chemical Co.	1	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Vera Chemical Co.	2	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Verde Tunnel & Smelter Co.	40	Ore	100,000	Steel	Steel	.....	.....	Pressed S. Car Co.
Virginia Tank Car Corp.	25	Tank	80,000	Steel	Steel	Spring	.....	American C. & F. Co.
Warner-Zuinlan Asphalt Co.	10	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Warren, Johnsville & Saline River	6	Log	40,000	Wood	Wood	Spring	.....	Company's shops.
Washington, Idaho & Mont.	30	Box	80,000	Wood	Steel	Friction	Bettendorf	.....
Waterloo, Cedar Falls & Nor.	40	Gondola	100,000	Wood	Wd. & St.	Spring	.....	Haskell & Barker.
Waterloo, Cedar Falls & Nor.	50	Auto	80,000	Wood	Wood	Spring	.....	Haskell & Barker.
Waterloo, Cedar Falls & Nor.	20	Stock	60,000	Wood	Wood	Spring	.....	Haskell & Barker.
Waters-Pierce Oil Co.	50	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Waverly Oil Works Co.	2	Tank	4500 g.	Steel	Steel	.....	.....	American C. & F. Co.
Western Chemical Mfg. Co.	6	Flat	80,000	Steel	Steel	.....	.....	German-Am. Car. Co.
Western Chemical Mfg. Co.	6	Flat	80,000	Steel	Steel	.....	.....	German-Am. Car. Co.
Western, New York & Penn.	141	Gondola	100,000	Wood	Steel	Friction	.....	Standard Steel Car Co.
Western, New York & Penn.	2	Cabin	.....	Wood	Steel	Friction	.....	Penn. R. R. shops.
Western Ohio	†4	Box	60,000	Wood	Wood	Spring	M. C. B.	Barney & Smith.
Western Maryland.	500	Gondola	80,000	Wood	Steel	Miner	Arch bar	Standard Steel Car Co.
Western Maryland.	15	Cabin	.....	Wood	Wood	Farlow	Pedestal	Company's shops.
Western Ry. of Alabama.	14	Box	60,000	Wood	Steel	Spring	Andrew	Company's shops.
Western Ry. of Alabama.	5	Flat	60,000	Wood	Wood	Spring	Arch bar	Company's shops.
Western Ry. of Alabama.	3	Flat	80,000	Wood	Wood	Spring	Arch bar	Company's shops.
Western Ry. of Alabama.	10	Flat	80,000	Wood	Steel	Friction	Andrew	Company's shops.
Western Ry. of Alabama.	10	Auto	80,000	Wood	Steel	Spring	Andrew	Company's shops.
Western Ry. of Alabama.	25	Stock	60,000	Wood	Steel	Friction	Andrew	Company's shops.
Western Ry. of Alabama.	1	Coal	80,000	Wood	Wood	Spring	Arch bar	Company's shops.
West Virginia Pulp & Paper Co.	1	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
West Virginia Timber Co.	5	Log	30,000	Wood	Wood	Spring	Arch bar	Kilby Loco. & M. Co.
Wheeling & Lake Erie.	1000	Gondola	100,000	Steel	Steel	Spring	Bettendorf	Standard Steel Car Co.
Wheeling & Lake Erie.	500	Hopper	100,000	Steel	Steel	Miner	Bettendorf	American C. & F. Co.
Wheeling & Lake Erie.	1	Caboose	.....	Wood	Steel	Spring	Arch bar	Company's shops.
White Lbr. Co., J. J.	10	Flat	60,000	Wood	Steel	Spring	Arch bar	Kilby Loco. & M. Co.
Wilhoit & Marcell.	10	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Wilhoit & Marcell.	4	Tank	60,000	Steel	Steel	.....	.....	American C. & F. Co.
Wilhoit & Marcell.	13	Tank	100,000	Steel	Steel	.....	.....	American C. & F. Co.
Will & Baumer Co.	2	Tank	80,000	Steel	Steel	.....	.....	American C. & F. Co.
Windsor, Essex & L. S. R.	2	Box	80,000	Comp.	Steel	Miner	Arch bar	Canadian C. & F. Co.
Windsor, Essex & L. S. R.	4	Flat	80,000	Wood	Steel	Miner	Arch bar	Canadian C. & F. Co.
Wood Products Co.	4	Tank	8,000 g.	Steel	Steel	Friction	M. C. B.	Penn. Tank Car Co.
Wood Products Co.	7	Tank	6,000 g.	Steel	Steel	Friction	M. C. B.	German-Am. Car. Co.
Yosemite Valley.	40	Flat	60,000	Wood	Steel	Spring	Arch bar	Seattle Car & Fdry. Co.

PASSENGER CARS.

†Indicates 1914 delivery. *Indicates report not confirmed.

Purchaser	No.	Type	Body	U. F.	Builder	Purchaser	No.	Type	Body	U. F.	Builder
Ala. & Vicksburg...	2	Postal	Steel	Steel	Amer. C. & F.	Chilean State Rys...	9	Sleeper	Wood	Wood	American C. & F.
Algoma Cent. & H.B.	1	Bagg. & Exp.	Wood	Wood	Can. C. & F.	Cin. N. O. & T. P...	5	Diner	Comp.	Steel	Barney & Smith
Arizona Eastern...	3	Mail & Bagg.	Steel	Steel	Pullman.	Chilean State Rys...	2	Coach	Wood	Steel	American C. & F.
Arizona Eastern...	1	Baggage	Steel	Steel	Pullman.	Chilean State Rys...	2	Coach	Wood	Steel	American C. & F.
Arizona Eastern...	6	Coach	Steel	Steel	Pullman.	Chilean State Rys...	2	Bagg. & Mail	Wood	Steel	American C. & F.
Arms Pal. H. Car...	7	Horse	Wood	Steel	Barney & Smith	C. C. C. & St. L...	2	Bagg. & Mail	Steel	Steel	American C. & F.
Atch., Top. & S. F...	124	Chair	Steel	Steel	Pullman.	C. C. C. & St. L...	2	Ch. & Bagg.	Steel	Steel	American C. & F.
Atch., Top. & S. F...	130	Smoker	Steel	Steel	Pullman.	C. C. C. & St. L...	25	Coach	Steel	Steel	American C. & F.
Atch., Top. & S. F...	135	Coach	Steel	Steel	Pullman.	C. C. C. & St. L...	10	Ch. & Bagg.	Steel	Steel	Standard S. Car
Atch., Top. & S. F...	16	Parlor	Steel	Steel	Pullman.	C. C. C. & St. L...	12	Postal	Steel	Steel	Pressed S. Car Co.
Atch., Top. & S. F...	115	Diner	Steel	Steel	Pullman.	C. C. C. & St. L...	1	Diner	Steel	Steel	Pullman.
Atch., Top. & S. F...	110	Compartment	Steel	Steel	Pullman.	Columbian Nat'l...	1	Observation	Wood	Steel	American C. & F.
Atch., Top. & S. F...	110	Parlor	Steel	Steel	Pullman.	Cuba Co.	2	Sleeper	Wood	Steel	American C. & F.
Atch., Top. & S. F...	130	Bagg. & Exp.	Steel	Steel	Pullman.	Cuba Co.	4	Bagg. & Exp.	Wood	Wood	American C. & F.
Atch., Top. & S. F...	125	Chair	Steel	Steel	Pullman.	Cuba Co.	2	Coach	Wood	Wood	American C. & F.
Atch., Top. & S. F...	135	Coach	Steel	Steel	Pullman.	Cuba Co.	2	Observation	Wood	Wood	American C. & F.
Atch., Top. & S. F...	124	Bagg. & Mail	Steel	Steel	Pullman.	Cuban Central...	3	Coach	Wood	Wood	American C. & F.
Atch., Top. & S. F...	12	Parlor	Wood	Steel	Pullman.	Cumberland Valley...	13	Coach	Steel	Steel	American C. & F.
Atlanta, Bir. & Atl.	2	Express	Steel	Steel	Harlan & Hol'th.	Cumberland Valley...	13	Pass. & Bagg.	Steel	Steel	American C. & F.
Atlantic Coast Line	12	Coach	Steel	Steel	Pullman.	Cumberland Valley...	13	Combination	Steel	Steel	P. R. R. shops.
Atlantic Coast Line	4	Pass. & Bagg.	Steel	Steel	Pullman.	Del., Lack. & W...	30	Suburban	Comp.	Steel	Barney & Smith.
Atlantic Coast Line	4	Mail & Exp.	Steel	Steel	Pullman.	Del., Lack. & W...	15	Combination	Comp.	Steel	Barney & Smith.
Atlantic Coast Line	9	Diner	Steel	Steel	Pullman.	Denver & Salt Lake	3	Passenger	Steel	Steel	Pullman.
Baltimore & Ohio...	8	Postal	Steel	Steel	Amer. C. & F. Co.	Denver & Salt Lake	1	Bagg. & Mail	Steel	Steel	Pullman.
Baltimore & Ohio...	149	Baggage	Steel	Steel	Pullman.	East Broad Top...	1	Passenger	Wood	Wood	Company's shops.
Baltimore & Ohio...	15	Bagg. & Mail	Steel	Steel	Pullman.	El Paso & Southw'n	1	Bagg. & Mail	Steel	Steel	Pullman.
Baltimore & Ohio...	17	Pass. & Bagg.	Steel	Steel	Pullman.	El Paso & Southw'n	2	Baggage	Steel	Steel	Pullman.
Baltimore & Ohio...	125	Coach	Steel	Steel	Pullman.	El Paso & Southw'n	3	Coach	Steel	Steel	Pullman.
Baltimore & Ohio...	115	Smoker	Steel	Steel	Pullman.	El Paso & Southw'n	2	Diner	Steel	Steel	Pullman.
Baltimore & Ohio...	14	Diner	Steel	Steel	Pullman.	Erie R. R.	25	Express	Wood	Steel	Osgood-Brad.
Baltimore & Ohio...	7	Postal	Steel	Steel	Amer. C. & F. Co.	Erie R. R.	17	Postal	Steel	Steel	Standard S. Car.
Boston & Albany...	12	Diner	Steel	Steel	Pullman.	Ex. Council of Ia...	1	Fish	Wood	Steel	American C. & F.
Boston & Albany...	120	Coach	Steel	Steel	Amer. C. & F. Co.	Federal da Bahia...	1	Insp.-Obs.	Wood	Wood	Osgood-Brad.
Boston & Albany...	14	Pass. & Bagg.	Steel	Steel	Stand. S. Car Co.	Fifth Meridian...	4	Sleepers	Wood	Steel	American C. & F.
Boston & Albany...	14	Mail	Steel	Steel	Press. S. Car Co.	Fifth Meridian...	2	Diner	Wood	Steel	American C. & F.
Boston & Maine...	110	Postal	Steel	Steel	Barney & Smith.	Florida East Coast...	12	Postal	Steel	Steel	Pullman.
Boston Elevated...	130	Pass.	Steel	Steel	Press. S. Car Co.	Florida East Coast...	13	Bagg. & Mail	Steel	Steel	Pullman.
Boston R. B. & L...	14	Pass.	Wood	Wood	Laconia.	Galv., H. & S. A...	17	Coach	Steel	Steel	Pullman.
Buffalo, Roch. & P...	2	Cafe-Parlor	Steel	Steel	Pullman.	Galv., H. & S. A...	12	Chair	Steel	Steel	Pullman.
Buffalo, Roch. & P...	3	Pass. & Mail	Steel	Steel	Pullman.	Galv., H. & S. A...	6	Baggage	Steel	Steel	Pullman.
Buffalo, Roch. & P...	3	Baggage	Steel	Steel	Pullman.	Galv., H. & S. A...	1	Motor	Steel	Steel	McKeen.
Buffalo, Roch. & P...	2	Bagg. & Mail	Steel	Steel	Pullman.	Georgia R. R.	1	Postal	.....	.....	Company's shops.
Buffalo, Roch. & P...	10	Coach	Steel	Steel	Pullman.	Georgia R. R.	1	Baggage	.....	.....	Company's shops.
Buffalo, Roch. & P...	7	Pass. & Bagg.	Steel	Steel	Pullman.	Grace & Co., W. R.	2	Diner	.....	.....	American C. & F.
Canadian Northern...	25	Pass.	Wood	Wood	Can. C. & F.	Grand Trunk.....	5	Postal	Steel	Steel	American C. & F.
Canadian Northern...	25	Pass.	Wood	Wood	Crossen Car Co.	Grand Trunk.....	*50	Passenger	.....	.....	Canadian C. & F.
Canadian Northern...	11	Comb.	Wood	Wood	Preston C. & C.	Grand Trunk.....	*15	Passenger	.....	.....	Pressed Steel Car.
Canadian Northern...	10	Baggage	Wood	Wood	Can. C. & F.	Grand Trunk.....	*32	Passenger	.....	.....	American C. & F.
Canadian Northern...	6	Sleeper	Wood	Wood	Barney & Smith.	Grand Trunk.....	*4	Diner	.....	.....	Osgood-Brad.
Canadian Nor. Ont...	5	Pass.	Wood	Wood	Hotchkiss-Blue.	Grand Trunk.....	*5	Parlor	.....	.....	Pullman.
Canadian Nor. Ont...	3	Comb.	Wood	Wood	Hotchkiss-Blue.	Grand Trunk.....	*10	Baggage	Wood	Steel	National S. Car.
Canadian Nor. Ont...	1	Store	Wood	Wood	Hotchkiss-Blue.	Great Northern...	20	Baggage	Wood	Steel	American C. & F.
Canadian Nor. Ont...	3	Express	Wood	Steel	Hotchkiss-Blue.	Great Northern...	25	Coach	Wood	Steel	American C. & F.
Canadian Nor. Que...	8	Pass.	Wood	Wood	Hotchkiss-Blue.	Great Northern...	22	Combination	Wood	Steel	American C. & F.
Canadian Nor. Que...	2	Cafe-Parl.	Wood	Wood	Hotchkiss-Blue.	Great Northern...	2	Postal	Steel	Steel	American C. & F.
Canadian Pacific...	2	Parl. & Buff.	Wood	Wood	Company's shops.	Great Northern...	21	Postal	Steel	Steel	Barney & Smith.
Canadian Pacific...	25	Pass. & Smok.	Steel	Steel	Company's shops.	Great Northern...	2	Refrig.-Exp.	Wood	Steel	Company's shops.
Canadian Pacific...	30	Colonist	Steel	Steel	Company's shops.	Gulf, Flor. & Ala...	*4	Passenger	.....	.....	.....
Canadian Pacific...	12	Bagg. & Exp.	Steel	Steel	Company's shops.	Havana Central...	2	Passenger	Wood	Steel	Wason.
Canadian Pacific...	10	Horse Exp.	Wood	Wood	Company's shops.	Havana Central...	4	Passenger	Wood	Steel	Wason.
Central New Eng...	12	Comb.	Wood	Steel	Laconia.	Havana Central...	3	Bagg. & Mail	Wood	Steel	Wason.
Central of Georgia...	13	Pass.	Steel	Steel	Pullman.	Havana Central...	*6	Interurban	Wood	Wood	American C. & F.
Central of Georgia...	13	Bagg. & Mail	Steel	Steel	Pullman.	Houston & T. C...	5	Baggage	Steel	Steel	Pullman.
Central of Georgia...	13	Express	Steel	Steel	Pullman.	Houston & T. C...	5	Chair	Steel	Steel	Pullman.
Central Pacific...	14	Coach	Steel	Steel	Pullman.	Houston & T. C...	2	Motor	Steel	Steel	McKeen.
Central Pacific...	4	Bagg. & Mail	Steel	Steel	Pullman.	Houston, E. & W. T.	3	Coach	Steel	Steel	Pullman.
Central Pacific...	2	Diners	Steel	Steel	Pullman.	Illinois Central...	10	Postal	Steel	Steel	Pullman.
Central Pacific...	2	Observation	Steel	Steel	Pullman.	Illinois Central...	10	Mail & Bagg.	Steel	Steel	Pullman.
Central Pacific...	2	Bagg. & Buff.	Steel	Steel	Pullman.	Illinois Central...	3	Diner	Steel	Steel	Pullman.
Central Pacific...	8	Baggage	Steel	Steel	Pullman.	Illinois Central...	7	Coach	Steel	Steel	Pullman.
Cent. R. R. of N. J.	125	Pass.	Steel	Steel	Harlan & Hol'th	Intercolonial Ry...	3	Sleeper	Wood	Steel	Pullman.
Cent. R. R. of N. J.	17	Bagg. & Mail	Steel	Steel	Harlan & Hol'th	Intercolonial Ry...	2	Diner	Wood	Steel	Pullman.
Cent. R. R. of N. J.	19	Comb.	Steel	Steel	Harlan & Hol'th	Intercolonial Ry...	2	Postal	Wood	Wood	Canadian C. & F.
Charleston & W. Car.	2	Coach	Wood	Steel	American C. & F.	Intercolonial Ry...	5	Colonist	Wood	Wood	Canadian C. & F.
Charleston & W. Car.	2	Pass. & Bagg.	Wood	Steel	American C. & F.	Intercolonial Ry...	4	Pass. & Bagg.	Wood	Wood	Canadian C. & F.
Charleston & W. Car.	3	Mail & Exp.	Wood	Steel	American C. & F.	Intercolonial Ry...	*8	Coach	Wood	Wood	Preston C. & C.
Chesapeake & Ohio...	2	Postal	Steel	Steel	Pressed S. Car.	Interstate R. R...	1	Coach	Wood	Wood	American C. & F.
Chesapeake & Ohio...	15	Coach	Steel	Steel	Pullman.	Kanawha & Mich...	1	Combination	Steel	Steel	American C. & F.
Chesapeake & Ohio...	3	Pass. & Bagg.	Steel	Steel	Pullman.	Kentucky & Tenn	2	Coach	Wood	Wood	Company's shops.
Chesapeake & Ohio...	2	Diner	Steel	Steel	Pullman.	Korean Rys	2	Private	Wood	Steel	American C. & F.
Chicago & Alton...	12	Diner	Steel	Steel	Pullman.	Korean Rys	2	Pass. & Din.	Wood	Wood	American C. & F.
Chicago & Alton...	13	Postal	Steel	Steel	Pullman.	Lake S. & M. S...	4	Postal	Steel	Steel	American C. & F.
Chicago & Nor.-Wn.	19	Diner	Steel	Steel	Pullman.	Lake S. & M. S...	50	Coach	Steel	Steel	Standard S. Car.
Chicago & Nor.-Wn.	136	Coach	Steel	Steel	Pullman.	Lake S. & M. S...	10	Postal	Steel	Steel	Pressed S. Car.
Chicago & Nor.-Wn.	14	Parlor	Steel	Steel	Pullman.	Lake S. & M. S...	30	Baggage	Steel	Steel	American C. & F.
Chicago & Nor.-Wn.	15	Obser.	Steel	Steel	Pullman.	Lake S. & M. S...	5	Bagg. & Mail	Steel	Steel	Standard S. Car.
Chicago & Nor.-Wn.	16	Chair	Steel	Steel	Pullman.	Lake S. & M. S...	2	Diner	Steel	Steel	Pullman.
Chicago & Nor.-Wn.	127	Smoker	Steel	Steel	American C. & F.	Lehigh Valley...	165	Coach	Steel	Steel	Pullman.
Chicago & Nor.-Wn.	130	Baggage	Steel	Steel	American C. & F.	Lehigh Valley...	125	Bagg. & Exp.	Steel	Steel	Standard.
Chicago & Nor.-Wn.	18	Postal	Steel	Steel	American C. & F.	Lehigh Valley...	110	Smoker	Steel	Steel	Pullman.
Chicago & Nor.-Wn.	16	Bagg. & Mail	Steel	Steel	American C. & F.	Long Island R. R...	140	Motor Pass.	Steel	Steel	American C. & F.
Chicago, Bur. & Q...	115	Bagg. & Mail	Steel	Steel	American C. & F.	Long Island R. R...	120	Bagg. & Exp.	Steel	Steel	American C. & F.
Chicago, Bur. & Q...	110	Postal	Steel	Steel	American C. & F.	Long Island R. R...	115	Motor P. & B.	Steel	Steel	American C. & F.
Chicago Grt. West...	1	Postal	Steel	Steel	American C. & F.	Long Island R. R...	112	Coach	Steel	Steel	American C. & F.
Chicago Grt. West...	16	Pass.	Steel	Steel	American C. & F.	Long Island R. R...	13	Pass. & Bagg.	Steel	Steel	American C. & F.
Chicago Ind. & Sou.	10	Coach	Steel	Steel	Standard S. Car.	Long Island R. R...	1	Club	Steel	Steel	American C. & F.
Chicago, M. & St. P.	3	Business	Steel	Steel	Pullman.	Louisiana & Ark...	2	Passenger	Steel	Steel	American C. & F.
Chicago, M. & St. P.	2	Sleeper	Steel	Steel	Barney & Smith.	Louisiana & Ark...	12	Passenger	Steel	Steel	American C. & F.
Chicago, M. & St. P.	10	Postal	Steel	Steel	American C. & F.	Louisiana & Ark...	1	Mail & Exp.	Steel	Steel	American C. & F.
Chicago, R. I. & P...	20	Coach	Steel	Steel	Pullman.	Louisiana & N. W...	12	Coach	Wood	Steel	Barney & Smith.
Chicago, R. I. & P...	18	Chair	Steel	Steel	Pullman.	Louisville & Nash...	2	Bagg. & Mail	Wood	Steel	Company's shops.
Chicago, R. I. & P...	7	Smoker	Steel	Steel	Pullman.	Louisville & Nash...	2	Chair	Wood	Steel	Company's shops.
Chicago, R. I. & P...	10	Baggage	Steel	Steel	Pullman.	Louisville & Nash...	10	V. Coach	Wood	Steel	Company's shops.
Chicago, R. I. & P...	5	Comp.	Steel	Steel	Pullman.	Louisville & Nash...	2	Bagg. & Mail	Wood	Steel	Company's shops.
Chicago, R. I. & P...	4	Horse-Exp.	Steel	Steel	Pullman.	Louisville & Nash...	6	V. Coach	Wood	Steel	Company's shops.
C. St. P. M. & O...	11	Coach & Smk.	Steel	Steel	Pullman.						
C. St. P. M. & O...	11	Coach	Steel	Steel	Pullman.						
C. St. P. M. & O...	12	Cafe	Steel	Steel	Pullman.						
C. St. P. M. & O...	15	Smoker	Steel	Steel	American C. & F.						
C. St. P. M. & O...	16	Baggage	Steel	Steel	American C. & F.						

Purchaser	No.	Type	Body	U. F.	Builder	Purchaser	No.	Type	Body	U. F.	Builder
Louisville & Nash...	4	Coach	Wood	Steel	Company's shops.	Pennsylvania R. R.	5	Bagg. & Mail	Steel	Steel	Company's shops.
Louisville & Nash...	14	Coach	Wood	Steel	Company's shops.	Pennsylvania R. R.	45	Coach	Steel	Steel	American C. & F.
Louisville & Nash...	5	Postal	Steel	Steel	American C. & F.	Pennsylvania R. R.	16	Coach	Steel	Steel	American C. & F.
Louisville & Nash...	12	Baggage	Steel	Steel	American C. & F.	Pennsylvania R. R.	50	Coach	Steel	Steel	Company's shops.
Louisville & Nash...	12	Bagg. & Mail	Steel	Steel	American C. & F.	Pennsylvania R. R.	25	Baggage	Steel	Steel	American C. & F.
Louisville & Nash...	110	Chair	Steel	Steel	American C. & F.	Pennsylvania R. R.	5	Horse-Exp.	Steel	Steel	American C. & F.
Louisville & Nash...	12	V. Coach	Steel	Steel	American C. & F.	Pennsylvania R. R.	70	Coach	Steel	Steel	American C. & F.
Mackenzie, M. & Co.	10	Coach	Wood	Wood	Canadian C. & F.	Pennsylvania R. R.	20	Pass. & Bagg.	Steel	Steel	Standard S. Car.
Maine Central...	12	Baggage	Steel	Steel	Pullman.	Pennsylvania R. R.	3	Pass. & Bagg.	Steel	Steel	American C. & F.
Maine Central...	12	Bagg. & Mail	Steel	Steel	Pullman.	Pennsylvania R. R.	2	Private	Steel	Steel	Company's shops.
Maine Central...	12	Postal	Steel	Steel	Laconia.	Pennsylvania R. R.	35	Milk	Steel	Steel	American C. & F.
Maine Central...	16	Coach	Steel	Steel	Pullman.	Pennsylvania R. R.	5	Dining	Steel	Steel	Company's shops.
Maine Central...	13	Smoker	Steel	Steel	Pullman.	Peoria & Eastern...	1	Pass. & Bagg.	Steel	Steel	American C. & F.
Maryland & Penna.	1	Coach	Wood	Wood	American C. & F.	Phila. & Reading...	150	Passenger	Steel	Steel	Harlan & Holth.
Mexican Ry.	1	Private	Comp.	Steel	Barney & Smith.	Phila. & Reading...	16	Baggage	Steel	Steel	Company's shops.
Michigan Central...	20	Coach	Steel	Steel	Pullman.	Pitts. & Lake Erie...	3	Coach	Wood	Steel	American C. & F.
Michigan Central...	10	Coach	Steel	Steel	Pressed S. Car.	Pitts. & Lake Erie...	20	Coach	Steel	Steel	Pressed S. Car.
Michigan Central...	15	Baggage	Steel	Steel	Amer. C. & F.	Pitts. & Lake Erie...	4	C'h. & Bagg.	Steel	Steel	Standard S. Car.
Michigan Central...	5	Bagg. & Mail	Steel	Steel	Standard S. Car.	Pitts. & Lake Erie...	4	Baggage	Steel	Steel	American C. & F.
Michigan Central...	2	Diner	Steel	Steel	Pullman.	Pitts. & Lake Erie...	2	Bagg. & Mail	Steel	Steel	Standard S. Car.
M. St. P. & S. S. M.	6	Coach	Steel	Steel	Barney & Smith.	Pitts. & Lake Erie...	1	Diner	Steel	Steel	Pullman.
M. St. P. & S. S. M.	2	Parlor	Steel	Steel	Barney & Smith.	Quebec & Lake St. J.	8	Passenger	Wood	Wood	Hotch.-Blue.
M. St. P. & S. S. M.	2	Observation	Steel	Steel	Barney & Smith.	Quebec & Lake St. J.	4	Combination	Wood	Wood	Hotch.-Blue.
M. S. P. & Roch. & D.	11	Gas-Elec.	.....	.....	Gen. Elec.	Quebec & Lake St. J.	2	Sleeper	Wood	Wood	Hotch.-Blue.
Minnesota Northern.	1	Gas-Elec.	.....	.....	Gen. Elec.	Quebec Central...	2	Pass. & Bagg.	Wood	Wood	Company's shops.
Mo. & Okla. & Gulf.	1	Dracar	Wood	Steel	Drake Automobile	Quebec Central...	2	Pass.-Smoker	Wood	Wood	Company's shops.
Montreal & S. C.	110	Motor	.....	.....	National S. Car.	Rutland R. R.	3	Smoker	Wood	Steel	Osgood-Brad.
Morgan's L. & T.	2	Motor	Steel	Steel	McKeen.	Rutland R. R.	2	Coach	Wood	Steel	Osgood-Brad.
New Orleans, N. & N.	1	Comb.	Wood	Wood	Fitzhugh Luthur.	Rutland R. R.	2	Baggage	Wood	Steel	Osgood-Brad.
New Orleans, N. & N.	2	Coach	Wood	Wood	Fitzhugh Luthur.	Rutland R. R.	1	Postal	Wood	Steel	Osgood-Brad.
N. Y. Cent. & H. R.	30	Coach	Steel	Steel	Amer. C. & F.	Rutland R. R.	1	Diner	Wood	Steel	Osgood-Brad.
N. Y. Cent. & H. R.	25	Coach	Steel	Steel	Amer. C. & F.	St. Louis Sou'west.	2	Parlor	Wood	Steel	American C. & F.
N. Y. Cent. & H. R.	35	Coach	Steel	Steel	Pressed S. Car.	St. Louis Sou'west.	18	Gas-Elec.	Steel	Steel	American C. & F.
N. Y. Cent. & H. R.	10	Coach & Bag.	Steel	Steel	Standard S. Car.	Salt Lake & Ogden.	1	Office	Wood	Steel	American C. & F.
N. Y. Cent. & H. R.	5	Postal	Steel	Steel	Pressed S. Car.	Salt Lake & Ogden.	8	Passenger	Wood	Steel	Niles Car & M.
N. Y. Cent. & H. R.	30	Bagg. & Mail	Steel	Steel	Pullman.	Seaboard Air Line.	3	Motor	.....	.....	Hall Scott.
N. Y. Cent. & H. R.	10	Bagg. & Mail	Steel	Steel	Standard S. Car.	Seaboard Air Line.	10	Coach	Steel	Steel	Pressed S. Car.
N. Y. Cent. & H. R.	2	Diner	Steel	Steel	Pullman.	Seaboard Air Line.	5	Express	Steel	Steel	Pullman.
N. Y. Cent. & H. R.	4	Passenger	Steel	Steel	Amer. C. & F.	Seaboard Air Line.	6	Diner	Steel	Steel	Pullman.
N. Y., Chi. & St. L.	121	Coach	Steel	Steel	Osgood-Brad.	Southern Ry.	2	Diner	Comp.	Steel	Barney & Smith.
N. Y., N. H. & H.	29	Smoker	Steel	Steel	Osgood-Brad.	Southern Ry.	13	Diner	Steel	Steel	Barney & Smith.
New York, Ont. & W.	12	Coach	Steel	Steel	Amer. C. & F.	Southern Pacific	16	Mail & Bagg.	Steel	Steel	Pullman.
N. Y., Phila. & N.	12	Coach	Steel	Steel	Standard S. Car.	Southern Pacific	111	Baggage	Steel	Steel	Pullman.
N. Y., Phila. & N.	12	Passenger	Steel	Steel	Standard S. Car.	Southern Pacific	14	Diner	Steel	Steel	Pullman.
Norfolk & Western.	15	Diner	Steel	Steel	Amer. C. & F.	Southern Pacific	123	Coach	Steel	Steel	Pullman.
Norfolk & Western.	11	Official	Steel	Steel	Pullman.	Southern Pacific	4	Observation	Steel	Steel	Pullman.
Norfolk Southern.	13	Mail & Bagg.	Comp.	Steel	American C. & F.	Southern Pacific	14	Buf. & Bagg.	Steel	Steel	Pullman.
Norfolk Southern.	6	Coach	Wood	Comp.	American C. & F.	Superior Roll.Stock.	1	Bagg. & Exp.	Wood	Wood	Canadian C. & F.
Norfolk Southern.	5	Motor	Wood	Wood	Southern Car.	Tallulah Falls.	1	Coach	Wood	Wood	Georgia Car & L.
Northern Pacific.	12	Postal	Steel	Steel	Pressed S. Car.	Tallulah Falls.	1	Mail & Exp.	Wood	Wood	Georgia Car & L.
Oregon & Calif.	12	Baggage	Steel	Steel	Pullman.	Temiskami'g & N. O.	13	Coach	Steel	Steel	Pullman.
Oregon S. L.	15	Bagg. & Mail	Steel	Steel	Pullman.	Temiskami'g & N. O.	12	Coach	Steel	Steel	Pullman.
Oregon S. L.	11	Postal	Steel	Steel	Pullman.	Temiskami'g & N. O.	13	Coach & S.	Steel	Steel	Pullman.
Oregon S. L.	15	Chair	Steel	Steel	Pullman.	Temiskami'g & N. O.	13	Bagg. & Mail	Steel	Steel	Pullman.
Oregon S. L.	15	Postal	Steel	Steel	Pullman.	Temiskami'g & N. O.	2	Bagg. & Exp.	Steel	Steel	Pullman.
Oregon S. L.	11	Diner	Steel	Steel	Pullman.	Terminal R. R. Assn.	1	Private	Wood	Steel	American C. & F.
Ore.-W. R. R. & N.	1	Observation	Steel	Steel	Pullman.	Texas & New O.	3	Chair	Steel	Steel	Pullman.
Ore.-W. R. R. & N.	15	Coach	Steel	Steel	Pullman.	Toledo & O. C.	1	Bagg. & Mail	Steel	Steel	Standard S. Car.
Ore.-W. R. R. & N.	12	Bagg. & Mail	Steel	Steel	Pullman.	Toronto, Ham. & B.	4	Passenger	Wood	Steel	American C. & F.
Ore.-W. R. R. & N.	12	Postal	Steel	Steel	Pullman.	Toronto, Ham. & B.	1	Bagg. & Exp.	Wood	Steel	American C. & F.
Ore.-W. R. R. & N.	14	Baggage	Steel	Steel	Pullman.	Tex. Pac. & West.	2	Coach	Wood	Steel	Pullman.
Pacific Great East.	2	Motor	.....	.....	Hall Scott.	Union Pacific	120	Chair	Steel	Steel	Pullman.
Penna. Lines West.	125	Coach	Steel	Steel	Pressed S. Car.	Union Pacific	15	Baggage	Steel	Steel	Pullman.
Penna. Lines West.	10	Coach	Steel	Steel	Standard S. Car.	United Fruit Co.	2	Coach	.....	.....	American C. & F.
Penna. Lines West.	5	Dining	Steel	Steel	Standard S. Car.	United Fruit Co.	2	Coach	.....	.....	American C. & F.
Penna. Lines West.	7	Coach	Steel	Steel	American C. & F.	United Rys. of Hav.	3	Sleeper	Wood	Steel	Wason Mfg.
Penna. Lines West.	31	Pass. & Bagg.	Steel	Steel	American C. & F.	United Rys. of Hav.	6	Passenger	Wood	Steel	Wason Mfg.
Penna. Lines West.	5	Baggage	Steel	Steel	American C. & F.	United Rys. of Hav.	6	Baggage	Wood	Steel	Wason Mfg.
Penna. Lines West.	2	Postal	Steel	Steel	American C. & F.	Uruguay Rys.	3	Coach	Wood	Wood	American C. & F.
Penna. Lines West.	1	Business	Steel	Steel	Pullman.	Uruguay Rys.	1	Brake Van	Wood	Wood	American C. & F.
Pennsylvania R. R.	105	Coach	Steel	Steel	Pressed S. Car.	Vicksburg, S. & Pac.	2	Postal	Steel	Steel	American C. & F.
Pennsylvania R. R.	5	Bagg. & Mail	Steel	Steel	Company's shops.	Virginian Ry.	3	Express	Wood	Comp.	Company's shops.
Pennsylvania R. R.	20	Bagg. & Mail	Steel	Steel	Company's shops.	Wheeling & L. E.	1	Baggage	Wood	Steel	Company's shops.

LOCOMOTIVES.

†Indicates 1914 delivery. *Indicates report not confirmed.

Purchaser	No.	Type	Weight	Cylinders	Vlv. G.	Builder	Purchaser	No.	Type	Weight	Cylinders	Vlv. G.	Builder
Ala. Grt. Southern	5	2-8-2	272,940	27x30	W.	Baldwin	B. Chile I. M. Co.	2	0-6-0-T	.....	.....	.....	American
Albany Southern	1	4-0-4	80,000	.....	.....	Watson-Genl.	Bingham & Garrd.	2	0-6-0	160,050	22x26	W.	Baldwin
Alg. Sullivan Lbr. Co.	1	Geared	104,000	14x15 1/2	.....	Heisler	Birm. & Sou. East.	2	0-6-0	108,000	17x24	S.	Baldwin
Alg. Cent. & H. B.	5	2-8-0	200,400	22x23	S.	Canadian	Birm. Col. & St. A.	1	4-6-0	119,600	18x24	S.	Baldwin
Algoma Steel Corp.	2	0-6-0	142,000	21x26	S.	Baldwin	Birm. Southern	2	2-8-0	203,200	22x28	W.	American
Aluminum Co.	1	0-6-0	144,000	20x26	S.	American	Boston & Albany.	6	4-6-2-S	241,000	22x26	W.	American
Amaga Ry. of Col.	2	2-6-2-T	62,000	12x16	S.	American	Boston & Albany.	14	2-8-2-S	284,000	25x32	W.	American
Amer. Bridge Co.	1	0-4-0	44,650	11x16	S.	Baldwin	Boston & Albany.	4	0-6-0-S	170,000	21x28	W.	American
A. R. R. of P. R.	*4	2-8-8-0	83,000	.....	.....	American	Boyer Cy., G. & A.	1	0-6-0	106,000	18x24	S.	American
Amsink & Co.	*3	2-6-0	.....	.....	.....	Baldwin	Brazil Nor. Eastn.	3	2-8-0	.....	.....	.....	Baldwin
Amsink & Co.	*1	2-6-2	.....	.....	.....	Baldwin	Bridat Veil Lbr.	1	0-6-0	70,750	15x18	S.	Baldwin
Amsink & Co.	*2	2-8-0	.....	.....	.....	Baldwin	Bridgeton & S. R.	1	2-4-4	69,700	12x16	W.	Baldwin
Aransas Har. Term.	1	2-6-0	99,850	17x24	S.	Baldwin	Brooklyn E. D. Tr.	1	0-6-0	127,000	19x24	S.	Baldwin
Arizona Eastern.	5	2-8-2	265,600	23 3/4 x30	W.	Baldwin	Buckhan. Chm. Co.	1	Geared	64,000	12x12 1/2	.....	Heisler
Atch., T. & S. F.	†35	4-6-2	268,800	29x28	W.	Baldwin	Buff., Roch. & Pit.	12	2-8-2	280,000	26 1/2 x30	W.	American
Atlanta & W. Pt.	1	0-6-0	119,000	19x24	S.	American	Buff., Roch. & Pit.	3	4-6-2	262,000	24 1/2 x26	W.	American
Atlanta & W. Pt.	2	4-6-2-S	257,000	24x28	B.	American	Butler Bros.	2	0-6-0	100,000	17x24	S.	Baldwin
Atl. Birm. & Atl.	5	2-8-2	249,900	24x30	B.	Baldwin	By-Prod. Coke Co.	1	0-6-0	113,200	19x24	S.	Baldwin
Atlan Coast Line.	25	4-6-0	169,700	21-26	W.	Baldwin	Cal. Harbor Com.	1	0-6-0	140,000	19x26	S.	Baldwin
Atlan. Coast Line.	3	0-6-0	126,800	19x24	S.	Baldwin	Cal. Harbor Com.	*1	0-6-0	140,000	.....	.....	.....
Atlan. Coast Line.	11	4-6-2	225,900	22x28	W.	Baldwin	Cal.-Western R. R.	1	2-6-2	110,100	15x22	S.	Baldwin
Atlan. Coast Line.	9	0-6-0	126,800	19x24	S.	Baldwin	Cambria & Ind.	1	2-8-2	.....	22x20	W.	Baldwin
Atlantic Northern.	1	2-6-0	104,600	17x24	S.	Baldwin	Can. Copper Co.	1	2-6-0	155,000	20x26	S.	American
Augusta T. & T.	1	0-4-4	42,000	10x16	S.	Davenport	Canadian Northern	15	0-6-0	124,000	19x26	S.	Canadian
Baltimore & Ohio.	60	2-8-2	284,500	26x32	W.	Baldwin	Canadian Northern	4	4-6-2-S	216,000	23x28	W.	Montreal
Baltimore & Ohio.	30	2-6-2	248,600	24x28	W.	Baldwin	Canadian Northern	25	2-8-0	138,600	23x26	W.	Canadian
Baltimore & Ohio.	10	0-8-8-0	470,000	26, 41x32	W.	American	Canadian Northern	25	2-8-0	220,000	24x32	W.	Canada Fdry.
Baltimore & Ohio.	50	2-8-2	284,500	26x32	W.	Baldwin	Canadian Northern	6	0-4-4-0	166,000	.....	.....	Gen. Elect.
Bartlett Western.	1	2-6-0	106,730	18x24	W.	Baldwin	Canadian Nor. Ont.	15	4-6-0-S	173,000	22x26	W.	Montreal
Bentley & Emery.	1	2-6-2	120,500	18x24	S.	Baldwin	Canadian Nor. Ont.	2	0-6-0	123,000	19x26	S.	Canadian
Bertron, Gr. & Co.	1	2-8-0	138,000	20x24	S.	American	Canadian Nor. Que.	10	4-6-0-S	173,000	22x26	W.	Montreal
Bessemer & L. E.	4	4-6-2-S	232,000	24x28	B.	American	Canadian Nor. Que.	5	4-6-0-S	172,500	22x26	W.	Montreal
Bessemer & L. E.	8	2-8-0	205,000	22x30	B.	American	Canadian Nor. Que.	3	0-6-0	123,000	19x26	S.	Canadian
Bessemer & L. E.	2	2-8-0	262,350	26x30	B.	Baldwin	Canadian Pacific	4	4-6-0	198,000	21x28	W.	Montreal
Bessemer Limestn.	2	Geared	50,000	10x12	.....	Heisler	Canadian Pacific	25	4-6-0	198,000	21x28	W.	Canadian

Purchaser	No.	Type	Weight	Cylinders	Vlv. G.	Builder	Purchaser	No.	Type	Weight	Cylinders	Vlv. G.	Builder
Canadian Pacific...	14	4-6-0	138,700	19x24	W.	Co. Shops	Duluth, S. S. & Atl.	3	4-6-2-S	193,000	21x26	W.	American
Canadian Pacific...	30	4-6-2-S	217,000	22½x28	W.	Montreal	Elbe Lbr. & S. Co.	1	Geared	104,000	14x15½	W.	Heisler
Canadian Pacific...	10	4-6-2	217,000	22½x28	W.	Co. Shops	El Paso & Sou. W.	5	2-8-2-S	325,000	29x30	B.	American
Canadian Pacific...	35	0-6-0	138,000	18x26	W.	Co. Shops	Emporia Mfg. Co.	1	Geared	64,000	12x12½	S.	Heisler
Canadian Pacific...	10	0-8-0	194,200	21x28	W.	Co. Shops	Enterprise Lbr. Co.	1	2-6-2	78,100	13x22	S.	Baldwin
Canadian Pacific...	2	4-6-2	222,000	22½x28	W.	Co. Shops	Ernie R. R.	10	4-6-2-S	285,000	25x28	B.	American
Canadian Pacific...	75	2-8-2-S	258,000	23½x32	W.	Montreal	Ernie R. R.	40	2-8-2-S	320,600	28x32	B.	American
Canadian Pacific...	20	2-8-0-S	225,000	23½x32	W.	Montreal	Ernie R. R.	20	4-6-2	281,600	25x28	B.	Baldwin
Canadian Pacific...	3	2-8-0	225,000	23½x32	W.	Canada Fdry.	Ernie R. R.	13	2-8-2-S	850,000	36x32	B.	Baldwin
Canadian Pacific...	10	4-6-0	147,500	19x24	W.	Co. Shops	Fathauer Co., Theo.	1	Geared	46,000	10x11	W.	Heisler
Canadian Pacific...	4	0-4-4-0	184,000	.....	.....	Gen. Elect.	Fernwood Fur. Co.	1	0-6-0	146,100	21x26	S.	Baldwin
Cape Gir. Northern	2	2-6-0	113,000	18x24	S.	American	Fernwood Lbr. Co.	1	2-8-2	164,700	20x24	W.	Baldwin
Carnegie Steel Co.	2	0-6-0	147,000	20x26	S.	Baldwin	Finch Pruyn & Co.	1	4-4-0	79,700	15x24	S.	Baldwin
Carnegie Steel Co.	4	0-6-0	150,000	22x26	S.	American	Florida E. Coast.	1	Geared	84,000	12x15	W.	Heisler
Carnegie Steel Co.	1	0-6-0	151,100	20x24	S.	Baldwin	Fla. Tim. Pr. Co.	1	2-6-2	204,000	22x26	W.	American
Carolina & N.-W.	2	4-6-0	134,900	19x24	W.	Baldwin	Foley Bros. W. & S.	4	0-6-0	78,350	16x22	S.	Baldwin
Carolina & N.-W.	4	2-8-0	146,000	20x24	W.	Baldwin	Frost Sibley L. Co.	1	Geared	46,000	17x24	S.	Davenport
Central of Brazil.	6	4-6-0	80,000	16x20	W.	American				10x11	W.	Heisler	
Cent. of Georgia..	4	4-6-2	228,600	23x28	W.	Baldwin	G., H. & S. A.	25	2-8-2-S	285,100	26x28	W.	Baldwin
Cent. of Georgia..	15	2-8-2	280,000	27x30	W.	American	G., H. & S. A.	6	0-6-0	145,000	19x26	W.	Baldwin
Cent. of Georgia..	2	0-6-0	113,000	18x24	W.	American	G., H. & S. A.	12	4-6-2-S	278,000	25x28	W.	American
Cen. of New Jersey	10	4-6-0	219,500	23x28	W.	Baldwin	Geo. Coast & Pied.	2	4-6-0	104,200	16x24	S.	Baldwin
Cen. of New Jersey	5	0-8-0	229,500	24x30	W.	Baldwin	Geo., Fla. & Ala.	1	2-8-0	152,000	20x26	S.	Baldwin
Cen. of New Jersey	3	0-6-0	147,500	21x26	B.	Co. Shops	Glen Val. Land Co.	1	0-4-0	46,000	11x16	S.	Davenport
Central Pacific ...	5	2-8-2-S	285,100	26x28	W.	Baldwin	Good Pine Lbr. Co.	1	2-6-2	117,650	17x24	S.	Baldwin
Central Pacific ...	6	2-8-2-S	265,600	23¾x30	W.	Baldwin	Govt. Hospital ...	1	0-6-0	97,300	16x24	S.	Baldwin
Central Pacific ...	4	0-6-0	155,000	19x26	W.	Baldwin	Grace & Co., W. R.	1	0-4-0-T	27,000	9x14	S.	American
Central Pacific ...	5	2-8-8-2-S	435,800	26, 40x30	W.	Baldwin	Grace Logging Co.	1	2-6-2	118,800	17x24	S.	Baldwin
Central Pacific ...	2	4-6-2-S	278,000	25x28	W.	American	Grand Trunk.	40	4-6-2-S	226,000	23x28	W.	American
Central Pacific ...	2	4-6-0-S	208,000	22x28	W.	American	Grand Trunk.	15	0-6-0	152,400	20x26	W.	Canadian
Charleston & W. C.	1	0-6-0	113,000	19x24	S.	Baldwin	Grand Trunk.	25	2-8-2	272,100	27x30	W.	Baldwin
Charlotte H. & Nor.	2	2-8-0	162,000	20x26	W.	American	Grant Smith & Co.	1	0-6-0	94,000	17x24	S.	Davenport
Cherry R.B. & L. Co.	1	2-6-0	90,000	15x24	S.	Baldwin	Grayling Lbr. Co.	1	2-6-2	90,000	15x24	S.	Baldwin
Cherry Valley.	1	2-8-2	175,000	20¾x28	S.	Baldwin	Gt. L. S. & L. Co.	1	0-4-0	51,000	12x18	S.	Baldwin
Chesapeake & Ohio	8	4-6-2	283,000	27x28	W.	Baldwin	Great Northern. ...	125	4-6-2	154,000	23½x30	W.	Lima
Chesapeake & Ohio	12	2-6-2	428,000	22, 35x32	W.	American	Great Northern. ...	115	4-8-2	210,000	28x32	S.	Baldwin
Chesapeake West..	1	2-8-0	136,500	19x24	S.	Davenport	Green Bay & West.	1	2-6-0	138,000	19x26	S.	American
Chicago & Alton..	10	4-6-2-S	277,000	25x28	W.	American	Grandley Consol..	2	Elect.	.....	.....	W.	Bald-West.
Chi. & East. Ill..	2	4-6-2-S	272,000	26½x28	W.	American	Green, S. & And.	6	Elect.	.....	.....	W.	Watson-Genl.
Chi. & North-West.	120	2-8-2-S	300,000	27x32	B.	American	Grogan Mfg. Co. ...	1	Geared	72,000	12x13	W.	Heisler
Chi. & North-West.	112	4-6-2-S	260,000	25x28	B.	American	Groveton, L. & Nor.	1	4-6-0	133,500	18x26	S.	Baldwin
Chi. & North-West.	118	0-6-0-S	140,500	18x24	B.	American	Guinle & Co.	1	0-4-0-T	14,500	6x12	S.	American
Chi. & West. Ind.	5	0-8-0	216,000	24x30	B.	American	Gulf, Tex. & West.	1	4-6-0	123,700	18x26	W.	Baldwin
Chi. & West. Ind.	14	2-6-0	189,000	23x28	B.	Lima	A. Guthrie & Co. ...	2	0-6-0	18,500	7x12	S.	Davenport
Chi. & West. Ind.	16	0-6-0	150,000	22x26	B.	Lima							
Chicago, Bur. & Q.	25	0-6-0	122,500	20x24	S.	Baldwin	Hamilton Rdg. Lbr.	1	2-6-2	55,000	12x16	S.	Baldwin
Chicago, Bur. & Q.	5	0-6-0	123,500	20x24	S.	Co. Shops	Hammond Lbr. Co.	1	2-6-2	117,750	17x24	S.	Baldwin
Chicago, Bur. & Q.	5	0-6-0	122,500	20x24	S.	Co. Shops	Hanging Rk. Iron	1	0-6-0	104,000	18x24	S.	Baldwin
Chicago, Bur. & Q.	35	2-8-2	310,000	28x32	W.	Baldwin	Hang Yang I. & S.	2	0-4-0-T	70,000	14x22	S.	American
Chicago, Gt. West.	5	4-6-2	260,000	25x28	W.	Baldwin	Hannan Hickey Br.	2	0-6-0	94,000	17x24	S.	Davenport
Chicago Junction..	1	0-6-0-S	149,000	20x26	S.	American	Haslam L. T. & L.	1	2-6-2	108,350	16x24	S.	Baldwin
Chicago Junction..	1	0-6-0-S	149,000	20x26	S.	American	Havana Cent.	8	2-8-0	154,000	20x26	W.	American
Chicago Junction..	12	0-6-0-S	149,000	20x26	S.	American	Havanna Central. ...	4	4-6-2-S	173,000	20x26	W.	American
Chi., Mil. & St. P.	35	0-6-0	127,000	19x26	S.	Co. Shops	Hill Logging Co. ...	1	2-6-2	88,000	14x22	S.	Davenport
Chi., Mil. & St. P.	10	0-6-0-S	129,000	20x26	W.	Co. Shops	Him., Har. Lbr. Co.	1	2-6-0	40,000	11x16	S.	Davenport
Chi., Mil. & St. P.	10	2-8-0-S	324,000	24x30	W.	Co. Shops	Hocking Valley. ...	6	2-8-2-S	323,000	29x28	W.	American
Chi., Peo. & St. L.	10	2-8-0	167,000	20x26	W.	American	Hocking Valley. ...	2	4-6-0-S	188,000	21x26	B.	American
Chi., R. I. & Pac.	30	4-6-2-S	281,500	27x28	B.	American	Houston & T. C. ...	6	0-6-0	145,000	19x26	W.	Baldwin
Chi., R. I. & Pac.	30	0-6-0	155,000	21x28	B.	American	Howze Lbr. Co. ...	1	Geared	72,000	12x13	W.	Heisler
Chi., R. I. & Pac.	25	2-8-2	320,000	28x30	B.	Baldwin	Huron Milling Co. ...	1	0-4-0	42,000	11x16	S.	Davenport
Chi., R. I. & Pac.	2	4-8-2-S	333,000	28x28	B.	American							
C., St. P., M. & O.	14	4-6-2-S	260,000	25x28	B.	American	Illinois Terminal..	2	2-6-0	121,000	20x24	S.	Baldwin
C., St. P., M. & O.	16	2-8-2-S	300,000	27x32	B.	American	Imperial Taiwan..	1	4-6-2-S	137,000	18½x24	W.	American
Chi. Short Line..	11	0-6-0	141,000	21x26	S.	Baldwin	Indiana Har. Belt.	1	7-0-8-0	239,500	25x30	W.	American
							Indiana Har. Belt.	8	0-6-0	169,600	21x28	W.	Baldwin
Chi., T. H. & S.-E.	5	2-8-0-S	244,000	25x32	W.	American	Ingram-Day L. Co.	1	4-6-0	112,400	18x24	S.	Baldwin
Chi., T. H. & S.-E.	2	0-8-0	163,850	20x26	W.	Baldwin	Inland Steel Co. ...	2	0-6-0	126,000	20x24	S.	Baldwin
Chicago Tunnel Co.	10	Elect.	.....	.....	.....	Bald-West	Intercolonial Ry. ...	4	4-6-2	230,000	23½x28	W.	Montreal
Cin., Flem. & Sou.	1	4-6-0	95,150	15x24	W.	Baldwin	Intercolonial Ry. ...	5	0-6-0	149,000	20x26	W.	Canadian
C., N. O. & T. P.	7	4-6-2-S	232,000	24x28	W.	American	Intercolonial Ry. ...	10	2-8-0	236,000	24x32	W.	Canada Fdry.
Citizens Gas Co.	1	0-6-0-T	133,000	19x24	S.	American	Intercolonial Ry. ...	5	2-8-0	236,000	24x32	W.	Montreal
A. L. Clark Lbr. Co.	11	2-6-2	101,000	.....	W.	Baldwin	Intercolonial Ry. ...	10	2-8-0	236,000	24x32	W.	Canadian
Clev. C. C. & St. L.	10	0-6-0	169,600	21x28	W.	Baldwin	Intercolonial Ry. ...	16	0-6-0	236,000	24x32	W.	Canadian
Coal & Coke.	2	2-8-0	177,850	22x28	B.	Baldwin	Intercolonial Ry. ...	15	0-6-0	149,000	21x26	W.	Baldwin
Coast P.O. & F. Co.	1	0-4-0	18,000	8x12	S.	Baldwin	International Ry. ...	1	Elect.	.....	.....	W.	Bald-West.
Comm. Edison Co.	1	0-6-0	152,100	23x26	S.	Baldwin	Inter. & Gt. Nor.	10	2-8-0	217,000	22x30	W.	American
Coney Lbr. Co. ...	1	Geared	84,000	12x15	W.	Heisler	Inter. & Gt. Nor.	3	2-8-0	217,000	22x30	W.	American
Consumers Co. ...	1	0-4-0	33,000	10x16	S.	Davenport	Irish Bayou L. Co.	1	2-6-2	57,250	11x16	W.	Baldwin
Cook Const. Co. ...	1	0-6-0	98,700	17x24	S.	Baldwin	Isle Royale Cop. Co.	1	2-8-2	179,000	19x26	W.	Baldwin
Cook Const. Co. ...	5	0-6-0	94,000	17x24	S.	Davenport							
Cornwall & Leb.	1	0-6-0	92,000	19x24	S.	Baldwin	Jacksonville Term.	1	0-6-0	123,000	19x26	W.	Baldwin
Craig Mt. Lbr. Co.	1	Geared	104,000	14x15½	W.	Heisler	Jamaica Gov. Ry. ...	3	2-8-2	.....	.....	W.	Baldwin
Croft Lbr. Co. ...	1	Geared	206,560	15x16	W.	Baldwin	Kanawha & Mich.	7	2-8-0-S	240,000	25x30	W.	American
Cuban Am. Sug. Co.	1	2-6-0	.....	.....	.....	Baldwin	Kans. City & Mem.	1	4-6-0	158,700	21x26	W.	Baldwin
Cuba R. R.	14	4-6-0	129,000	18x24	W.	American	Kansas City South.	4	0-6-0-S	156,000	30x28	W.	American
Cuba R. R.	1	4-6-0-S	147,000	21x26	W.	American	Kansas City South.	1	4-4-4	171,000	17x18	S.	Lima
Cuban Central.	3	4-6-0-S	118,000	18x24	W.	American	K'ville, A. C. & L. C.	1	2-6-0	96,000	16x22	S.	American
Cuban Central.	3	2-8-0-S	125,000	18x24	W.	American	Kentwood & East.	1	2-6-0	77,000	16x20	S.	Baldwin
Cuban Central.	1	2-6-2-T	106,000	17x24	S.	American	Kiangsi Ry.	2	4-4-0	112,000	17x24	S.	American
Cuban Central.	1	2-8-0	94,000	16x20	S.	American	Korea Gov. Rys. ...	6	4-6-2	.....	.....	W.	Baldwin
Cumber & Penn..	1	2-8-0	174,500	21x26	S.	Co. Shops							
Cumber. & Penn..	11	2-8-0	174,500	21x26	S.	Co. Shops	Lake Shore & M. S.	3	0-8-8-0-S	463,000	26, 40x28	W.	American
Cuyamel Fruit Co.	1	2-6-0	55,000	13x18	S.	Davenport	Lake Shore & M. S.	5	4-6-2-S	272,000	23½x26	W.	American
Cuyamel Fruit Co.	1	2-6-0	72,000	15x20	S.	Davenport	Lake Shore & M. S.	15	2-8-2-S	322,000	27x30	W.	American
Czarnikow Rionda.	1	2-8-0	.....	.....	.....	Baldwin	Lake Shore & M. S.	20	0-8-0-S	239,000	25x30	W.	American
							Lakeside & Mblhd.	1	0-6-0	162,000	21x28	W.	American
Danville & West..													

Purchaser	No.	Type	Weight	Cylinders	Vlv. G.	Builder	Purchaser	No.	Type	Weight	Cylinders	Vlv. G.	Builder
Louisville & Nash..	24	2-8-0	220,000	24x30	W.	Co. Shops	Pitts. & Shaw....	10	2-8-2	229,600	22x28	W.	Baldwin
Louisville & Nash..	†16	2-8-2	290,000	27x30	W.	Co. Shops	Pitts., S. & Nor...	2	2-6-0	163,000	20x26	W.	Baldwin
Louisville & Nash..	†4	4-6-2	215,000	22x28	W.	Co. Shops	Poltevent & Favre	1	2-4-2	66,350	14x22	S.	Baldwin
Lufkin L. & Lbr..	1	2-6-2	88,650	15x20	S.	Baldwin	Poltevent & Favre	1	2-6-2	119,100	18x24	S.	Baldwin
Mac a Mac Corp...	1	2-6-0	133,000	19x26	S.	American	Port Huron Sou...	1	0-6-0	100,000	18x24	S.	Baldwin
Magnolia Pet. Co.	1	0-4-0-T	51,000	12x18	S.	American	Porter B's. & G. S.	2	0-4-0	42,000	11x16	S.	Davenport
Maine Central....	*4	2-8-0	.....	.....	.....	American	Que. & Lake St. J.	1	4-6-0	154,000	20x24	W.	Montreal
Maine Central....	*3	4-6-2	.....	.....	.....	American	Quebec Central...	4	2-6-0	155,000	21x26	S.	Canadian
Maine Central....	*3	2-8-2	.....	.....	.....	American	Repub. I. & S. Co.	1	0-6-0	150,800	22x26	S.	Baldwin
Manch'str S. Mills	1	2-6-2	76,500	13x22	S.	Baldwin	Repub. I. & S. Co.	1	0-6-0	155,200	22x28	S.	Baldwin
Manning, A. C....	1	Geared	88,000	12x15	...	Heisler	Rich. Cedar Wks.	1	2-6-2	54,450	12x16	S.	Baldwin
Marsch, John....	2	0-6-0	108,000	19x24	S.	Baldwin	Roan. R.R. & Lbr.	1	2-6-0	47,600	11x18	S.	Baldwin
Maryland & Penn.	1	0-6-0	129,400	20x26	W.	Baldwin	Roebblings Sons, J.	1	0-4-0	101,700	15x20	S.	Baldwin
Maryland & Penn.	1	0-6-0	132,000	20x26	S.	Baldwin	Rapides Lbr. Co...	1	2-6-0	66,800	15x20	S.	Baldwin
Maryland Steel Co.	1	0-6-0	108,000	19x24	S.	Baldwin	Rutland R. R....	6	2-8-0-S	214,000	22½x30	S.	American
Marysville & Nor...	1	Geared	208,000	15x16	W.	Baldwin	Rutland R. R....	1	0-6-0	136,000	19x26	S.	American
Mayton Lbr. Co...	1	Geared	68,000	12x13	...	Heisler	St. Lawr. Bridge..	1	0-4-0-T	51,000	12x18	W.	American
McArthur Co. J.D.	2	2-6-0	130,000	19x26	S.	Montreal	St. L. N. Stk. Yds.	1	0-6-0	121,000	19x24	S.	American
Meridian Lbr. Co.	1	2-6-0	89,500	16x24	S.	Baldwin	St. L. Sou'western.	10	4-6-0	209,200	22x28	W.	Baldwin
Michigan Central.	15	0-6-0-S	170,000	21x28	W.	American	St. L. Sou'western.	10	2-8-0	230,300	25x30	W.	Baldwin
Michigan Central.	35	2-8-2-S	322,000	27x30	W.	American	San Ant. & Ara. P.	10	2-8-0	165,200	20x26	W.	Lima
Michigan Central.	8	4-6-2-S	272,000	23½x26	W.	American	San Ant. & Ara. P.	8	2-8-0	159,650	20x26	W.	Baldwin
Michigan Central.	10	0-6-0	169,600	21x28	W.	Baldwin	S. Ant., Uval. & G.	1	2-8-0	144,000	20x24	W.	American
Midland Penna. ..	1	4-4-0	113,000	18x24	S.	Baldwin	S. Ant., Uval. & G.	2	2-8-0	140,000	20x24	S.	American
Midland Valley ...	2	2-8-0	150,925	20x24	W.	Baldwin	S. Ant., Uval. & G.	2	4-6-0-S	140,000	20x24	W.	American
Min'ral L. Log. Co.	1	2-8-2	141,100	18x24	S.	Baldwin	San D. & S. East.	1	4-6-0	123,000	18x24	...	American
M., St. P. & S. S. M.	†4	4-6-2-S	260,000	25x26	W.	American	Sand Springs Ry...	1	Elect.	.....	.....	...	Bald.-West.
M., St. P. & S. S. M.	†6	2-8-0-S	226,000	25x30	W.	American	Sandy R. & R. L.	1	2-6-2	67,000	13x16	W.	Baldwin
M., S. P., R. & D.E.	3	Elect.	.....	.....	.....	Genl.-Elect.	San Luis Central..	1	2-8-0	131,000	20x24	S.	Baldwin
Minn., D. & West.	1	4-4-0	185,000	20x26	B.	Baldwin	S. P., L. A. & S. L.	†8	2-8-2-S	285,000	26x28	W.	American
Minn., D. & West.	1	4-4-0	150,000	19x24	W.	Baldwin	S. P., L. A. & S. L.	3	0-6-0	145,000	19x26	W.	Baldwin
Minn. Steel Co....	2	Elect.	.....	.....	...	Bald.-West.	Sawyer Good. Co.	1	2-6-2	103,000	16x24	S.	Baldwin
Missouri & Louis.	1	2-6-2	90,850	15x20	S.	Baldwin	Seaboard Air Line	42	4-6-2-S	220,000	23x28	W.	American
Missouri, K. & T...	40	2-8-2	285,000	26½x30	W.	American	Seaboard Air Line	5	0-6-0	144,000	19x28	W.	Baldwin
Missouri Pacific ..	7	4-8-2-S	296,000	28x28	B.	American	Seaboard Air Line	1	0-4-0	86,500	16x24	S.	Baldwin
Missouri Pacific ..	5	4-6-2-S	258,000	26x28	W.	American	Shannon & Co., J.	1	0-4-0	68,950	14x24	S.	Baldwin
Missouri Pacific ..	5	2-8-2-S	276,000	27x30	W.	Baldwin	Shaimon & Co., J.	1	0-4-0	68,950	14x24	S.	Baldwin
Missouri Pacific ..	†25	2-8-2-S	276,000	27x30	W.	Baldwin	Shelby County Ry.	1	4-6-0	98,900	16x24	S.	Baldwin
Mobile & Ohio....	†9	2-8-2	272,940	27x30	W.	Baldwin	Shippens'g, N. & W.	1	Elect.	.....	.....	...	Bald.-West.
Mobile & Ohio....	†7	2-8-0	224,000	24x30	W.	Baldwin	Silver Falls Timb.	1	2-8-2	176,000	20½x28	S.	Baldwin
Mond Nickel Co...	1	2-6-0	156,000	20x26	S.	Montreal	Sioux City Term...	1	0-6-0	117,000	19x24	S.	American
Monongahela R. R.	6	2-8-0	193,100	21x30	B.	American	Skaneateles R. R.	1	0-6-0	132,000	19x26	W.	American
Montreal L. H. & P.	1	0-4-0	15,500	6x10	S.	Davenport	Sou. Car. West. Ex.	†1	4-4-0	117,000	18x24	W.	Baldwin
Moore Timber Co.	1	2-6-2	76,000	13x22	S.	Baldwin	Sou. Alum. Co...	1	2-4-2	182,100	14x22	S.	Baldwin
Morrissey F. & M.	2	2-8-0	148,000	20x24	W.	Baldwin	Southern	15	2-8-2	274,000	27x30	W.	Baldwin
Nash, C. & St. L.	5	4-6-2	259,800	25x28	W.	Baldwin	Southern	10	4-6-2	231,300	24x28	W.	Baldwin
Native Lbr. Co...	1	Geared	84,000	12x15	...	Heisler	Sou. Ry. & Nav.	1	2-6-2	62,000	12x18	S.	Baldwin
N. J. Ind. & Ill.	1	2-6-0	120,000	18x24	S.	American	Sou. Ry. of Peru...	†4	2-8-0-S	115,000	16½x26	W.	American
N. O. Great Nor...	†1	4-6-0	169,000	20x26	W.	American	Southern Pacific...	12	2-8-2-S	265,600	23½x30	W.	Baldwin
N. Y. C. & H. R.	20	4-6-2-S	271,000	23½x26	W.	American	Southern Pacific ..	7	0-6-0	155,000	19x26	W.	Baldwin
N. Y. C. & H. R.	30	4-6-2-S	272,000	26x26	W.	American	Southern Pacific ..	8	2-8-2-S	285,100	26x28	W.	Baldwin
N. Y. C. & H. R.	20	0-6-0	168,000	21x28	W.	American	Southern Pacific ..	6	4-6-0-S	208,000	23x28	W.	American
N. Y. C. & H. R.	1	0-8-8-0-S	357,000	21½x34x30	W.	American	Southern Pacific ..	3	4-6-2-S	277,000	25x28	W.	American
N. Y. C. & St. L.	8	4-6-0-S	150,000	19x24	P.	American	South. Pine Lbr...	1	2-6-2	121,000	17x24	S.	Baldwin
N. Y. C. & St. L.	6	0-6-0-S	153,100	20x26	W.	American	Spokane, Pt. & S.	3	Elect.	.....	.....	...	Gen.-Elect.
N. Y. C. & St. L.	6	2-8-0-S	178,000	20x28	W.	American	Spokane, Pt. & S.	2	0-6-0-S	154,000	20x26	W.	American
N. Y. C. & St. L.	3	4-6-0-S	173,900	20x26	W.	American	Standard Lbr. Co.	1	Geared	104,000	14x15½	...	Heisler
N. Y. N. H. & H.	50	4-6-2-S	248,000	24x28	W.	American	Standard Lbr. Co.	1	Geared	170,000	16x18	...	Heisler
N. Y. N. H. & H.	25	0-6-0	138,000	19x26	S.	American	Stahdard Oil Co...	1	0-6-0	120,000	19x24	S.	Davenport
N. Y., Phila. & N.	2	2-8-0	202,000	22x28	W.	Co. Shops	Stewartstown	1	2-6-0	104,000	17x24	S.	Baldwin
N. Y., Phila. & N.	1	4-4-2	206,800	22x26	W.	Co. Shops	Sunset Tim. Co...	1	Geared	170,000	16x18	...	Heisler
Niagara F. Pr. Co.	2	Elect.	.....	.....	...	Bald.-West.	Susq. & New York	1	Geared	174,800	15½x16	...	Climax
Nigerian Rys.	8	4-8-2-S	140,000	18x33	W.	American	Sydney & Louisb'g	1	2-8-0	179,000	21x26	S.	Montreal
Nigerian Rys.	2	0-6-0-T	71,000	14x24	W.	American	Tacoma Smel. Co.	1	0-4-0	55,000	12x18	S.	Davenport
Nigerian Rys.	2	4-8-2-S	140,000	18x33	W.	American	Tall Tim. Lbr. Co.	1	2-6-2	117,650	17x24	S.	Baldwin
Norfolk & Western	40	2-6-6-2	405,000	22, 35x32	B.	American	Taupo Totara Tim.	1	2-4-4-2	66,000	10, 16x14	W.	American
Norfolk & Western	5	4-6-2	247,000	22½x28	B.	Co. Shops	Taylor & Crate...	1	Geared	52,000	10x12	...	Heisler
Norfolk & Western	24	Elect.	104,000	.....	...	Bald.-West.	Taylor Co. Lbr. Co.	1	2-6-2	77,500	13x22	S.	Baldwin
Norfolk Southern	5	2-8-0	172,525	21x28	B.	Baldwin	Tennessee Ry. ...	1	.....	126,000	20x24	...	Baldwin
Norfolk Southern	4	4-6-0	172,250	20x28	B.	Baldwin	Tennessee Ry. ...	1	.....	120,000	20x24	...	Baldwin
North B'd Lbr. Co.	1	Geared	124,000	12x16½	...	Heisler	Texas Midland....	2	2-8-0-S	190,000	23x28	W.	American
N. W. of Brazil...	*4	2-6-0	.....	.....	...	Baldwin	Tidewater Oil Co.	1	0-6-0	127,300	19x24	S.	Baldwin
Oahu R. & L'd Co.	2	2-8-0	103,000	16x20	S.	American	Toledo & O. Cent.	1	0-8-0	239,500	25x30	W.	American
Oakl'nd. Ant. & E.	2	Elect.	.....	.....	...	Bald.-West.	Toledo, P. & West.	†2	2-8-0	183,000	22x28	W.	Baldwin
Ocean Shore R. R.	2	2-6-0	160,400	21x28	W.	Baldwin	Toledo, St. L. & W.	5	2-8-0	191,350	21x28	W.	Baldwin
Oconto Company	1	2-6-2	103,000	16x24	W.	Baldwin	Toledo Terminal ..	2	2-8-0-S	198,000	22x28	W.	American
Ohio & Kentucky.	1	2-6-0	112,000	19x24	S.	American	Toronto, H. & B.	1	0-6-0	165,000	21x28	W.	Montreal
Opd'nw'r-A. C. Co.	1	2-4-0	44,000	12x18	S.	Davenport	Toronto, H. & B.	2	0-6-0	137,000	20x26	W.	Montreal
Oregon & Calif...	1	2-8-2-S	285,100	26x28	W.	Baldwin	Toronto, H. & B.	1	4-6-2	219,000	23x28	W.	Montreal
Oregon & Calif...	2	2-8-2-S	265,600	23½x30	W.	Baldwin	Transit Devel. Co.	2	Elect.	.....	.....	...	Was.-Gen. E.
Oregon & Calif...	1	0-6-0	155,000	19x26	W.	Baldwin	Tremont & Gulf...	1	4-6-0	134,075	19x26	S.	Baldwin
Oregon & Calif...	1	4-6-2-S	278,000	25x28	W.	American	Tremont & Gulf...	1	4-4-0	76,000	18x24	S.	Baldwin
Oregon Short Line.	15	2-8-2-S	276,750	26x28	W.	Baldwin	Trinity R. Lbr. Co.	1	2-6-0	117,750	18x26	S.	Baldwin
O.-W. R.R. & Nav.	10	2-8-2	265,600	23½x30	W.	Baldwin	Trona Ry.	†1	2-8-0	203,000	22x30	...	Baldwin
O.-W. R.R. & Nav.	6	0-6-0	145,000	19x26	W.	Baldwin	Twiggs & Son....	1	0-4-0	65,000	13x18	S.	Davenport
O.-W. R.R. & Nav.	6	4-6-2-S	277,000	25x28	W.	American	Union R. R.	5	2-8-0	254,000	24x32	S.	Baldwin
Paris & Mt. Pleas.	1	4-6-0	119,600	18x24	S.	Baldwin	Union Pacific	25	2-8-2	285,100	26x28	W.	Baldwin
Paulista Ry.	*2	2-6-2	.....	.....	...	Baldwin	Union Pacific	15	0-6-0	145,000	19x26	W.	Baldwin
Pekin Kaigan	4	2-8-8-2-S	300,000	20, 32x26	W.	American	Union Pacific	10	4-6-2-S	278,000	25x28	W.	American
Pekin Kaigan	5	4-6-2-S	180,000	20x26	W.	American	U. S. Government.	1	2-4-0	85,450	15x24	S.	Baldwin
Pekin Kaigan	4	2-8-0-S	185,000	20x28	W.	American	Utah Const. Co...	4	0-4-0	38,500	10x16	S.	Davenport
Pennsylvania R. R.	10	0-6-0	116,500	.....	...	Co. Shops	Vandalia	4	4-6-2	263,000	24x26	W.	American
Pennsylvania R. R.	22	0-8-0-S	180,000	.....	...	Co. Shops	Vir. & Car. Sou...	1	4-6-0	126,000	18x26	W.	Baldwin
Pennsylvania R. R.	33	4-4-2-S	240,000	.....	...	Co. Shops	Vir. & Sou.-West.	3	2-8-2	270,700	27x30	W.	Baldwin
Pennsylvania R. R.	80	2-8-0-S	244,800	.....	...	Co. Shops	Virginia & Truckee	1	4-6-0				

Vanadium Steel in Locomotive Construction, 1913.

During the year 1913, vanadium steel was used for locomotive parts as shown in the following table, the number of locomotives so equipped being also indicated:

	Number of engines	Number of parts
Axles	466	1277
Crank pins	188	580
Piston rods	69	138
Main rods	347	734
Side rods	354	1840
Springs (engine and tender).....	306	
Frames	776	1592
Engine truck axles.....	62	62
Wheels		700
Tires		1000
Cylinders (Vanadium cast iron).....	260	540

With the exception of wheels and tires, these figures include only new locomotives. In addition vanadium steel has been used extensively in repair work.

Patents Issued December 23.

- Railway car, 1,081,942—Ralph H. Beach, New York, N. Y.
 Nut lock for track bolts, 1,081,965—Marcus Kester, Olney, Ill.
 Movable headlight for locomotives, 1,081,992—Shelby E. Simmons, Russellville, Ky.
 Rail joint, 1,082,022—William Goldie, Jr., Bay City, Mich.
 Station indicator, 1,082,036—Cornelius P. McDonnell, Kansas City, Mo.
 Combined rail brace and splice, 1,082,042—William M. Palmer, Taft, Cal.
 Bolster stake holder, 1,082,073 and 1,082,073—Casper Faust, Oshkosh, Wis.
 Train control and signal system for double track railways, 1,082,095—Franklin A. Pierce, Wheeling, W. Va.
 Interchangeable car placard device, 1,082,155—Charles L. Herbst, and Romeo C. Avansino, Los Angeles, Cal.
 Composition filled brake shoe, 1,082,158—Harry Jones, Suffern, N. Y.
 Signal lamp, 1,082,169—Judson S. Pixley, New York, N. Y.
 Signal lamp, 1,082,178—Furman D. Spear, New York, N. Y.
 Roller side bearing, 1,082,179—Arnold Stucki, Pittsburg, Pa.
 Track contactor, 1,082,184—Charles W. Ward, Lakewood, Ohio.
 Coaling station, 1,082,194—Alexander B. B. Harris, Chicago, Ill.
 Hot water injector, 1,082,220—Thomas Henry White, Pendleton, Salford, England.
 Car vestibule diaphragm, 1,082,241—Harry H. Schroyer, Chicago, Ill.
 Car construction, 1,082,247—William James Tollerton, Chicago, Ill.
 Switch, 1,082,251—Alfred J. Wilson, Evansville, Ind.
 Tie and tie plate support, 1,082,252—Clemens W. Ackermann and Frank B. Ackermann, Chicago, Ill.
 Composition filled brake shoe, 1,082,266—Joseph D. Gallagher, Glen Ridge, N. J., and Harry Jones, Suffern, N. Y.
 Tank car construction, 1,082,269—John A. Jackson, Chicago, Ill.
 Fluid pressure brake device, 1,082,296—Walter V. Turner, Edgewood, Pa.
 Stormproof car door, 1,082,343—Gulesberry Marion Kirby, Aurora, Mo.
 Deflector and ventilator, 1,082,362—Shepherd Brown Shipley, Chattanooga, Tenn.
 Track bolt, 1,082,376—John Scott Wait, Jr., and Alexander Haliday, Two Harbors, Minn.
 Nut lock for track bolts, 1,082,389—John R. Armstrong, Cranston, R. I.
 Train order holder, 1,082,392—Jerome Barlow, Chicago, Ill.
 Railway crossover, 1,082,394—Isaac V. Bilyeu, Springfield, Ill.
 Locomotive stoker, 1,082,419—Norman E. Gee, Altoona, Pa.
 Rail fastening, 1,082,433—Ives A. Miller, Grapeville, Pa.
 Water gage glass column, 1,082,441—William M. Paul, Galveston, Tex.

Car door, 1,082,450—George H. Smith, Reliance, S. D.

Locking clamp bolt, 1,082,461—Evan O. Edwards, Chehalis, Wash.

Brake shoe, 1,082,462—William Gilmour, Montreal, Quebec, Canada.

Railway tie plant, 1,082,471—Arvid Saari, Duluth, Minn.

Electric signaling system, reissued, 13,663—John D. Taylor, Edgewood Park, Pa.



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RAILWAY REVIEW

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Proposed Through Routing of Steam Railroad Traffic in Chicago.

The Citizens' Terminal Plan Committee, of Chicago, has given out a report by Bion J. Arnold and Walter L. Fisher recommending through routing of steam railroad trains in suburban traffic. The report deplors the fact that the principle of through routing of steam railroads was practically ignored by the council committee. On that point the report says: "The lessons so slowly and so expensively learned with respect to through-routing on our street and elevated railroads are unlearned still with regard to the suburban and through traffic of the railroads operated by steam. Many of our city officials are deluded by the belief that obstacles in the way of the free movement of transportation with and through the city are somehow to the advantage of Chicago. They do not see that these obstacles and the expense, discomfort and delay they entail upon our own people of the greater Chicago are a needless burden imposed upon our people as a whole for the benefit of the comparatively small class who own property or do business at the points of congestion."

Progress of the Panama-Pacific Exposition.

The building of the great Panama-Pacific International Exposition, in San Francisco, Cal., has passed the preliminary stage and visitors to the grounds now gain an idea of what the grandeur, immensity and beauty of the finished product will be. All of the eleven main exhibit buildings are under construction, several are already roofed over and some, notably the Palace of Machinery, the largest frame structure ever erected by man, are rapidly approaching completion. It is estimated that all will be in condition to receive exhibits at least eight months previous to the opening date—a record in itself among the world's expositions of all times. Thousands of the greatest exhibitors in the world have applied for and been granted space, and the number of applications is constantly increasing. More than 7000 applications for concession privileges have been received, and the installation for the concessions in the amusement center is estimated from the amounts the concessionaires have agreed to spend as exceeding \$10,000,000, assuring a remarkable aggregation of amusement spectacles. Some of the concessionaires have already commenced construction. Thirty-two foreign nations have announced their intention of officially participating in the exposition and 35 states and territories of the American union have selected sites for their pavilions and these are on the way toward construction.

Control of Shifting Sand, Southern Pacific Co.

Reclamation of sand hills that is saving for the state of California a large area of valuable farming land is being accomplished by the Southern Pacific Co. along the ocean shore on its coast line near Goleta. Incidentally, this work secures the shifting sand along the right of way and makes the roadbed permanent. The history of Golden Gate park in San Francisco is being repeated; and what was once a barren waste of sand dunes is now becoming covered with useful trees and plants. From the San Francisco park commission a certain variety of grass is obtained which takes root and

grows rapidly. As it spreads and mats, the ground beneath is sheltered from the ocean winds and held firmly together, in good shape for later planting with less hardy vegetation. This work has been done for many miles along the Southern Pacific line and will be extended as time permits. It takes about three years for the grass to spread completely and prepare the soil for agriculture. The sand of itself is fertile enough. The drawback now is that vegetation cannot get a hold before it is caught up by the gales and carried away from the roots.

Railroad Instruction for U. S. Marines.

The commanding officer of the battalion of the United States marine corps stationed at Camp Elliott, Panama Canal zone, has requested that a detachment of his men be given instruction in locomotive running and train handling. Accordingly arrangements have been made for such instruction on trains and in the yards and engine houses of the Isthmian Canal Commission railway service. A committee of railway officials, in conference with officers of the marine corps, has formulated the following plan, which was placed in effect on December 22: 1. Twenty-four men are to be designated by the commanding officer at Camp Elliot for instruction. 2. The 24 men are to be divided into Class A and Class B, of 12 men each. 3. Class A to go on duty one week. To be composed of five men as student engineers, five as student trainmen, and two non-commissioned officers as student yardmasters, when they can be spared from military duties. One student engineman to be assigned to the wrecker engine; two student trainmen to be assigned to the wrecking train crew; four student enginemen to be assigned to I. C. C. locomotives in various services running out of Empire; three student trainmen to be assigned to conductors in various services running out of Empire. Assignments to be made by Mr. Barnett. 4. Class B, second week, to go through the same routine as Class A. 5. Class A, second week's training. Student enginemen to put in half a day for one week at Empire shops, under the supervision of Mr. Eason, for instruction in locomotive machinery and air brakes.

Good Accident Record, Pennsylvania R. R.

Not a single passenger out of 111,000,000 carried by the Pennsylvania Railroad in 1913 was killed in a train accident. Reports for the past six years show that almost 600,000,000 passengers, more than one-third of the whole world's population, have been carried by the Pennsylvania Railroad, and but 16 of them lost their lives in accidents to trains; nine were killed in one accident. In six years, out of approximately 5,000,000 trains operated, about 1370 a day, only five have suffered wrecks which caused the death of any of the passengers carried on them. Three of these years were entirely free from train accidents causing the death of passengers.

The Rogers Pass Tunnel, C. P. R.

The Canadian Railway and Marine World states that 350 men are now engaged in the preliminary work for the construction of the Rogers Pass tunnel of the Canadian Pacific Ry. in the Selkirk range. The tunnel will be more than 5 miles in length and will have a 1700 ft. approach on the west side, and a 2600 ft. approach on the east side. It will lower the summit of the road 545 ft., will shorten the distance by nearly 4 miles; and will cut out a stretch of road whereon snow slides have been troublesome. Before work can be started on the main tunnel, the course of the Illecillewaet river, for nearly a mile, will have to be changed. In doing this the river will be diverted some 900 ft. laterally from its present course. In the construction of the tunnel an auxiliary bore, 7x8 ft., will be driven parallel with the line of the

main tunnel, and from this cross cuts will be made at intervals, in order that work on the main tunnel may be carried on simultaneously at several points.

New Public Utilities Commission of Illinois.

The personnel of the new public utilities commission of Illinois, which took office January 1, displacing the previous Railroad & Warehouse Commission, is as follows: James E. Quan, wholesale grocer, in the firm of W. J. Quan & Co., Chicago; 44 years old. Mr. Quan will be chairman of the commission. Walter A. Shaw, civil engineer, former assistant city engineer of Chicago; now a member of the state rivers and lakes commission by appointment of Gov. Dunne. Richard Yates, of Springfield, former governor of Illinois. Frank H. Funk, of Bloomington; was Progressive candidate for governor in 1912. Owen P. Thompson, of Jacksonville, Ill., judge of the circuit court, Seventh district; sixteen years on the bench.

End of the Commerce Court.

The United States Court of Commerce passed out of existence with the close of the year 1913, and all the cases with which it had been dealing were assigned to the various United States District courts. Strictly speaking, there were no cases pending before the Commerce court, because all not otherwise disposed of have been appealed to the Supreme court; and there is a legal argument as to whether the Commerce court retained any jurisdiction at all over cases in which appeal had been perfected. However all such cases were assigned to the appropriate districts, amounting to an indication to those interested to what district the cases will be sent in the event the Supreme court mandates return them to a lower court for further proceedings.

Illinois Central R. R. Hit by Tax Assessment.

James G. Brady, auditor of the state of Illinois, has served formal notice on the Illinois Central R. R. demanding that the company increase almost three fold its annual payment of taxes to the state. The railroad owes the state, according to the auditor's figures, \$2,177,723 for 1913. The amount is in addition to \$1,355,178 which the railroad already has paid the state on the supposition that this payment settled in full its obligations for the year. Mr. Brady's action came as a complete surprise to the railroad officials. It was prompted by an opinion given to the auditor by Attorney General Lucey that under its charter the Illinois Central's taxes should be computed on full valuation of its property instead of on one-third, as is the rule in the case of private citizens and other corporations. This opinion is in direct conflict with a ruling given by former Attorney General Stead a few years ago. Mr. Lucey also held that in assessing the tax the Illinois Central is not entitled to make any deductions for indebtedness. Illinois Central officials protested strenuously against the justice of this assessment. Charles H. Markham, president of the railroad, said: "The action of the auditor in so assessing the property of this company as to add more than \$2,000,000 a year to its taxes is an outrageous attempt to injure a company that is one of the state's best assets and pays into the public treasury, through the payments provided in its charter, at a rate double that paid by any other railroad company. Not only so, but it is an attempt to override the methods of assessment of its property approved by a previous state administration, following a carefully prepared opinion of Attorney General Stead, and to have this company pay the state tax upon the full cash value of such property, while all other taxpayers pay the same tax upon one-third of the value of their property. The charter specified the class of property to be returned to the auditor. The company complied with

such requirements. The auditor, however, has not only doubled or trebled the valuation, putting it far in excess of the actual value, but has added thereto the full capital stock of the company, though such stock represents the other tangible property so valued and taxed, and thereby has levied the state tax both against the tangible property and against the capital stock, a procedure not tolerated or permitted in the assessment of property by the revenue laws of the state."

Militant Mayor of Memphis.

A freight train struck a street car at a crossing in the outskirts of Memphis, Tenn., January 4, and five persons were killed. The freight train was operating on a track, which, it was alleged, city authorities had ordered removed several days ago. The railroad had made no move to comply with the order. The following day E. H. Crump, mayor of Memphis, and Thomas Dies, commissioner of public utilities, headed a large force of men which, moving secretly, tore up the railroad tracks at the crossing where the accident occurred. The same day, however, an order obtained by the railroad in the chancery court, required the replacement of the track. The temporary restraining order enjoins the city from interfering with traffic of the railroad pending the hearing of arguments, January 9, on an application for an injunction which is expected to bring to an issue the right of the city to compel railroads to eliminate the grade crossings there.

B. & O. Employees Petition Interstate Commerce Commission.

Employees of the Baltimore & Ohio R. R., at Newark, Ohio, are circulating a petition to the Interstate Commerce Commission, asking that the application of the eastern railroads for an increase in freight rates be granted. The petition is being circulated in business circles, shippers, merchants, jobbers, buyers, public officials, professional men and others, showing a willingness to sign it. Several hundred names have been affixed to the document. The petition is being circulated on the initiative of the railroad men themselves and has the endorsement of all classes of employees. The communication to the Interstate Commerce Commission sets forth that the application of the railroads is believed to be wholly within reason, in view of the concessions made during recent years to employees, the higher cost of material and supplies and other items of expense having to be met. It also points out that both freight and passenger rates have been raised on foreign roads while during the same period in this country many of the rates have been reduced. "The undersigned urgently solicit your favorable consideration of the request for an increase in freight rates," reads the petition, "in order that railroad facilities may be developed to meet the demands of constantly increasing traffic."

Some Modifications in the 78 Questions.

The roads concerned in the rate increases proposed in the Official Classification Territory were represented in an interview with Commissioner Harlan, January 7, at Washington, regarding certain phases of the questions.

George S. Patterson, general counsel for the Pennsylvania, and Daniel Willard, president of the Baltimore and Ohio, headed the delegation, which had been selected to speak for all the railroads.

The commission had asked the railroads to answer 78 questions during the month of January. The testimony was intended to show that it would be highly expensive in some cases and physically impossible in others to comply with the request in so short a time. Modifications were suggested. For the New York Central it was represented that to answer the commission's questions about lighterage

at New York would cost \$75,000 in clerk hire and require one year. Mr. Brandeis suggested that a representative month be selected and that an answer be prepared on that basis. To answer the commissions's question about contracts for material, it was said on behalf of the Baltimore and Ohio that it would involve 13,000 pages of copying and a review of 100,000 transactions. The railroad offered to submit originals of any contracts the commission might wish to inspect. Mr. Brandeis agreed to that.

Frank Lyon, counsel for the Pittsburg Coal Company, brought to issue the shippers' rights by asking that the railroads be asked to furnish the cost of moving bituminous coal. Commissioner Harlan said there was no doubt as

to the right of shippers to be heard as to particular rates, but that he intended to ask the entire commission next week to pass on the question of whether hearings on particular rates should be incorporated into the hearing of the general question of increased rates or reduction of expenses, or whether shippers should be given an opportunity after those questions were decided to present their position.

The roads represented that it would be impracticable to give a detailed reply to the questions about unproductive expenditures for the years from 1898 to the present, and suggested that the period be limited from 1907 to the present—the time that the system of uniform accounting had been in operation.

Dynamometer Car for the Erie Railroad.

**This dynamometer car is provided with a possible pull or shock registering capacity of 1,000,000 pounds, and among other features, incorporates a means of recording locomotive data while the engine is standing still. This is accomplished by means of a supplementary record four inches wide; the roll being motor driven during periods when the car is standing and when motion from the axle-drive mechanism is, on that account, not available. Special provision for night running is made by placing hoods for searchlights at the floor level on either side of the car.*

The mechanical department of the Erie R. R. recently completed and placed in service, a dynamometer car, the general appearance of which is shown in Fig. 1. The designs and specifications for this car were prepared in the office of the mechanical engineer of the road at Meadville, Pa., under the direction of Mr. William Schlafge, general mechanical superintendent. With the exception of the recording table and the underframe, which were built in contract shops to drawings and specifications furnished by the road, the car was constructed in the Erie shops at Meadville.

The Dynamometer.—The dynamometer is of the liquid type with double pistons twenty inches diameter, whose heads press against blind rubber gaskets covering the liquid cylinders, from one of which the pressure of the draw bar pull is registered, the other the buffing. The pistons have

1-64 inch clearance and move on ball bearings and the arrangement is so designed that the pull or buff delivered at the coupler acts in a direct line on the dynamometer; the rubber gaskets doing away with piston fits or packing in such a way as to make the dynamometer practically frictionless. The pressure in the dynamometer cylinders (alcohol being used) is transmitted through extra heavy steel pipes to the recording table. The dynamometer apparatus is similar in principle, to that installed on a car for the Atchison, Topeka & Santa Fe Ry., and described with illustrations in the Railway Review for April 6, 1912.

Recording Apparatus.—The liquid pressure from the dynamometer is directed against the recording cylinder pistons which work against carefully calibrated springs connected to the recording arm. A combination of different springs and pistons at this point is used such as will give an 8-inch maximum movement of the recording arm each side of its central or neutral position; one side of the center registering buffing forces, the other indicating drawbar pull. By changing the combination of the springs and pistons, a registering capacity can be had to any desired amount up to 1,000,000 lbs. on the drawbar.

The following records are made on the dynamometer chart: is driven either by an axle drive or by a motor. Two rolls of paper are used; one being a 30-inch roll on which records



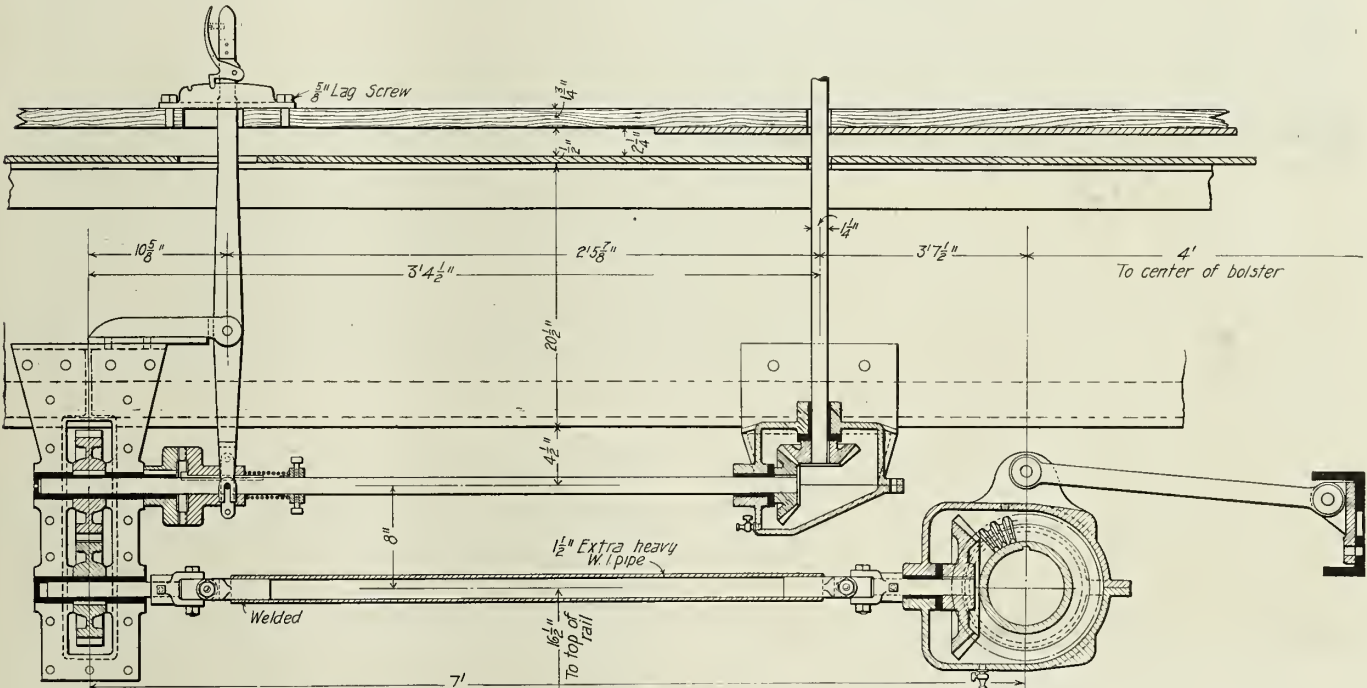
Dynamometer Car for the Erie R. R.

second intervals by an electric contact time clock. The record of location is made by an observer from the cupola of the car, by the use of a push button connected to one of the electric magnets on the recording table. The observer is also provided with an electric searchlight to assist in taking observations at night.

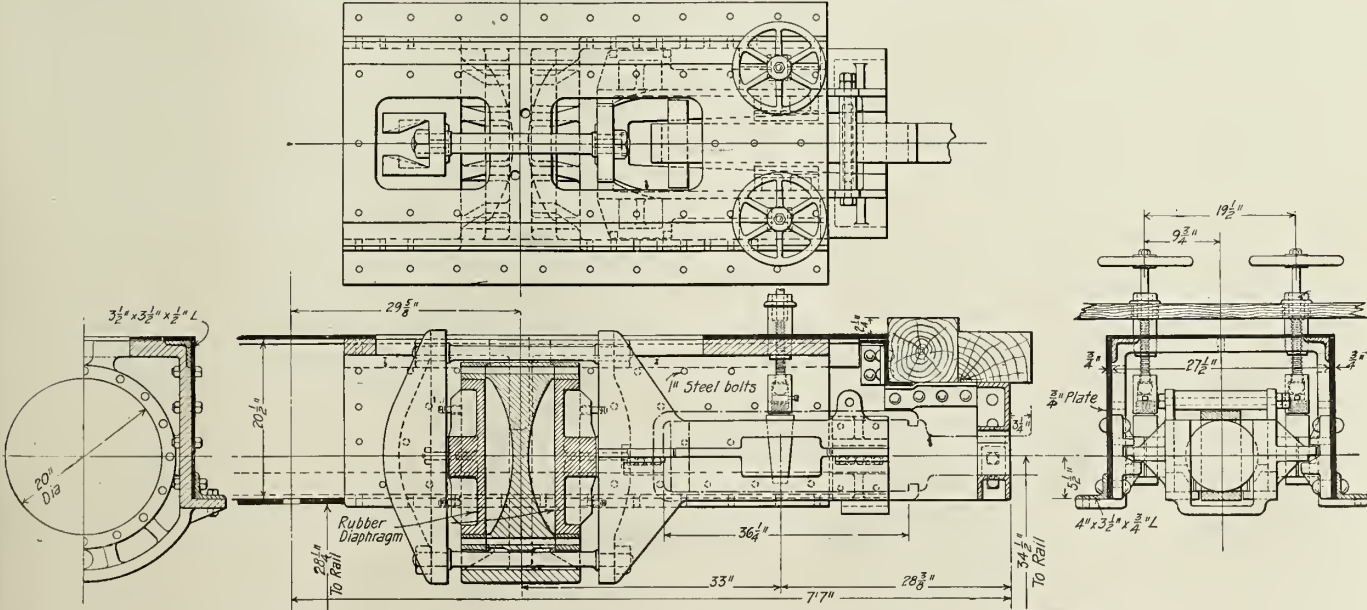
The Car Body—The car body was built for the accommodation of the dynamometer and the specially recording apparatus, for convenience in taking observations when in service, and for the accommodation of the operators. The dynamometer end of the car is built to comply with the postal department specifications for reinforcing the ends of mail cars. The recording room in the dynamometer end of the car is 17 ft. 7 $\frac{3}{4}$ in. long and 9 ft. 0 in. wide, containing the recording apparatus, switchboards, pressure gauges, clocks, work bench, cupboards, etc., with a cupola to assist the operators in taking observation. In the center of the car is a stateroom, 11 ft. 2 $\frac{1}{2}$ in. by 6 ft. 11 $\frac{1}{4}$ in., containing two upper and two lower berths. The rear end of the car contains a Baker heater, the toilet room, and the kitchen with

its range, refrigerator, sink and cupboards. The outside of the car is finished in standard Pullman color; the interior is finished in light oak.

The Underframe—The underframe is of the built-up type, consisting of web plates, cover plates and angles, with pressed steel transoms and built-up bolsters. The center sills are of two $\frac{3}{4}$ -in. thick web plates, 20 $\frac{1}{4}$ in. deep, spaced 27 $\frac{1}{2}$ ins. apart, reinforced by a $\frac{1}{2}$ -in. top cover plate 29 in. wide, with inside top angles 3 $\frac{1}{2}$ by 3 $\frac{1}{2}$ by $\frac{1}{2}$ -in. and outside bottom angles 3 $\frac{1}{2}$ by 4 by $\frac{3}{4}$ -in. The end sills and side sills are 6-in. Z bars weighing 15.6 lbs. per ft. The bolsters in each case consist of two $\frac{1}{4}$ -in. pressed steel web plates with $\frac{3}{4}$ -in. top and bottom cover plates. The three transoms are spaced 6 ft.-10 in. apart, between the bolsters, and are composed of one $\frac{1}{4}$ -in. pressed steel web plate with $\frac{3}{4}$ -in. top and bottom cover plates riveted to center sills and side sills. A Cardwell friction draft gear is used on the platform end of the car with a high capacity buffing arrangement. On the dynamometer end of the car a Westinghouse friction draft gear is used. The underframe is intended to have a shock-



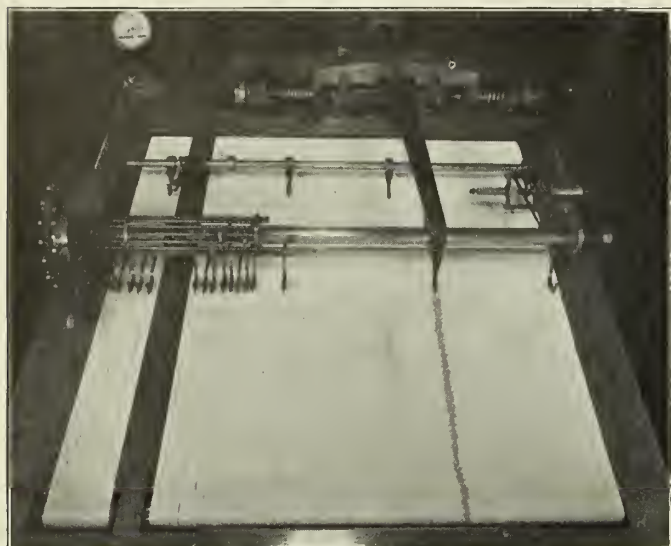
Transmission Apparatus for Recording Paper, Dynamometer Car for the Erie R. R.



Arrangement of Pressure Head and Draft Apparatus, Dynamometer Car for the Erie R. R.

resisting capacity of 1,000,000 lbs. The trucks have cast steel frames, bolsters, and spring planks, designed with special clearances to accommodate the dynamometer apparatus.

Electric Equipment—The car is equipped with a 32-volt car lighting system. The switchboard contains a standard car lighting control system and an auxiliary switchboard



Recording Table, Dynamometer Car, Erie R. R.

arranged with a series of multiple jacks in such a way that 8, 16, 24 or 32 volts can be used on any of the electric connections on the recording table.

General Dimensions—The general dimensions of the car are as follows:

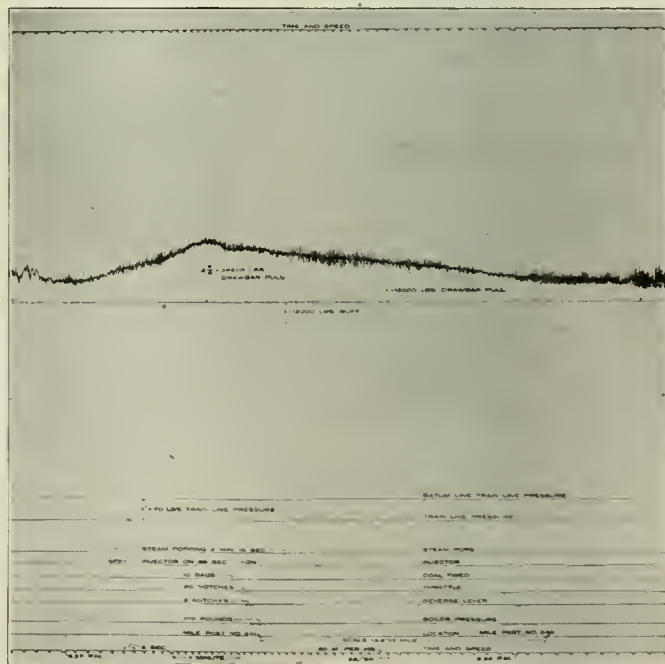
Length over end sills	40 ft. 8 in.
Total wheel base	35 ft. 4 in.
Center to center of trucks	27 ft. 4 in.
Wheel base of trucks	8 ft. 0 in.
Width over side sills	9 ft. 8 in.
Extreme width (outside of eaves).....	10 ft. 2½ in.
Total weight of car	91,250 lbs.
Hight from top of rail to eaves.....	10 ft. 5 in.
Hight from top of rail to cupola running board.....	13 ft. 1½ in.
From center of bolster to outside of end sill on dynamometer end	7 ft. 0 in.
From center of bolster to outside of end sill on platform end	6 ft. 4 in.
Kind of trucks	Four wheel cast steel
Size of journals	5 by 9 in.

For the information above given and for the material from which the accompanying illustrations were prepared, acknowledgement is due William Schlafge, general mechanical superintendent of the Erie R. R. at New York city, New York.

Morgan Firm Retires from Directorates.

J. Pierpont Morgan & Co., of New York city, announced on Friday, January 2, that Mr. Morgan and four of his partners had resigned from the directorates of more than a score of large corporations in which the banking firm, had been interested. The action was given significance as indicating a change of the financiers' policy with regard to representation on the boards of concerns with which the bankers have held fiduciary connections; and this significance was emphasized when, on the same day, George F. Baker, of the First National Bank, another dominant figure in American finance, made an announcement of his intention to make moves of the same nature. Mr. Morgan made the following public statement announcing the withdrawal of five mem-

bers of J. P. Morgan & Co. from directorates in 27 corporations and the intention to withdraw from more: "The necessity of attending many board meetings has been so serious a burden upon our time that we have long wished to withdraw from the directorates of many corporations. Most of these directorates we have accepted with reluctance and only because we felt constrained to keep in touch with properties which we had reorganized or whose securities we had recommended to the public, both here and abroad. An apparent change in public sentiment in regard to directorships seems now to warrant us in seeking to resign from some of these connections. Indeed, it may be, in view of the change in sentiment upon the subject, that we shall be in a better position to serve such properties and their security holders if we are not directors. We have already resigned from the companies mentioned and we expect from time to time to withdraw from other boards upon which we feel there is no special obligation to remain." The list of corporations from which the five individuals have withdrawn, is as follows: J. P. Morgan—New York Central & Hudson River R. R.; West Shore R. R.; Lake Shore & Michigan Southern Ry.; Michigan Central R. R.; New York, Chicago & St. Louis R. R.; Cleveland, Cincinnati, Chicago & St. Louis Ry.; New York, New Haven & Hartford R. R.; Central New England Ry.; New York, Westchester & Boston Ry.; Harlem River & Port Chester R. R.; Millbrook Co.; New England Navigation Co.; New England Steamship Co.; Rhode Island Co.; Rutland Ry.; Hartford & Connecticut Western; New York, Ontario & Western Ry.; Western Union Telegraph Co. Charles Steele—Jersey Central R. R.; United States Steel Corporation. H. P. Davidson—American Telephone & Telegraph Co.; Astor Trust Co.; Guaranty Trust Co., of New York; Chemical National Bank. W. H. Porter—Bankers' Trust Co.; Guaranty Trust Co., of New York. T. W. Lamont—Westinghouse Electrical & Manufacturing Co.; Utah Copper Co.; Astor



Sample Record Made by Dynamometer Car, Erie R. R.

Trust Co.; Bankers' Trust Co. The above named, and other partners in the Morgan banking house still retain directorships in a large number of corporations, among which are several of the great railroad systems, and many smaller lines.

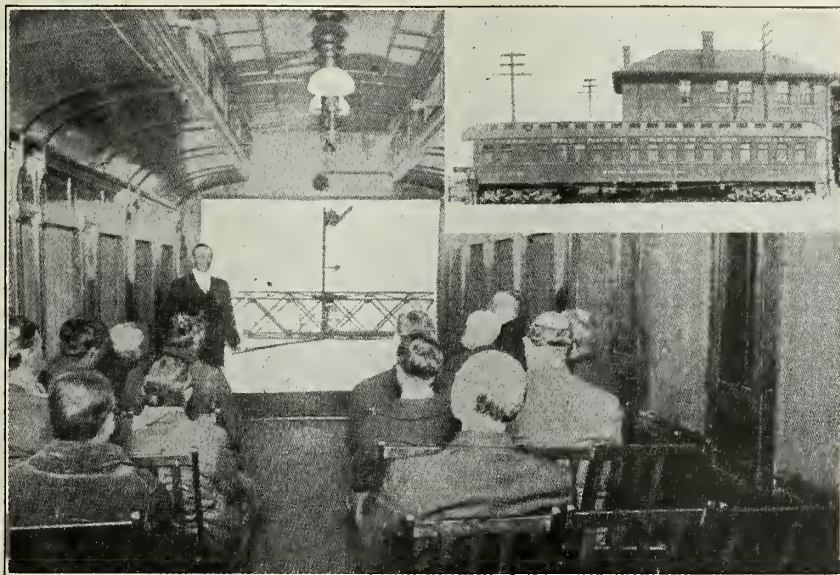
George F. Baker is a director in more than sixty cor-

porations, a greater number than any other one man in the country.

Signal Instruction on the Chicago & Northwestern Ry.

The Chicago & Northwestern Ry. has inaugurated signal instruction by lectures in a car fitted up for the purpose, that will cover the lines of the system twice a year. The lectures are for the benefit of all operating employees.

An interior view of the passenger coach that has been refitted for the purpose is here shown. Half of the car is given over to a lecture room. At the other end are the quarters of the instructor, the heating plant, and a dark room and other facilities.



Interior of Signal Instruction Car, C. & N. W. Ry.

ties for the developing of pictures and making of lantern slides. The instructor is supplied with a combination gas-electric stereopticon machine and an oxyhydrogen (OH) gas generator, for use at points where electric power is not obtainable. The car also is fitted with both gas and electric lighting facilities.

Scheduled stops are made at important points on each division. At each point lectures lasting about two hours are given, illustrated by stereopticon views taken along that particular division. All signal and interlocking devices, in their different positions or aspects, special track work and other conditions not likely to be understood by the average employee are brought up and explained. Mr. C. G. Stecher, an expert in the signal department, is in charge of the car and the work of instruction.

Interpretations of Rules of Interchange.*

Important questions having arisen as to the proper interpretation of the rules of interchange of the Master Car Builders' Association, effective October 1, 1913, the arbitration committee believed it would be to the mutual interests of all concerned in interchange if it could meet the chief interchange inspectors of the country and discuss questions that may have been raised on any of the rules in order that a definite understanding might be reached by all concerned and that the rules might be interpreted in a uniform manner. Pursuant thereto, an invitation was extended to all the chief interchange inspectors to meet the committee in the office of the secretary, on October 28, 1913. It was agreed that such rulings as were made at this meeting should be sent to all the members of the association, and that these

should supersede the rulings given in Circular No. 12, issued September 13, 1913; that any rulings in Circular No. 12 not covered by this circular should be considered null and void. The rules were then taken up and the following interpretations rendered:

Rule No. 1.—Running repairs are defined such repairs as are necessary to make a car safe and serviceable to run and, as far as practicable, safe to load. The spirit of the rules is that foreign cars should be maintained by the handling company. This item was inserted in the rule to more forcibly call attention to the necessity of this practice.

Rule No. 2.—In the matter of an embargo against light capacity or other cars, it is to be understood that the M.

C. B. rules do not provide for embargoing any car on account of capacity or design. Paragraph (c) of this rule refers to the provisions of loading rules only, and it is suggested that it be understood as though it read as follows: "(c) Cars improperly loaded (not complying with the Loading Rules) when transfer or rearrangement of lading is necessary."

Rule No. 3.—As to what constitutes damage so slight that repairs are not required, this is regarded as a question of judgment entirely. At outlying points, where joint inspection is not in effect, the matter will be left to the judgment of the receiving line. At the larger points, where chief joint interchange inspectors are employed, the decision will be made by the chief joint interchange inspector, as the representative of the receiving line.

Rule No. 4.—The references to rules in the first sentence should be Rules 46 and 58. In the second sentence they should read: "Rules 35, 56, 57 and 70." As to

the matter of missing brake beam, under M. C. B. rules, a car can not be offered in interchange with a missing brake beam. Also under Rule 4, defect cards are required for missing material due to unfair usage.

In reading Rule 4, the second paragraph of the preface of this code of rules, and Rule 3, must be taken into consideration.

Rule No. 5.—Both sides of defect cards should be filled out in all cases. If the defect card is only filled out on one side, it becomes illegible very quickly.

Rule No. 12.—The proper time and place to sign joint evidence card is preferably at the point where the car is received on home line, but joint evidence may be obtained at any point on the home line at which the improper repairs may be found.

Rule No. 14.—Designating the location of body defects in the same manner as truck defects is not a requirement of the rules, but there are no objections to such practice.

Rule No. 15.—This rule should read: "Duplicate defect, billing repair or joint evidence cards must be furnished promptly on request for lost or illegible cards."

Rule No. 35.—The third paragraph of this rule regarding stenciling of cars applies to both old and new equipment. The and year when built new. The committee would make the meaning of the words, "date when built," refers to the month suggestion that, in so far as cars built prior to 1895 are concerned, it will only be necessary to stencil cars "built prior to 1895."

Rule No. 48.—In case of interior fire damage, in any class of car, if the evidence of such interior damage is not discernible externally, such interior damage is an owner's defect.

*From Bulletin No. 18 of the Master Car Builders' Association, issued by the secretary on Dec. 11, 1913.

Rule No. 53.—Rule 53 should be removed from the bracket and only Rules 54 and 56 included in same.

Rule No. 57.—Air brake hose not bearing the names of the manufacturer and the purchaser does not comply with the M. C. B. specifications.

Rule No. 58.—A missing dust collector is cardable in interchange, as it can not be missing in fair usage.

Rule No. 98.—The proper charge in case two secondhand wheels are applied and two scrap wheels are removed is \$4.75; a credit of \$4.75 should be allowed for each wheel removed and applied. The same charges and credits hold in case two secondhand wheels are applied and one secondhand and one scrap are removed.

Rule No. 115.—The last paragraph, page 83, regarding secondhand credit for wheels, should be charged to conform

to Rule 98, that is, the average credit price should be used.

Rule No. 120.—A home route card should have noted on it all existing defects, as covered by joint evidence statement. It should be borne in mind, however, that this rule refers only to such cars as have deteriorated generally to such an extent as to make it doubtful whether the money expenditure necessary to make them safe and serviceable is warranted. Scrap credit for the different metals under M. C. B. rules should be made for air-brake equipment when the owner authorizes destination of the car. The scrap price allowed for scrapping cars under this rule applies to secondhand wheels and axles which may be under the car as well as to other parts of the car. In the case of a home route car card, the evidence of two inspectors is necessary.

The Engineering Problem of Electrification.

By A. H. ARMSTRONG.

The author, who is assistant engineer, railway and traction department, General Electric Company, herein makes an important contribution to electric railway literature. He analyzes the three systems which would be considered for main line electrification, viz., the single-phase alternating current, split-phase alternating current, and high voltage direct current systems, and shows the present standing of each as regards their use on important roads. The efficiency of the different systems is reviewed from many different standpoints. A convincing illustration is included, showing the comparative sizes of the split-phase alternating current and the 2400-volt direct current locomotive. From a paper read before the Canadian Society of Civil Engineers in Montreal on December 18, 1913.

It is proposed to replace the steam engine with a type of motive power that offers superior advantages in the hauling of heavy trains. In other words, the electric locomotive itself constitutes the main argument in favor of electrification, and no marked excellence of distribution system can offset the failure of the electric motive power. The steam locomotive it is proposed to replace is a highly developed machine of great reliability and the result of the experience born of a great many failures. It cannot be too strongly emphasized, therefore, that the electric motive power is the controlling factor in main line electrification, a point of view that is sometimes overlooked.

The three electric systems considered for main line electrification are as follows: 1. Single-phase—alternating. 2. Split-phase—alternating. 3. High voltage—direct current.

The single-phase commutating motor has been in operation upon interurban electric railways for some years, and a study of the history of these installations reveals some of the fundamental reasons why this type of motive power has not been more generally adopted. It has been found that the initial expense and cost of upkeep of rolling stock equipped with single-phase commutating motors is fully double that of cars having the same seating capacity and equipped with direct current motors. No new installations have been made for the past two years, and the several single-phase roads are being changed over to direct current as fast as financial conditions will permit.

The introduction of the single-phase system was a result of the success of suburban and interurban electric railway operation and the extension of these lines over large areas, thus bringing into prominence the question of economical power distribution. It was recognized that a voltage higher than the commonly accepted standard of 600 volts was de-

sirable upon the trolley in order to minimize the cost of installing feeder copper and substations. While the single-phase motor was being developed and installed upon interurban railways, careful attention was also being given to the question of the possibility of using direct current motor equipments at higher voltages and resulted in the installation of the first 1200 volt road, the Indianapolis & Louisville railway, operated in 1907. The success attending this operation led to other similar installations at both 1200 and 1500 volts until it is now generally recognized that the high voltage direct current system is without a competitor for all classes of suburban and interurban electric railways. It is a safe prediction to make that no more single-phase motor equipments will be placed in operation in this country on new roads unless these roads virtually form an extension of existing systems. All the direct-current, high-voltage roads are operating with the highest degree of success and no change of type of equipment has been made or any such contemplated.

The history of the battle of the systems and the elimination of the single-phase motor as being unsuitable for the equipment of light electric railways has an important bearing upon the selection of systems for main line electrification. The limitations of the single-phase motor that led to its failure in the interurban railway field do not appear to be lessened when considering it for locomotive equipment,

MAIN LINE ELECTRIFICATION — UNITED STATES AND CANADA

Installation	Year	Type Locomotive	System	Voltage
St. Clair Tunnel...	1908	Geared	Single-phase alternating	3300
N.Y., N.H. & H...	1907	Gearless	" " "	11000
Hoosac Tunnel...	1911	Geared	" " "	11000
Cascade Tunnel...	1909	Geared	Three-phase "	6600
*Norfolk & Western	1914	Geared Side Rod	Split-phase "	16500
Baltimore & Ohio Tunnel.....	1895	Geared	Direct Current	600
New York Central	1906	Gearless	" "	600
Detroit Tunnel...	1910	Geared	" "	600
Pennsylvania Terminal.....	1910	Side Rod	" "	600
Butte, Anaconda & Pacific.....	1913	Geared	" "	2400
*Canadian Northern	1914	Geared	" "	2400
*Canadian Pacific..	1914	Geared	" "	2400

* Under construction.

with the result that it is in use on but three of the twelve roads that are truly representative of electrified steam roads operating large electric locomotives. The accompanying tabulation gives a list of electrified main line railways in the United States and Canada. There are other electrified steam lines but the service on them more nearly approaches that of high class electric interurban railways. Also there are interurban systems where electric locomotives of considerable capacity are operated, but the class of service does not approach the exacting demands of main line passenger and freight operation. The table, however, comprises converted steam lines where the service consists of hauling main line

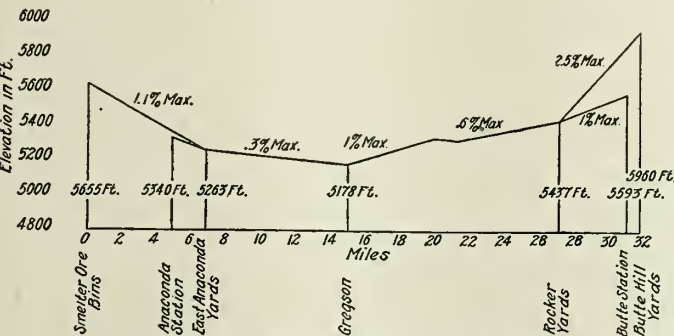


Fig. 1—Profile of Butte, Anaconda & Pacific Ry.

passenger and freight trains behind electric locomotives of large capacity.

It is a noteworthy fact that the use of the single-phase motor has not extended beyond the two original roads installing this type of equipment, the Grand Trunk and New York, New Haven & Hartford (including Hoosac Tunnel installation), whereas direct current motors have been universally adopted in all the more recent electrifications with the single exception of the proposed split-phase installation on the Norfolk & Western Ry.

The so called "split-phase" system is comparatively a newcomer in the electric traction field and it has not yet been subjected to the test of actual operation. The proposed system offers many attractive features, however, and it is worthy of careful study in order to understand its fitness for heavy electric railway service. From experimental tests made, it seems reasonably certain that the split-phase locomotive can meet the demands of commercial operation with satisfactory reliability. The split-phase locomotive was first described by E. F. Alexanderson, and reference is made to his articles for a full understanding of its underlying principles.*

Confronted with the problem of main line electrification and the demand for a distributing system which would provide for the economical distribution of large units of power over an extended area, the need of higher direct current voltage was appreciated and resulted in the first installation of 2400 volts direct current upon the Butte, Anaconda & Pacific Ry., first operated May 28, 1913. This installation marks an epoch in electric railway progress, as its success offers substantial proof that direct current motor equipments can be constructed at a reasonable cost and operated in an efficient and reliable manner with trolley potentials as high as 2400 volts.

It has been characteristic of the installations operating at 1200 and 1500 volts that the reliability of the direct current motive power has been in no way impaired by reason of using a higher trolley voltage, in fact, the maintenance of 1200 volt motor equipments shows no increase over that of

600 volt equipments. A brush life of over 150,000 miles gives evidence of good commutator performance with practically no wear and the increased insulation and creepage distance provided has been ample to ensure reliability and low cost of maintenance.

The transition from 1200 to 2400 volts direct current has also resulted in completely successful operation at this potential. The operating record of the Butte, Anaconda & Pacific 2400 volt direct current system has been truly remarkable and can best be expressed by a quotation from a letter by H. A. Gallwey, general manager:

"In reply to your inquiry I would say that on Oct. 1, 1913, the Butte, Anaconda & Pacific Ry. established regular electric passenger service between Butte and Anaconda. For approximately four months previous to this the freight service between East Anaconda yards and the smelter had been handled electrically. During this period electric locomotives have made approximately 55,000 miles and have delivered to the smelter about 1,500,000 tons of ore. Since starting the electric service there has been no failure of any of the electric apparatus and no delay in any way attributable to electric operation.

"The substation at Anaconda has been in continual service twenty-four hours a day with no more than ordinary care and without replacement of any parts. The locomotives have been operated by the steam locomotive enginemen and have been maintained by the regular shop force with the addition of one man experienced in electric operation. They have met every requirement and there has been no failure or replacement of locomotive parts.

"The overhead contact system has been highly successful, and there have been no failures and no accidents. The wear of the contact wire is inappreciable. The original pantograph rollers on the locomotives are still in use and show very slight wear notwithstanding the severe conditions imposed by the smoke and soot deposited on the wire from the steam locomotives during the several months of construction. Our experience up to the present time indicates the complete success of our electrification and justifies the existing optimism and enthusiasm for heavy railroad electrification."

The success of high voltage direct current installations has not been marred by a single instance of failure due to fundamental defect in the type of apparatus used, and justifies

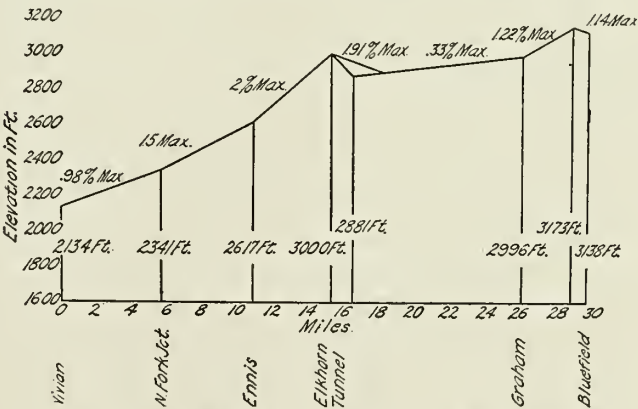


Fig. 2—Profile of Elkhorn Division, Norfolk & Western Ry.

the conclusion that the 2400 volt, 1200 volt and the 600 volt direct current equipments are all part of the same general direct current system, and that the only difference is the need of more insulation in one case than in the other. The 2400 volt direct current installation of the Butte, Anaconda & Pacific cannot be looked upon, therefore, as in any way constituting a new "system" of electrification, but rather as a natural development along the lines of higher voltage of the same well known direct current system which has

*A. I. E. E. Proceedings, 1911, Induction Machines for Heavy Single-Phase Motor Service, G. E. Review, October, 1913, The Split-Phase Locomotive.

rendered such excellent account of itself in the past on all our city and practically all of our suburban and interurban electric lines. This has an important bearing upon the general electrification of the steam roads, as it places the status of the direct current system as applied to such service.

Fully appreciating the grave responsibility of selecting a type of motive power for a proposed electrification that holds promise of special fitness for the immediate service contemplated and also is capable of meeting the demands of unlimited future extensions, this paper will briefly touch upon the comparative characteristics of the split-phase and 2400 volt direct current systems of operation. The choice seems to lie between split-phase and direct current in as much as the history of the single-phase motor equipment does not seem to justify its further consideration for heavy electric railroading.

A general scheme of distribution to the split-phase locomotive is shown in the accompanying diagram, Fig. 5, which has special application to western railways where 60-cycle power supply is universally standardized. A corresponding diagram of the 2400 volt direct current system is shown in Fig. 6, this also being adapted to 60-cycle power supply.

Starting first with a comparison of the two types of locomotive, it is necessary to make some general assumption as regards service conditions in order to draw conclusions as to relative locomotive characteristics. The electric locomotive is capable of being constructed in very large units, but convenience in shopping and simplicity in construction both point to a unit of approximately 100 tons total weight on drivers. These 100-ton units can be coupled together and operated as a single locomotive of any desired capacity, though probably a two unit locomotive weighing 200 tons and giving a starting tractive effort of 120,000 lbs. is as large as the draft gear will stand.

Experience with steam locomotive practice seems to point to a locomotive rating on ruling grade that calls for a tractive effort corresponding to approximately 18 per cent coefficient of adhesion on drivers. Thus the conditions obtaining upon a 2 per cent ruling gradient will be as follows:

Tractive effort due to 2 per cent grade.....	40 lb.
Tractive effort due to train resistance.....	6 lb.
Tractive effort due to curve resistance.....	2 lb.

Total per ton	48 lb.
Total weight on drivers.....	200,000 lb.
Rating at 18 per cent coefficient of adhesion.....	36,000 lb.
Gross train weight	750 tons
Trailing train weight	650 tons
Speed	15 m.p.h.
Net output at drivers.....	1450 h.p.

A maximum load of 50,000 lb. per axle has been assumed as being within acceptance of good practice. The question of speed on ruling grade is one subject to local requirements, but in general a speed of 15 miles per hour on 2 per cent grade is as high as desirable on roads of moderate tonnage.

As ruling grade generally extends unbroken over comparatively short distances, it is possible to take advantage of this fact in electric locomotive design and proportion the motive power for a continuous capacity of say 16 per cent coefficient of adhesion without danger of exceeding safe temperature limits in operation. The continuous capacity of the 100 ton unit would therefore be 32,000 lb. tractive effort at slightly more than 15 miles per hour, based upon 16 per cent coefficient of adhesion of the weight upon the drivers.

Owing to the moderate speeds at which a freight locomotive will operate, it is entirely feasible to consider a construction wherein the motors are geared direct to the driving axles by twin gearing, in this respect following the practice of the Detroit Tunnel, Cascade and B. A. P. locomotive which has proved very successful.

For the purpose of this comparison, it is assumed that both

split-phase and direct current locomotives will be of similar construction and employ twin geared motors of equal weight and efficiency. A comparison of weight distribution in the two types of locomotives is presented herewith.

Comparative Weight of Locomotive—Continuous Capacity 32,000 Lbs.—15 M. P. H.

	Split-Phase	2400 Volts Direct Current
4 Motors	44,000 lb.	44,000 lb.
Control apparatus complete...	17,000 lb.	27,000 lb.
Air compressor	4,000 lb.	4,000 lb.
Air brake equipment.....	3,000 lb.	3,000 lb.
Miscellaneous	2,000 lb.	2,000 lb.
Phase converter	22,000 lb.	.....
Transformer	13,000 lb.	.....
Cab and running gear	160,000 lb.	120,000 lb.
Total	270,000 lb.	200,000 lb.

As the direct current locomotive of 100 tons carries no ballast, it is evident that the 40,000 lb. comprising the phase converter and transformer of the split-phase locomotive must

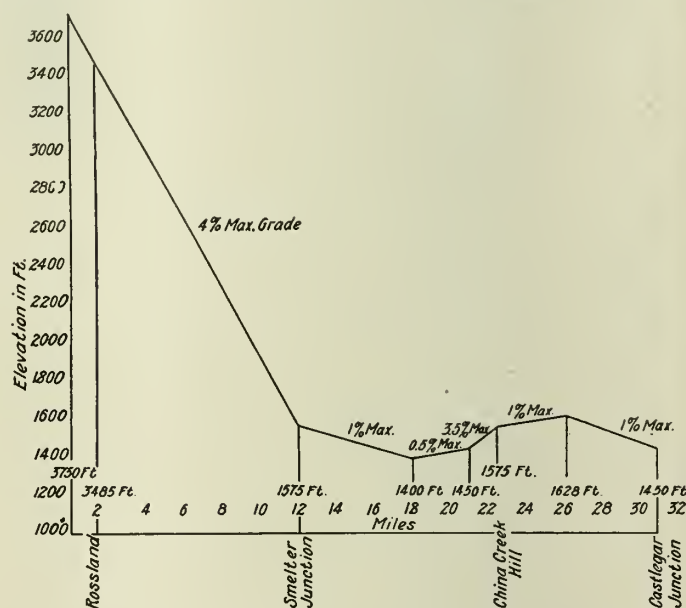


Fig. 3—Profile of Rossland Subdivision, Canadian Pacific Ry.

be carried on idle wheels together with the additional weight of cab and running gear required to carry this excess weight. The net result is a split-phase locomotive of fully 35 per cent more weight than a direct current locomotive of equal capacity and of similar construction. This weight comparison is based upon the assumption that 50,000 lbs. per axle constitute the limit allowable, thus forcing the introduction of guiding axles to carry the excess weight of the split-phase equipment. For locomotive construction of less capacity permitting the split-phase to come within axle weight limits, both types of locomotives would comprise four axles with no guiding wheels and the split-phase locomotive may not total more than 20 per cent more than the direct current type.

It is evident that the split-phase locomotive is not only considerably heavier for equal capacity, but also more complicated and inefficient than the direct current locomotive. The power from the trolley must in turn pass through transformer, phase converter, control, motors and gears. The efficiency of the complete locomotive in operation will depend upon its output and hence in the following comparison, efficiency has been computed for operation on both ruling grade and level track. The average efficiency of a day's run will obviously lie somewhere between these values, assuming that portion of the run when the locomotive is taking power.

Freight Locomotive Efficiency—Detailed Comparison.

	Split-Phase		2400 Volts Direct Current	
	Ruling Grade	Level	Ruling Grade	Level
Motors and gears.....	89.3%	86.0%	89.3%	86.0%
Blower	97.8%	95.8%	97.9%	95.9%
Starting resistances	98.6%	98.0%	99.2%	99.4%
Phase converter	96.3%	94.7%	.....	.....
Transformer	98.0%	97.0%	.....	.....
Wheel correction	98.0%	98.0%	.....	.....
Weight efficiency	95.0%	97.0%	.....	.....
Combined efficiency	75.7%	70.5%	86.6%	82.0%
Average of grade and level..	73.1%		84.3%	

Motor and gears are assumed to be of equal efficiency for both split-phase and direct current, as the advantage of one type motor over the other will be small at best and will not materially affect the values given.

Blower efficiency is based upon the fan blower required to cool the motors and auxiliaries taking 30 kw. split-phase and 25 kw. direct current.

Starting resistances consume a portion of the power required to start the train, and efficiency of the locomotive is based upon the assumption that the train is started from rest once in two hours. This starting resistance loss is greater with the split-phase than with the direct current locomotive, being twice as large up to speeds of 15 miles per hour on ruling grade and four times as large up to speeds of 30 miles per hour on level track.

Phase converter efficiency is determined by assuming that the capacity of the converter will approximate 75 per cent of that of the four motors it controls.

Transformer efficiency values given require no comment.

Wheel correction is determined as follows:

Induction motors run at nearly synchronous speed, the slip being proportional to the total secondary non-inductive resistance, hence all wheels upon the same locomotive must be very closely of the same diameter in order to insure equal loading of the several motors. When one pair of wheels is turned, all must be turned equally. This would not be a very serious handicap were it not for the fact that several locomotives will operate in the same train thus necessitating equal wheel diameters on all such locomotives. It is, therefore, evident that all locomotives must be interchangeable and any group of two or more be capable of running in the same train or the operating department will be seriously handicapped.

The diameter of new and turned wheels may vary fully 4 per cent, an amount sufficient to cause a prohibitive load distribution between motors. Hence it is proposed to install a variable secondary resistance and so adjust this resistance in the several motor secondaries that all wheel

peripheral speeds will conform to the average diameter of new and worn wheels. This will entail an average loss of say 2 per cent when operation has continued long enough to require turning wheels to the minimum diameter allowable. Direct current motors have such a variable speed characteristic as to require no adjustment for varying wheel diameters.

Comparative Weight Efficiency—Freight Locomotives.

	2400 Volts	
	Split-Phase	Direct Current
Rated t. e. on ruling grade.....	36,000 lb.	36,000 lb.
Gross train weight	750 tons	750 tons
Trailing train weight.....	615 tons	650 tons
Per cent trailing to gross.....	82%	86.7%
Weight efficiency	94.7%	100%

On level track it is assumed that pushing locomotives will be dropped and train weight per road locomotive will be double the ruling grade values. On this basis the split-phase locomotive weight efficiency will be 97 per cent for level track runs. Both values of split-phase locomotive weight efficiency are based upon the assumption that locomotives will be loaded to 100 per cent capacity on ruling grades. As such will not always be possible in regular operation it is evident that the values quoted above will be lower under actual service conditions.

The combined efficiency of the complete locomotive shows that the split-phase freight locomotive will demand 15 per cent more power input from the trolley than a direct current locomotive of equal hauling capacity and similar mechanical drive.

For passenger service it is reasonable to expect the locomotive running gear to be so constructed as to permit maximum speeds approaching 75 miles per hour without danger of derailment or exceeding safe limits of motor and drive construction. Neither of the forms of construction in Fig. 7 are well adapted for very high speeds, and to secure good running qualities it is probably necessary to adopt different types of construction for freight and passenger locomotives, however desirable it may be from an operating standpoint to have them interchangeable.

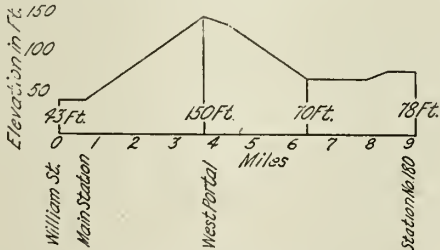
With direct current motors several forms of construction are available that will all operate successfully at high speeds. The most efficient construction is unquestionably to mount the motor armatures upon the driving axles and eliminate the losses, weight and complications of any form of mechanical drive. It is assumed in this comparison that gearless construction will be adopted for direct current high speed passenger locomotives.

The split-phase locomotive motor is of the multiphase induction type and not adapted to gearless construction except by the introduction of quills and springs. This form of construction has not been so successful in operation as to justify considering its general adoption. It is assumed therefore that in order to get a locomotive of good riding qualities at high speeds, it is necessary to resort to side rod drive from a jack shaft and house the motors in the cab. In this comparison it is assumed that motors drive the jack shaft through gears rather than by rods as offering a lighter form of construction requiring less space. The same form of drive is equally available with direct current motors, but gearless construction offers great advantages such as extreme simplicity, accessibility and high efficiency, so that comparison will be based upon geared side rod split-phase and gearless direct current motor locomotives.

Passenger Locomotive Efficiency—Detailed Comparison.

	2400 Volts	
	Split-Phase	Direct Current
	Ruling Grade	Ruling Grade
Motors and gears.....	89.3%	87.5%
Blower	97.8%	97.9%
Starting resistance	98.6%	99.2%
Phase converter	96.3%	.....
Transformer	98.0%	96.0%
Wheel correction	98.0%	98.0%
Weight efficiency	92.5%	92.5%
Jack shaft	97.0%	93.0%
Side rods	97.0%	93.0%
Combined efficiency	69.3%	85.0%
Average of grade and level..	61.9%	87.1%

Fig. 4—Profile of Montreal Tunnel and Terminal Electrification, Canadian Northern Ry.



peripheral speeds will conform to the average diameter of new and worn wheels. This will entail an average loss of say 2 per cent when operation has continued long enough to require turning wheels to the minimum diameter allowable. Direct current motors have such a variable speed characteristic as to require no adjustment for varying wheel diameters.

Weight efficiency is a relative value based upon compar-

It appears reasonable to expect the efficiency of mixed passenger and freight locomotive operation to approximate 85 per cent for direct current and not much exceeding 68 per cent to 70 per cent for split-phase locomotives. This efficiency in each case is based upon that portion of the run during which power is delivered to the locomotive. If transformer, phase converter and blower are kept running during coasting periods or when standing, the stand by losses thus introduced will seriously reduce the all day efficiency in commercial operation. It is evident that such stand by losses are much greater in the split-phase than in the direct current

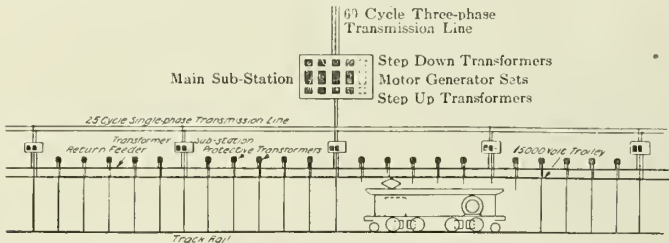


Fig. 5—General Scheme of Split-Phase Alternating Current System.

locomotive and the 20 per cent saving in power for mixed freight and passenger service credited to the direct current motive power may be materially increased in actual service.

Before concluding the general discussion of the locomotive it is necessary to touch upon the question of braking. One of the strongest arguments advanced for the adoption of the induction motor locomotive is that this type of motor offers an ideal electric brake by reversing its function on down grade and returning power to the trolley circuit. A regenerative braking method of control has been perfected for use with the direct current motor which offers even greater advantages in service operation than induction motor braking. Just as the direct current locomotive is the more efficient in hauling a given trailing tonnage, so also it will return to the system a larger percentage of the mechanical power given the locomotive by the descending train. Hence whatever claims are advanced for regenerative electric braking with the split-phase locomotives are even more applicable to the direct current type.

Referring again to Figs. 5 and 6, showing the general plan of distribution respectively for the split-phase and direct current systems, it is of interest to compare the two in order to see how much of the split-phase locomotive loss is recouped by its efficient distribution system. The following comparison is therefore submitted.

Efficiency of Distribution System—Detailed Comparison.

	Split-Phase	2400 Volts Direct Current
Step down transformers	97.5%	96.5%
Motor generator sets.....	87.0%	81.0%
Step up transformers.....	97.5%	.....
Railway transmission line	96.0%	96.0%
Line transformers	96.0%	.....
Protective transformers	96.0%	.....
Trolley, track and feeders.....	96.0%	88.0%
Combined efficiency	70.5%	66.0%

Protective transformers appearing in above table are for the purpose of neutralizing the inductive disturbance caused by single-phase trolley upon neighboring telephone, telegraph and signal circuits.

Total Efficiency—Distribution System and Locomotive.

	Split-Phase	2400 Volts Direct Current
Freight Service—		
Distribution	70.5%	66.0%
Locomotives	73.1%	84.3%
Combined efficiency	51.5%	55.7%
Passenger Service—		
Distribution	70.5%	66.0%
Locomotives	61.9%	87.1%
Combined efficiency	43.6%	57.5%

There is every reason to expect that the split-phase system will demand fully 15 per cent or more power input than the direct current system of 2400 volts for equal trailing tonnage movement, actual figures depending upon the proportion of freight and passenger tonnage. This figure is based upon 60 cycle power supply for the reason that many of the immediate electrification projects under construction or contemplated are located in territories where this frequency is firmly established.

Where 25 cycles is available, single-phase power may be taken direct from the three-phase supply provided phase and voltage balance is maintained by suitably located substations containing step down transformers and phase converters. Direct current supply will be more efficiently obtained through rotary converters in place of motor generator sets. The efficiency of the distribution system, as given above, will therefore need correction for 25 cycle power supply but will result in no material change in the relative efficiency figures quoted for the two systems.

Installing a power house to generate single-phase current at 25 cycles or less introduces all the serious handicaps encountered in single-phase generation as well as raises questions of general expediency and adequate return on the capital invested in a power plant devoted to supplying railway load only. Advocates of single-phase trolley distribution have sometimes failed to fully consider the question of power supply available as having any bearing upon the broad question of electrification. Not every railway is so situated by reason of character of load, cheap fuel or other favoring local conditions as to justify the large expenditure for a generating station containing ample reserve capacity. Appreciating fully the somewhat higher efficiency of the split-phase distributing system if single-phase power of 25 cycles or lower is available, this matter is so local in its character that it may properly be looked upon as a special condition applying only to favorable and restricted localities.

A study of the general plan of distribution as given in Figs. 5 and 6 discloses the fact that where 60 cycle power supply is available at attractive rates, the general statement can be safely made that the total amount of electrical apparatus is greater and, therefore, the first cost higher and efficiency lower with the split-phase than with the direct current locomotive system. Nor is this statement modified to any extent in the event that power supply is obtained from a 25 cycle three-phase source, as it will be the exception rather than the rule that any power company will be found willing to furnish single-phase power from its balanced three-phase circuit when the pernicious effect upon the general distribution system of a violently fluctuating low

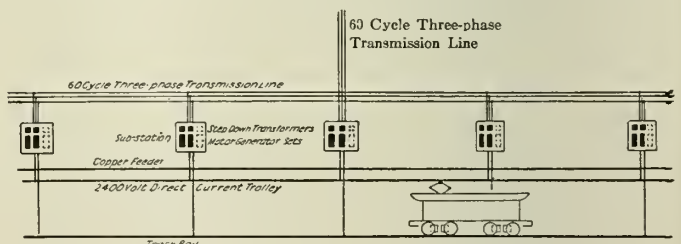


Fig. 6—General Scheme of 2400-Volt Direct Current System.

power factor single-phase load is fully understood. Some corrective device like a phase converter must be introduced and its first cost and efficiency are both comparable to the rotary converters which are permissible with 25 cycle supply to secure direct current. It would seem, therefore, that the complication of the split-phase locomotive system renders it inherently more expensive to install and less efficient to operate. This is due largely to the fact that substations are required both on the ground and also in the locomotive cab itself.

The single-phase trolley circuit, irrespective of the type

of locomotive it may supply, constitutes in itself a most serious handicap to the adoption of any type of alternating current locomotive. Neighboring circuits of all kinds are practically put out of commission by static and inductive disturbances unless adequate protective measures are introduced. No method of complete protection has as yet been perfected, although many schemes have been proposed that are partially successful. The elaborate and expensive apparatus now being installed upon one of our important single-phase railways will soon be in operation and is expected to give relief from the present serious conditions obtaining. As the inductive interference of the single-phase trolley is proportional to the intensity of the current and dis-

trolling advantages of alternating current locomotive traction which cannot be secured at less expense and with greater reliability in operation with direct current motive power.

Until the adoption of inter-pole motor construction made it entirely practicable to build direct current motors for high potentials, there was some justification for considering alternating trolley systems as offering the only means of changing from steam to electric motive power at a reasonable first cost. The high voltage direct current motor has now been developed, built and proved completely successful under the most exacting service conditions. The trolley potential has been raised to 2400 volts which seems sufficiently high to ensure a distribution system of reasonable first cost and not too high to handicap the locomotive as regards its first cost, reliability and operating efficiency. Experimental results already obtained with direct current apparatus tested at potentials higher than 2400 volts indicate that no construction difficulties apparently exist and the installation of a higher voltage becomes an economic question rather than an engineering problem.

With 2400 volts direct current both protected third rail construction and multiple unit car operation are feasible. The third rail offers advantages in accessibility and low cost of maintenance on single track roads and multiple unit car operation is without question the proper way to take care of local traffic. Furthermore, 2400 volt equipments can be successfully operated under the lower voltage terminal zone that local restrictions may make necessary.

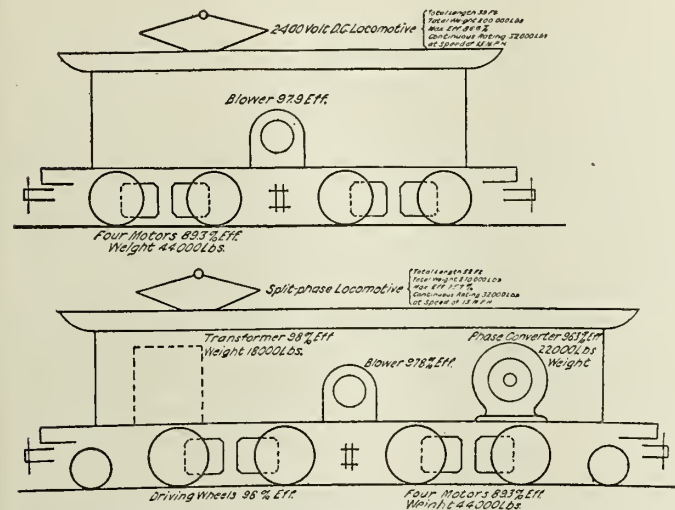


Fig. 7—Comparative Elevations of Split-Phase and 2400-Volt Direct Current Locomotives of Equal Capacity.

tance it is transmitted, it is to be expected that a maximum disturbance will result in the case of mountain grade divisions where the current input to trains approaching 3000 tons gross weight is several times that thus far met in any single-phase trolley installation now operating. No cost estimate of single-phase trolley systems is, therefore, complete without including a liberal allowance for telephone and telegraph protective devices. This cost will probably not be less than \$2500.00 per mile of route and may even greatly exceed this figure. Even with such an expenditure, no assurance is at hand that hazard to employees and interference with service will be entirely eliminated, and until more exact knowledge of this whole situation is available, single-phase trolley interference constitutes the greatest handicap to the adoption of any alternating current locomotive system of operation.

This paper is largely devoted to a comparison of alternating and direct current motor locomotives, as lack of appreciation of the fundamental facts involved has perhaps been the basis of the false hopes raised as to the possible advantages resulting from the installation of the single-phase trolley. It surely does look attractive to install a system employing 15,000 volts on the trolley, no feeder copper and no rotating substation apparatus. But investigation discloses the fact that the single-phase trolley is a decided menace to neighboring circuits, feeder copper is required for return circuit, substations are comparable as to first cost and efficiency with direct current substations and finally, the alternating current locomotive of the most promising type, the so called split-phase combination of induction motors, transformer and phase converter is heavy, expensive, complicated and inefficient to a degree that would not be tolerated in direct current construction. Assuming that the favorable results of factory experiments are borne out in the success of later commercial operation, there appear to be no con-

Affairs of the New York, New Haven & Hartford R. R.

Officials of the New York, New Haven & Hartford R. R. and United States Attorney General McReynolds have been in conference, at Washington, D. C., regarding a re-organization of the New Haven system to conform with the ideas of the department of justice with respect to the Sherman anti-trust law. The Massachusetts legislature and the Boston chamber of commerce have also been represented in these conferences. To correct what has possibly been a misapprehension held in the minds of some people, regarding the province and purposes of the department of justice, Attorney General McReynolds issued a statement on January 7, declaring that the department has no authority under the existing law to prosecute railroad officials for improvidence or dishonesty in the financial management of a road. The criminal provisions of the Sherman law give the department of justice the right to seek the indictments of officials of roads only on the ground that they have been personally responsible for the creation of monopolies. The statement follows:

"The department of justice is constantly receiving letters inquiring why it does not direct the prosecution of officers and directors who have been responsible for the financial irregularities of railroads, which have been disclosed from time to time. These inquiries proceed from a mistaken, but a very common, view of the powers of the department of justice. There is no law under which it can prosecute the officers, directors, or other agents of the railroad companies for improvident or dishonest management of the financial affairs of those companies. The congress has not undertaken to regulate the issuance of securities by corporations created by states, or the conduct of fiduciary relations of their officers, but has left those matters to the states, respectively."

Announcement was made on January 2, that the agreement between the New York Central and the New York, New Haven & Hartford railroads by which the latter enjoyed trackage rights over the Boston & Albany road, which is under lease to the New York Central, is to be canceled in accordance with the views of the department of justice. The cancelation is to take effect

January 31. The operating agreement, which was made in 1911, gave the New Haven the privilege of running certain trains over Boston & Albany tracks. After the agreement expires, the New

Haven will withdraw all its trains from Boston & Albany tracks, except those between Fitchburg and Boston, via South Framingham, which have been operated for many years.

Air Seasoning of Ties.

BY WILLIAM H. KEMPFFER, FOREST PRODUCTS LABORATORY, MADISON, WIS.

From a paper on "Air Seasoning of Timber," contributed to Bulletin 161, of the American Railway Engineering Association. It covers, besides the seasoning of railroad ties, as described in the accompanying extracts, the seasoning of telegraph poles, cross arms, sawed timbers and fence posts.

Air seasoning of timber means ridding the wood of part of its moisture by letting it stand in the open air. If seasoned long enough in this way, the moisture content of the wood will finally come into equilibrium with that of the surrounding atmosphere. This process takes place in any timber which has been felled or deadened, but the rate of drying varies with many factors, among them climate, time of year, species of wood, size and form of the piece, and degree of exposure. Certain of these factors may be controlled and others taken advantage of, so as to hasten the drying process itself, and also to minimize the injuries to wood involved in seasoning.

The objects of seasoning, briefly summarized, are:

- (1) To prevent injury by insects and decay before the timber is put to use.
- (2) To increase the durability of timber in service.
- (3) To prevent shrinking and checking of the timber in service.
- (4) To increase the strength of the wood.
- (5) To decrease its weight.
- (6) To prepare it for treatment with preservatives, for kiln drying, and for other industrial processes.

Wood, while green, is especially susceptible to attack by insects and decay-producing fungi; on the other hand, wood seasoned too rapidly or unequally may check or warp so seriously as to render it worthless. It is, therefore, necessary to know the time required for wood to become air dry, and also the effect of factors which tend to increase or retard the rate of evaporation.

The data collected by the Forest Service on air seasoning pertain chiefly to the rate at which various species and

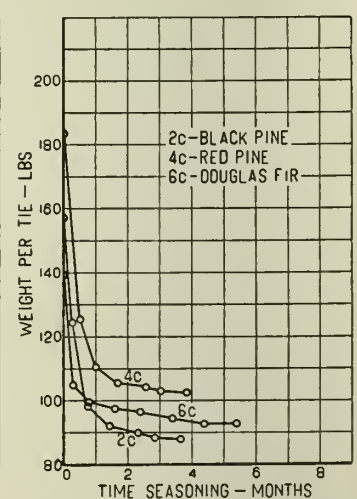
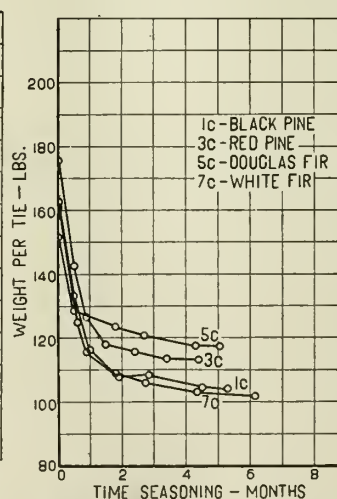
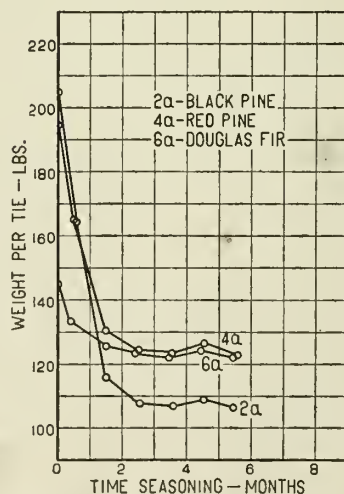
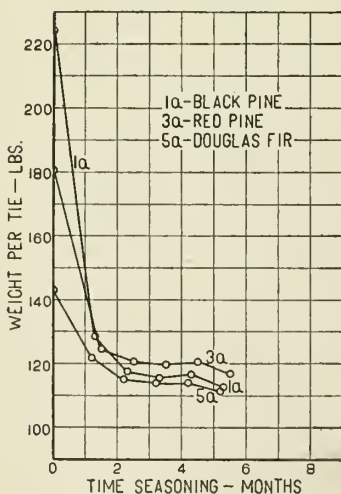
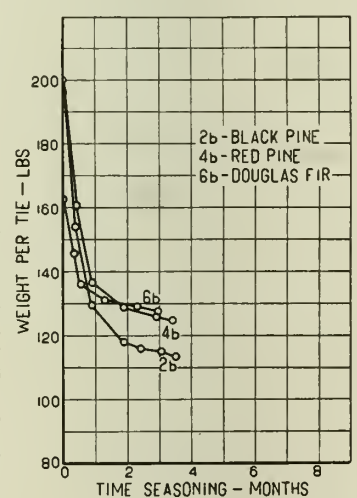
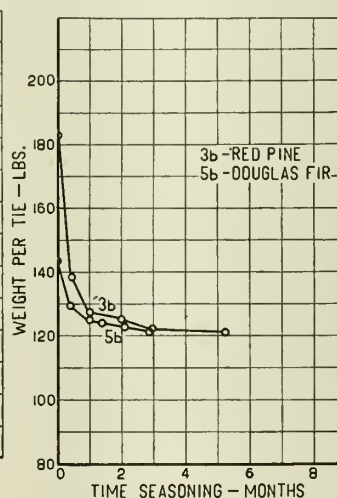
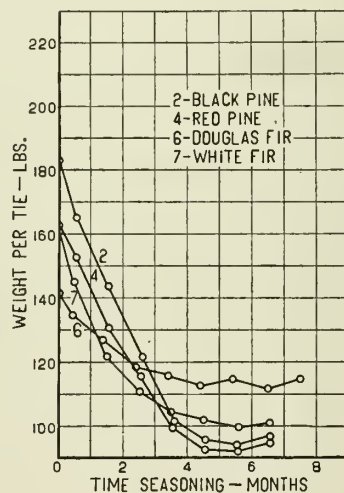
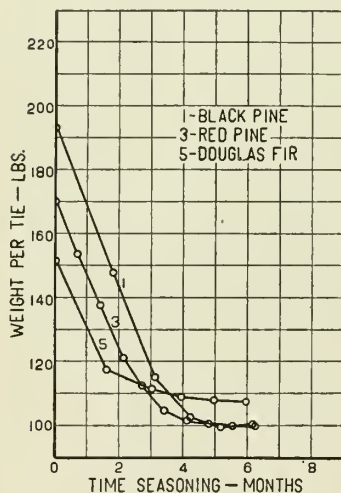


Fig. 1—Seasoning of Ties at Pecos, N. M.; Cut in January and February.

Fig. 2—Seasoning of Ties at Rociata, N. M.; Cut in January.

Fig. 3—Seasoning of Ties at Pecos, N. M.; Cut in March.

Fig. 4—Seasoning of Ties at Rociata, N. M.; Cut in March.

Fig. 5—Seasoning of Ties at Pecos, N. M.; Cut in May and June.

Fig. 7—Seasoning of Ties at Pecos, N. M.; Cut in August, September and October.

Fig. 6—Seasoning of Ties at Rociata, N. M.; Cut in May and June.

Fig. 8—Seasoning of Ties at Rociata, N. M.; Cut in August and October.

forms of timber lose moisture when freely exposed to the atmosphere. Such information with respect to cross-ties, poles and sawed timbers has been obtained in a number of localities, representing various climatic conditions throughout the country, and for a large number of species, especially of the conifers. Much of this information, though already published by the Forest Service, is scattered among various circulars and bulletins; and other data, although collected a number of years ago, have not been previously

second set of investigations no special study was, as a rule, made of seasoning, but in some instances a record of the loss of weight was obtained on timbers received green and tested air dry.

Interpretation of the Seasoning Curves.—In the case of cross-ties, which furnish the greater portion of the data presented in this bulletin, the rate of seasoning is shown by curves plotted from the average weights of the ties at successive periods. On account of the variation in the

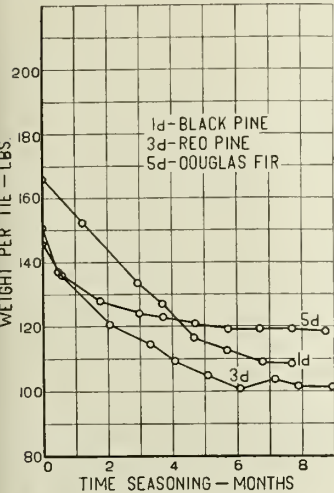


Fig. 9—Seasoning of Ties at Pecos, N. M.; Cut in November and December.

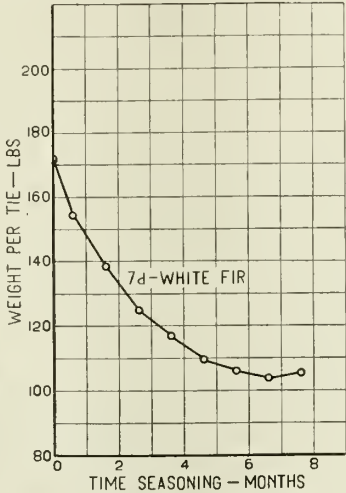


Fig. 10—Seasoning of Ties at Rociata, N. M.; Cut in December.

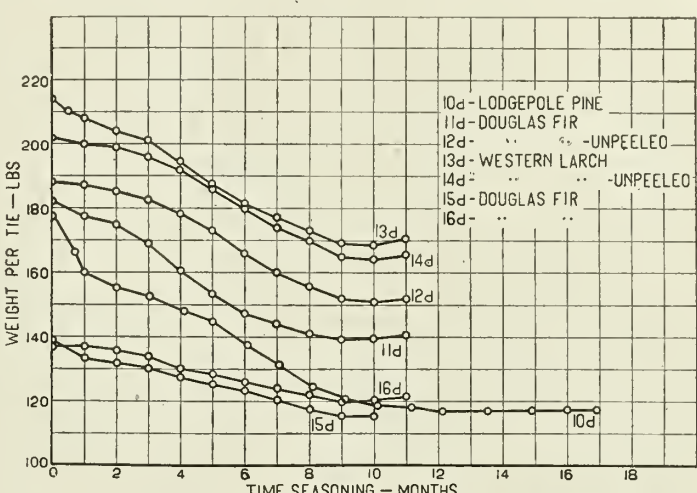


Fig. 14—Seasoning of Lodgepole Pine Ties at Bozeman, Mont.; Douglas Fir at Sandpoint, Idaho (Curves 11d and 12d), Pasco, Wash. (Curve 15d), and Tacoma, Wash. (Curve 16d); and Western Larch at Sandpoint, Idaho; Cut in October, November and December.

published. To make this information available, therefore, it is here collected, and the results of the various tests are put into such form as to be, so far as possible, comparable with one another.

The data* on air seasoning have been obtained in connection with two distinct lines of investigations: (1) studies of methods to increase the durability of timbers; and (2) tests of mechanical properties of wood. In the first set of investigations green timbers, in the form of ties, poles and cross-arms, were dried so as to determine the effect of seasoning upon the wood's durability and upon its permeability. The tests were concerned primarily with durations of seasoning applicable to commercial timber yards. In the

average size of the different lots of ties, the losses in pounds per tie do not afford as good a basis for comparison as percentage losses, or losses expressed in pounds per unit of volume. But the unit volume basis could not be applied, because in many cases the volumes of the ties had not been obtained, and the former was considered inadvisable because the percentage method is open to more errors than the method adopted. Freshly cut timber loses weight very rapidly in warm, dry weather—so rapidly that ties of some species lose 10 pounds in 24 hours. While in most cases the first weights were nominally the green weights of the timber, usually it was not possible to weigh the ties immediately after they were cut. As a rule, from one day to a week or more elapsed between the time of cutting and the time when the ties were brought to the yarding point and weighed. The first weights are therefore not strictly comparable, and the losses during the first

*The experiments on which this publication is based were made in co-operation with various commercial companies and associations, and with educational institutions.

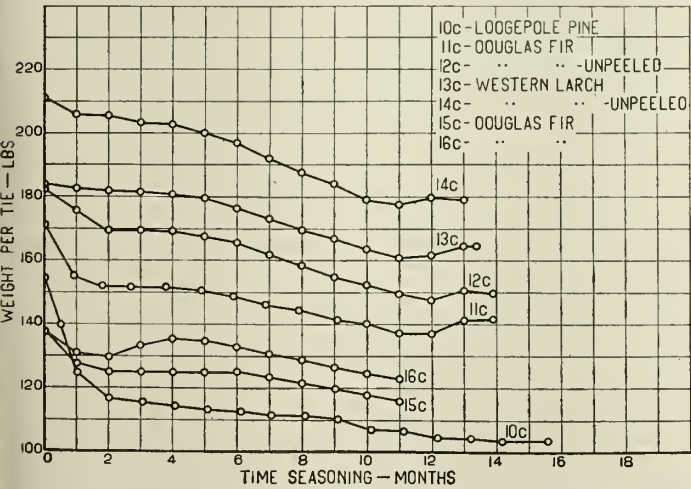


Fig. 13—Seasoning of Lodgepole Pine Ties at Bozeman, Mont., Douglas Fir at Sandpoint, Idaho (Curves 11c and 12c), Pasco, Wash. (Curve 15c), and Tacoma, Wash. (Curve 16c), and Western Larch at Sandpoint, Idaho; Cut in August, September and October.

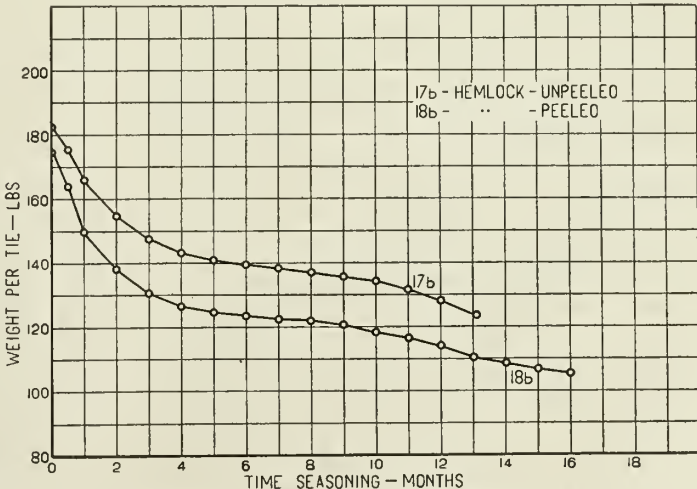


Fig. 15—Seasoning of Hemlock Ties at Escanaba, Mich.; Cut in June and July.

stage of the seasoning process, which may or may not be shown by the weighings, would make an important difference in computed percentage losses. In the case of curves plotted from actual weights, neither their direction nor location is affected by failure to have the first weights of the ties comparable; the only effect of changes occurring before the first weights were obtained is to change the points of origin of the curves.

The rates of seasoning of the various species and lots of ties may be compared by the general trend of the curves. The approach of the ties to the air-seasoned condition is

indicated in general by the approach of the curves to a comparatively horizontal position, except when this occurs at a time of the year unfavorable for seasoning; if it first occurs at such a time, the degree of dryness is not indicated unless the curves are continued through the unfavorable period into the succeeding favorable period.

Method of Conducting Tests.—The various experiments on tie seasoning differed in details, but they were conducted on the same general plan. The ties were procured at monthly intervals throughout the year and each month's cut piled in different ways so as to determine the effect of

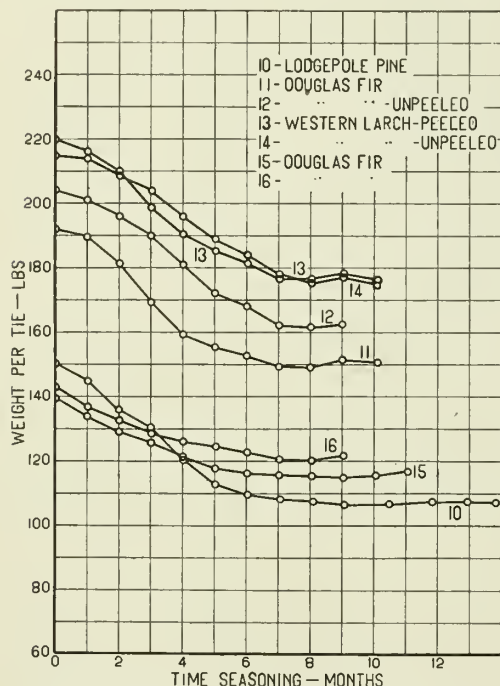


Fig. 11—Seasoning of Lodgepole Pine Ties at Bozeman, Mont., Douglas Fir at Sandpoint, Idaho (Curves 11 and 12), Pasco, Wash. (Curve 15), and Tacoma, Wash. (Curve 16), and Western Larch at Sandpoint, Idaho; Cut in January and February, Tacoma Ties in December and January.

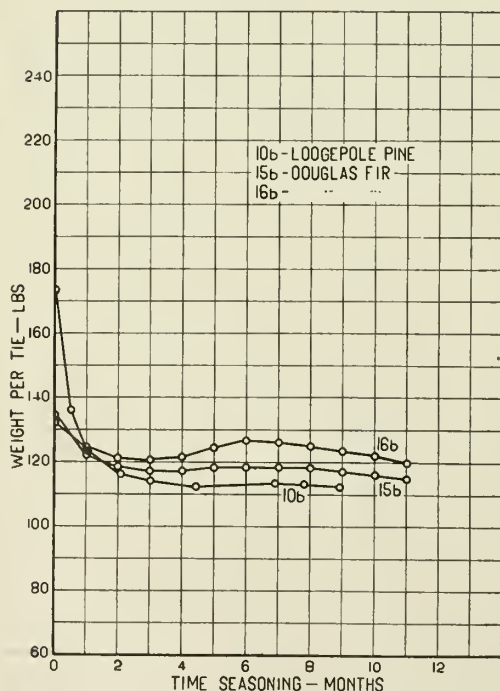


Fig. 12—Seasoning of Lodgepole Pine Ties at Bozeman, Mont., and Douglas Fir at Pasco, Wash. (Curve 15b), and Tacoma, Wash. (Curve 16b); Cut in May, June and July.

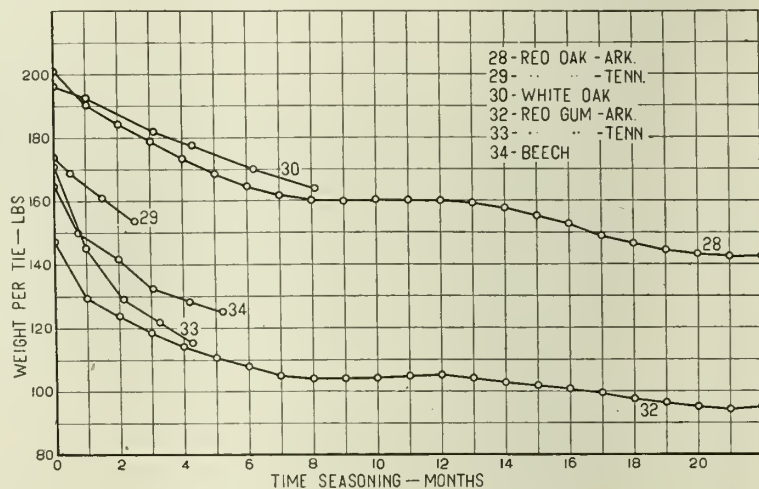


Fig. 17—Seasoning of Hardwood Ties in Southern States; Cut in January, February and March.

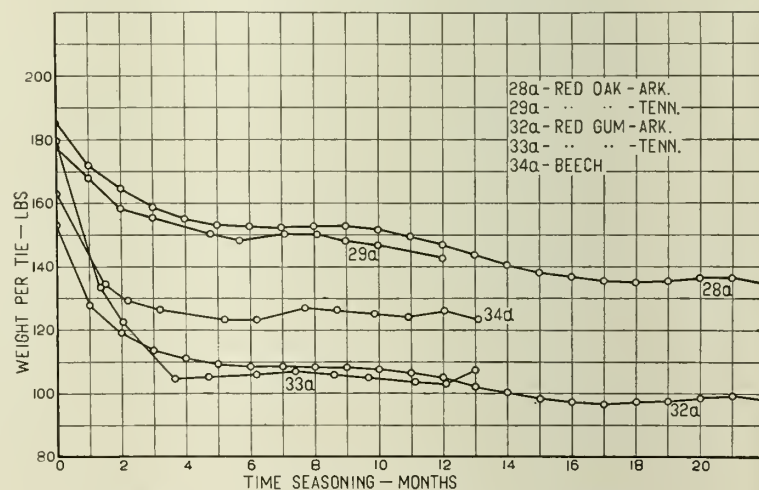


Fig. 18—Seasoning of Hardwood Ties in Southern States; Cut in April, May and June.

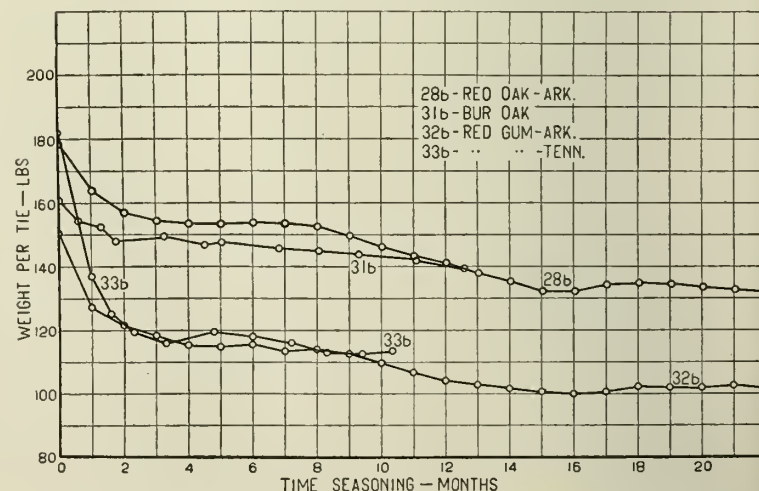


Fig. 19—Seasoning of Hardwood Ties in Southern States; Cut in July.

the form of pile on the rate of seasoning. Each pile consisted of 50 ties; these were exposed to the weather without cover, except in so far as the top tier of each pile served as a roof. The rate of seasoning was determined by weighing each tie individually, usually at intervals of one month.

It was found that the rate of seasoning from month to month did not vary sufficiently to warrant presenting the data for each month separately, and adjacent curves for ties of two or three months which showed similar rates of seasoning were accordingly combined. Curves for the different forms of piles have also been combined when they showed little difference in the rate of seasoning, but data were omitted on piles which showed marked irregularity, such as unusually high or low average weight.

As a rule, the data for each pile were plotted separately and from these certain curves were selected and averaged to form the final curve. In many cases, however, the final curve could be attained directly by computing numerically the average weights.

The woods of the Southwest tested for seasoning were western yellow pine, white fir and Douglas fir. Two forms of western yellow pine were distinguished: the "black pine," the comparatively young, rapidly-growing trees; and the "red pine," consisting of the older trees. The ties were seasoned at Pecos and Rociata, New Mexico, which are between 7000 and 8000 feet above the sea.

The monthly curves could be classified best in five groups, as follows: (1) January and February; (2) March and April; (3) May, June and July; (4) August, September and October, and (5) November and December. This grouping has been followed so far as comparable data on the different species were available. The rate of seasoning is shown by Figs. 1 to 10.

Ties cut in January and February required from four to five months to reach a constant moisture content. As the season advanced the rate of evaporation very much increased. Ties cut in May and June required a much shorter time to reach constant weight; those tested at Rociata required two months; those at Pecos, only one month. Not much change occurs in this rate until November. The November and December ties reach a constant weight in about six months.

Very little difference was found in the rate of seasoning of black and of red pine, but the total loss of weight was usually greater for the black pine. This would be expected, because rapidly-grown trees generally contain more sapwood, and hence more moisture,* than the more slowly-grown trees of the same species. The curves for white fir resemble very closely those for the pines. Douglas fir seems to require about the same time to reach constant weight as the other species, but the weight lost is much less.

Pecos and Rociata have quite different exposures, though nearly the same elevations. The ties at Pecos apparently season a little more rapidly than those at Rociata, but since the seasoning at both places is very rapid the differences in time are not important.

Table 1—Average Volume and Air-Dry Weight per Cubic Foot of Sample Ties—New Mexico.

Species	Number of Ties	Average Volume (air dry)	Weight per cu. foot
"Black pine"	82	3.5	33
"Red pine"	67	3.6	33
Douglas fir	76	3.3	33
White fir	50	3.5	31

From volume and weight determinations on sample ties,

*This applies to most coniferous woods, but not necessarily to the broadleaved trees or hardwoods.

which had seasoned from 12 to 20 months, were obtained the air-dry weights per cubic foot shown in table. The moisture content of the ties was not known.

Seasoning curves (Figs. 11 to 14) are given for lodgepole pine, western larch and Douglas fir, of the Northwestern species. The records on lodgepole pine were obtained at Bozeman, Mont., on Western larch at Sandpoint, Idaho, and on Douglas fir at Sandpoint, Idaho, and Pasco and Tacoma, Wash.

Although climatic conditions in the Northwest are different from those in the Southwest, and vary also throughout the region, the same grouping of the ties could be employed at all places. In spite of differences caused by species and by local climatic conditions, a similarity exists in the curves for the various lots of ties cut at the same time of year. The effect, however, of the time of year when the tests are started is very evident.

Lodgepole pine in Montana cut in May, June or July was practically air dry in three months, and even if started in September it became fairly well seasoned before winter; but, if started in winter, it did not become dry until July of the following summer. Larch in Idaho and Douglas fir in Idaho and Washington, if cut in the early spring, required from four to five months to reach a condition at all resembling air dryness; if the ties were cut as late as July they lost almost as much moisture in the succeeding two or three months as they did by holding them over until the following summer.

The ties seasoned at Tacoma and Pasco, Wash., afford a good example of local climatic effects; both lots were from the same source and the first weights were taken at the same time, but in each case the ties at Pasco lost weight faster and reached a lower weight than the ones at Tacoma. Also the gains in weight, due to the absorption of water during the rainy season, which were noticeable in Tacoma ties, were absent or less pronounced in those at Pasco.

The Douglas fir ties seasoned at Tacoma and at Pasco were sawed to standard dimensions and had an average volume of 3.5 cu. ft. Assuming the oven-dry weight of the wood to be 28.3 $\frac{1}{2}$ lbs. per cu.-ft., the moisture content of the most thoroughly seasoned ties was 15 per cent for those at Pasco and 16 per cent for Tacoma. The corresponding weights for the two sets were about 33 lbs. per cu. ft.

The only eastern coniferous woods on which seasoning records were obtained are hemlock and tamarack. Curves of the rate of seasoning of hemlock are shown in Figs. 15 and 16.

Figures 15 and 16 show the rate of seasoning for two groups of hemlock ties cut respectively in June and July, and in October, November and December. The ties when green had a very high moisture content, and although they lost weight rapidly during the summer months, none of them reached a constant weight within the period of observation; those cut in June and July, the ones held longest, were still losing weight at the end of the second summer, 16 months from the time of cutting (Fig. 15, curve 18b.)

Comparing the rate of seasoning of ties openly piled (7x2 and 8x1) with those closely piled (7x7), practically no difference occurred between these two conditions. As between the peeled and the unpeeled ties, however, considerable difference in the rate of seasoning was evident.

Ties taken from stock which having been closely piled with the bark on for a year, were then peeled and repiled in open forms. The curves (not here shown) give the

†Average as quoted in Circular 146, for a series of determinations on Douglas fir beams made by the Forest Service at the Berkeley, Cal., timber-testing laboratory.

losses which occurred after the first year. The final weight, 107.4 lbs. per tie for the hemlock, is equivalent to a weight of 30.6 lbs. per cu. ft., and the moisture content of 27.5 per cent, based on an average dry weight of 24 lbs. per cu. ft.* Freshly cut hemlock ties weighed from 55 to 57 lbs. per cu. ft.; they can readily be seasoned to 40 lbs. per cu. ft., a process which requires from four to nine months, according to the time of the year they are cut.

The tamarack ties (curve not shown here) were cut during the winter and first weighed in late April. In six

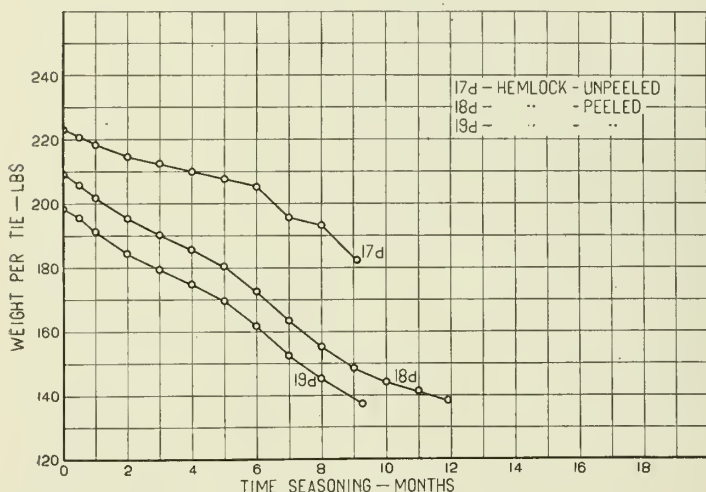


Fig. 16—Seasoning of Hemlock Ties at Escanaba, Mich.; Cut in October, November and December.

months they lost about 30 lbs. per tie and then weighed 41 lbs. per cu. ft. Prolonged seasoning resulted in a minimum weight of 39 lbs. per cu. ft., or a moisture content of 27.5 per cent based on an oven-dry weight of 30.6 lbs. per cu. ft.*

Seasoning records were obtained on loblolly, longleaf and shortleaf pine at Silsbee, Texas, and on loblolly pine at Ackerman, Miss.

The influence of variations in meteorological conditions with the time of year is again well marked in the form of

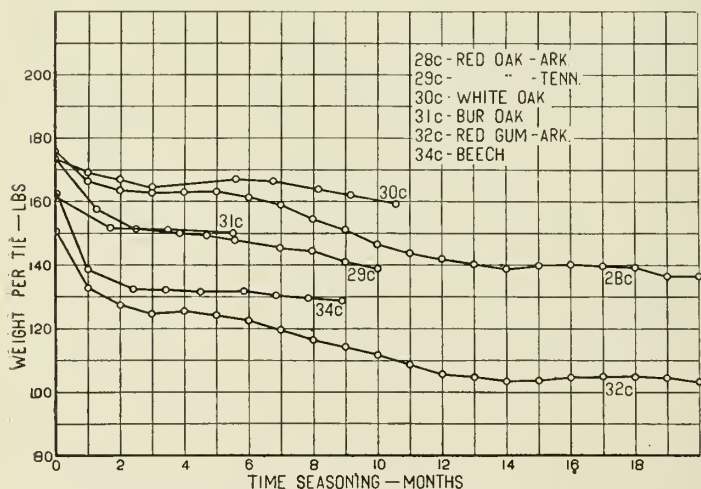


Fig. 20—Seasoning of Hardwood Ties in Southern States; Cut in August and September.

the curves (not here shown) although conditions seem favorable to rapid drying throughout a large portion of the year.

The ties cut in January and February are fairly dry at the end of four or five months, but continue losing ap-

*The average of ten determinations on discs cut from the ties.

preciable weight for about eight months. From April to October the seasoning is so rapid that there is comparatively little loss of weight after the first two or three months, even when the ties are held over until the following summer. The curves for loblolly and shortleaf pines at Silsbee, Texas, resemble each other very closely; the longleaf pine dries a little more quickly, but the total weight lost is much less.

Southern Hardwoods.—Seasoning records were obtained on red, white and burr oak, red gum and beech taken at points in Western Tennessee, Northeastern Arkansas, Southern Illinois and Southern Indiana. The rate of seasoning of these woods is shown by the curves in Figs. 17-21.

The hardwoods in general differ from conifers in the slower rate at which they lose moisture and the longer time they require to become air dry. The tests of red oak in Arkansas cover a sufficient period to show very strikingly the slow rate of season of this wood. Ties cut in the spring and early summer (Fig. 18) were far from dry when they ceased to lose weight at the approach of winter. This is shown by the fact that during the following summer they lost nearly two-thirds as much moisture as during the first summer.

When the ties were cut in the winter and carried through two years the loss of weight during the second summer was nearly half that of the first summer (Fig. 17.)

The records on white and burr oak cover too short a period to show very much about the seasoning of these species, but the structure of the wood suggests that they would season even more slowly than the red oak. The losses from the white and burr oak ties during the periods covered by the curves are small.

The curves for red gum in Arkansas are very similar to those for red oak in the same locality, but the gum shows a slightly greater total loss of weight and loses a greater proportion of the total during the early part of the drying period. The red gum in Tennessee shows very much greater losses than that in Arkansas. The reason for this difference is not apparent, especially since the red oak curves for the two localities are similar.

Beech also shows a greater loss than red oak during the early stages of seasoning and falls between the Arkansas and Tennessee gums in this respect. Unfortunately, the tests on beech do not cover a period sufficient to show definitely how long is required for this species to become air dry, but the curves in Figs. 18 and 20 indicate that the loss of weight during the second summer would be relatively small.

Northern Hardwoods.—Data on the rate of seasoning hardwood ties in the North are very meager. With ties sawed in July from logs felled in the woods from six months to a year previously there was considerable loss of moisture during the first few months of seasoning, but values for the oven dry weight of these woods obtained from other sources indicate a high moisture content—40 to 45 per cent.

(To be continued.)

Electric Railway Statistics, 1913.

Statistics on construction of electric railway during the year 1913 were published by the Electric Railway Journal in its issue of January 3. The figures show a total of 1018.9 miles of track built during the twelve months. This includes interurban lines, street railway and electrified steam road. The comparison with previous years is as follows: In 1912, a total of 950.2 miles were built; in 1911 the aggregate was 1191.5 miles; and in 1910, according to the same authority, 1397.2 miles were built. The largest new mileage credited to any one state during the past year, is 177.77 miles, built in Texas. This total includes the longest interurban railway

built in the United States during 1913, namely the Southern Traction Co., 154 miles, connecting Waco, Dallas and Corsicana. Missouri has the second largest total, with 74.52 miles, and Pennsylvania is third, with 55.79 miles.

Rolling equipment ordered by electric railways during the year 1913 amounted to the following totals: city cars, 3820; interurban cars, 547; freight and miscellaneous cars, 1147; electric locomotives, 68. Last year's figures for the same equipment were: city cars, 4531; interurban cars, 783; freight and miscellaneous cars, 687; electric locomotives, 65. The total number of cars of all classes built in company shops last year was 772, as compared with 429 in 1912.

The past year, the Electric Railway Journal states, has been an exceptionally active one in electric railway signaling; and the tabulation shows a total of 1699 route miles protected by the new installations.

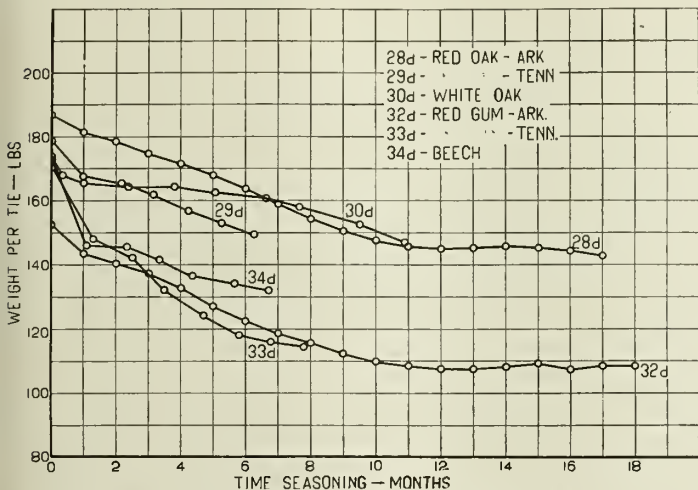


Fig. 21—Seasoning of Hardwood Ties in Southern States; Cut in October, November and December.

Receiverships involved 18 electric railway companies during the past year, the corporations having a total of 342.84 miles of track, and comprising outstanding stock of \$31,006,900 and an aggregate funded dept of \$47,272,200. The property of eighteen companies was sold at foreclosure, involving 311.28 miles of track, outstanding stock amounting to \$15,743,700, and a total funded debt of \$19,526,000.

It is reported that President Menocal, of Cuba, intends to obtain soon the services of an American railroad expert for the purpose of assisting the republic's railroad commission in preparing a general adjustment of freight rates. The government considers the present railroad rates too high, which the railroads deny. President Menocal believes that justice to all parties will best be insured by securing expert advice. The United States has some "rate expert" talent to spare, but Heaven help the Cubans if certain of these individuals get busy there.

Convention of the Wood Preservers.

The tenth annual convention of the American Wood Preservers' Association will be held at St. Charles Hotel, New Orleans, La., January 20-22, 1914. The following program for business and entertainment has been announced.

TUESDAY FORENOON, JAN. 20, 10 O'CLOCK.

Convocation.

Address of Welcome, The Mayor.

Response, J. H. Waterman.

President's Address, A. E. Larkin.

Secretary-Treasurer's Report, F. J. Angier.

Report of Entertainment Committee, R. S. Manley, Chairman.

TUESDAY AFTERNOON, JAN. 20, 2 O'CLOCK.

Announcement of Resolutions Committee.

PRESERVATIVES.

Report of Standing Committee on Preservatives, E. F. Bateman, Chairman.

Address on Creosote Oil, P. C. Reilly, Pres., Republic Creosoting Co.

Preliminary Work in Fireproofing Wood, Robert E. Prince, Forest Products Laboratory.

Some Methods of Separating Water from Creosote Oil, Thomas White, assistant manager American Creosoting Works.

WEDNESDAY FORENOON, JAN. 21, 10 O'CLOCK.

WOOD BLOCK PAVEMENT.

Report of Standing Committee on Wood Block Paving, Walter Buehler, Chairman.

The Construction of Creosoted Wood Block Pavements, R. S. Manley.

A Comparison of Wood Paving in European Countries and the United States (Illustrated by Stereopticon Views), S. R. Church.

Results Obtained by Piling Creosoted Wood Blocks Closely in Cages and the Saving Effected Thereby, R. H. White, President Southern Wood Preserving Co.

New Type of Paving Block Plant, J. B. Card.

WEDNESDAY AFTERNOON, JAN. 21, 2 O'CLOCK.

TIES, TIMBERS, PILING AND CROSS ARMS.

Report of Standing Committee on Preservation of and Specifications, for Timbers, Ties, and Piling, E. A. Sterling, Chairman.

The Protection of Ties from Mechanical Destruction, Howard F. Weiss, Director Forest Products Laboratory.

Future Tie Material in the United States, H. H. Gibson, Editor "Hardwood Record."

Treatment of Piling and Timber According to Condition of Use and Exposure, E. L. Powell, Vice-President American Creosoting Works.

Some Facts Which I Have Gathered From Observation and Inspection of Experimental Ties, J. H. Waterman.

WEDNESDAY EVENING, JAN. 21, 8 O'CLOCK, Smoker Banquet.

THURSDAY FORENOON, JAN. 22, 10 O'CLOCK.

PLANT OPERATION AND MISCELLANEOUS.

Report of Standing Committee on Plant Operation, G. B. Shipley, Chairman.

Report of Standing Committee on Miscellaneous Subjects, J. H. Waterman, Chairman.

Air Pumps vs. Hydraulic Pumps for Injecting Preservatives into Wood, F. J. Angier.

The Effect of Varying the Preliminary Air Pressure in Treating Ties from the Absorption and Penetration of Creosote, Clyde H. Teesdale, Forest Products Laboratory.

Mechanical Handling of Railroad Cross Ties and Timbers at Timber Preservation Plants, Lambert T. Ericson, Assistant Supt. Port Reading Creosoting Plant.

Tram Cars and Their Construction, J. H. Grow, Allis-Chalmers Manufacturing Co.

Methods of Keeping Tie Records, E. T. Howson, Engineering Editor "Railway Age Gazette."

The Yale Forest School, S. J. Record.

Discussion of Forest Products Exposition, Geo. S. Wood, Manager.

THURSDAY AFTERNOON, JAN. 22, 2 O'CLOCK, Business Session.

Report of committee on resolutions; new business; election of officers; place of next meeting; adjournment.

FRIDAY, JAN. 23—Trip by special train to inspect the plant of the Southern Creosoting Company at Slidell, La., and visit the largest sawmill in the world at Bogalusa, La., as guests of the Great Southern Lumber Company.

RAILWAY REVIEW

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CORRESPONDENCE.—Information concerning any matter of railway or engineering news is invited from any person. Subscribers and others are requested to notify us promptly of changes in the personnel or organization of railways; of new incorporations or of the improvement of existing roads. We desire especially to receive particulars of new work undertaken, contracts let, new structures or new equipment completed or under way, experiments with new devices or methods, the adoption of new rules or practice, methods of maintenance, official meetings, the formation of railway supply companies and important orders or sales of railway or engineering materials or equipments. Drawings or photographs of new construction, copies of annual reports, reports of tests and reports of technical meetings are sources of information highly appreciated. New publications in railway or engineering literature, including trade catalogues and circulars describing new devices and appliances, will receive attention if sent to this office. Our columns are available for criticism or comment on articles published, and for expression of opinion on any subject of railway business or management, if of an impersonal nature and of general application. All matters for editorial purpose should be addressed to the Chicago office.

ADVERTISING.—Rates of advertising made known on application. Copy for changes in standing advertisement should be in this office ten days before date of first publication if proof is to be submitted by mail for approval before publication; or on or before the Wednesday preceding the date intended for publication, if proof is not required.

REMITTANCE.—All remittances should be by bank draft, express or postal money-order, payable to THE RAILWAY REVIEW.

No. 2 JANUARY 10, 1914. Vol. 54.

In the interest attaching to many subjects in the last issue of this paper, the table entitled "Freight Car Maintenance Record 1902-1912-1913" should not be overlooked. It simply brings down the figures given a year ago, another year; so that the record covers a ten-year period, and eleven years. The figures given for 1913 are compared with those of 1902, so that the reader may clearly observe whether the ten-year trend has kept up or changed.

The density of traffic on the 28 systems increased an average of 41.67 per cent in ten years and 63.26 per cent in eleven years. On some western lines the density of traffic has been kept down by expansion of track into new territory. The large business of the past year is clearly shown in this column and is indicative of the tremendous growth of the country.

The cost of maintaining freight cars per mile run increased from .569 cents in 1902 to .918 cents in 1912,

and .967 cents in 1913—an increase of 69.9 per cent. During this time the average capacity of freight cars increased 36.75 per cent and the average car load increased only 28.46 per cent. The expense of maintenance has increased more than twice as much as the loads carried, and nearly twice as much as the capacity of the cars.

When, however, we consider the cost of maintenance per ton mile, we find that the increase has only been 37.43 per cent and is very close to the increase in car capacity. There are wide variations in cost between different roads, due to varying conditions. All of the roads show an increase, with the exception of the Union Pacific, which has reduced the ton mile cost 9.89 per cent in the eleven years, and two other lines which made small decreases.

Some progress was made last year in car loading—the average reaching 20.58 tons, or nearly 55 per cent of capacity. In utilizing the power of locomotives some advance was also made. The average number of tons of revenue freight per train load increased from 310.94 in 1902 to 426.21 in 1912 and 467.30 in 1913—the increase for eleven years being 50.28 per cent. The train load shows more of the strain put upon the cars than the car load.

On the presumption that cars were well maintained during the fiscal year 1913, which was generally the case, owing to the demand for cars, the record of the year is a very good one. The reduction of cost per ton mile was creditable and gives encouragement for believing that as modern cars increase this expense may be further reduced.

Favorable conditions have developed during the past week in iron and steel, which have been manifested in a fair volume of orders for steel rails, an increase in orders for structural material and a flow of inquiries for other steel and iron products. A stronger undertone is manifested throughout the entire industry. Large consumers of pig iron are again in the market, and to all appearances large contracts will soon be closed. Resumption has taken place in practically all of the mills temporarily closed for repairs. A better feeling seems to be developing in all financial and commercial channels. The highest authorities in the steel industry appear to have taken a more favorable view of probabilities for the next three months. There is practical assurance of a considerable volume of business in every branch of the industry.

The suggestion made by Mr. Kruttschmitt, chairman of the Southern Pacific, in his annual report to the stockholders, that they should use their personal influence toward securing better public sentiment toward the railways, is a most excellent one. The officers of the roads cannot give all of their time to this, and to a certain extent their official positions handicap them. That road alone has some 23,000 stockholders.

They can have a mighty effect upon public opinion if they will seriously study to do it. If the great host of railway stockholders and employees would work together in this line, they would all be benefited by the results.

There is another army of stockholders who ought to be impressed with their personal responsibility in this matter—those of the industries which deal with railways. We believe that the officers of railway supply establishments might well endeavor to enlist their stockholders in this kind of a personal campaign also. The Railway Business Association is sending out an edition of Howard Elliot's book, "The Truth About The Railways," with a request to each recipient that, after reading it, he pass it around and get as many others to read it as possible. This follows a plan started some time ago by one railway supply manufacturer, as noted in these columns at the time.

An excellent plan for both railway companies and manufacturing establishments would be for them to give some idea to their stockholders as to the way in which they can exercise their influence upon the public toward securing fair sentiment on railway subjects. It is one thing to be willing and to want to do; but another thing to know what to say, when to say it, and to whom to say it. There is undoubtedly a growing sentiment favorable to the railway side of current questions; but this sentiment will not be effective until it controls the regulating bodies—both legislative and administrative.

This may be a slow process, as all educational movements are which have to fight sensationalism. There are many thousands of women who are now stockholders in corporations; and hundreds of thousands who are to some extent dependent upon dividends. Women are coming into politics, and will have greater influence in the future than in the past. And they need to learn and are willing to be taught. Mr. Kruttschnitt's idea is a valuable one and should be elaborated. There is a great conservative power here which ought to be put into action.

The Review was, we believe, the only paper to publish in full the 78 questions prepared by Mr. Brandeis, and propounded to the carriers in the Official Classification Territory, who are applicants for permission to increase freight rates five per cent. These questions are, of course, of deep interest to all railway men, although sent only to those who are parties to the proceedings now before the commission. There is naturally great curiosity as to the answers that will be made, especially in the groups relating to economy and conflicting interests.

A delegation representing these roads called on Commissioner Harlan January 7th and asked for interpretation of some of the questions. To answer some questions would, it was stated, require a year's time and an enor-

mous expenditure of money. It was agreed to cut down the period covered on some traffic inquiries to one representative month. Other modifications were made, also, to bring the inquiry within the region of possibilities.

Some shippers are endeavoring to have the rates on particular commodities investigated in this hearing. The commission has not yet announced a decision on this matter. Particular rates can be investigated later in individual proceedings; and it will greatly delay the general case if investigation is to be undertaken at the special instance of a shipper of coal or of any other commodity. As has been said before, the decision of this horizontal increase case will not preclude later adjustments. The hearings ought not, therefore, to be encumbered and dragged out in this way. As a matter of fact, the 78 questions, together with the testimony already presented, will consume an amount of time which will cause the general business of the country to fret and fume with impatience.

In sending out the blanks for answers, the commission has added a special note to question 63, relating to conflicting interests, asking that, before answering, the respondent is requested to secure from each official listed a statement in writing as to any financial interest which he had in any concern with which the carrier has had transactions during the year ended June 30, 1913.

The second annual report of the federal chief inspector of locomotive boilers for the year ending June 30, 1913, is now being generally distributed, and will be found in abstract on page 81, of this issue. As in last year's report, there is a complete catalog of accidents resulting from the failure of locomotive boilers and their appurtenances during the year, and also a tabular classification of all defects of whatever nature observed by the inspectors. A tabular statement classifying the causes of injuries during the year accompanies the abstract above mentioned and also offers a comparison with the results of the previous year. Much of the report, notably the catalog of locomotive defects, inspections, etc., is, as last year, valuable only as a record of the activities of the boiler inspection department. While the department admits that the work has not yet been in progress a sufficient length of time to positively determine its value, there is, however, one circumstance that stands very conspicuously in its favor: This is the fact that the fatalities for the year ending June 30, 1913, are but 36 as compared with 91 for the previous year, representing a reduction of 60 per cent. It is hardly possible that this showing is entirely due to causes outside of the influences of the service, and the more the department can properly take unto itself credit therefor, the more is its existence justified.

The year was particularly fortunate in the absence of shell explosions, three of which, in the 1912 report, account for 68 casualties, 27 of which resulted fatally. Crown sheet failures for the year were 72, as compared

with 92 for the year previous, resulting in 146 casualties (29 fatalities), as compared with 217 casualties (50 fatalities), respectively. Aside from these particular features, it does not appear that the roads have availed themselves to any great extent of their opportunities to attack the various sources of injury as, for example, in the matter of squirt hose accidents, which this year actually increased in number from 243 to 266. The degree of seriousness of all accidents, with the exception of arch tube failures, appears less for 1913 than for 1912, rather than that vigilance has served to keep down the total number of accidents. Inasmuch, then, as each failure is potentially as destructive as ever, but little real progress can be claimed. Fortunately, it appears that a better basis of understanding is being arrived at between the roads and the inspection service, and it is to be hoped that through this a much greater reduction in the number of minor accidents also can be reported by the end of another year.

Traingrams Abroad.

It appears that American railways are not the only ones which have experienced trouble with overburdening of the telegraph wires, for, in an address before the London School of Economics, by Mr. G. C. Godfrey, agent (general manager) of the Bengal-Nagpur Railway, that gentleman had considerable to say regarding the necessity for a "check" on the use of the telegraph wires, not only on his road, but on Indian railways in general. One step toward the relief of the telegraph service was the use of "train messages," or what, in this country, are known as "traingrams," which readers understand to be letters sent in envelopes of a distinctive color (usually pink) for forwarding by train mail. Urgent messages which, nevertheless, may be delivered in seasonable time if taken to their destination by train, providing there be no delay in the local delivery of the same, are now handled by this method extensively, the special color and marking of the envelopes indicating that the prompt delivery of the same after it has left the train is an urgent matter. For one thing, such applies to a large mass of correspondence originating too late in the day to be useful at destination, before office-closing hours, even if forwarded by telegraph, and which may every bit as well be carried by train and delivered in time to receive attention at the opening of offices the following morning.

The Indian railways have adopted this method of transmitting such messages as may reasonably await the slower process, but generally adhere to the practice of sending, as an accompaniment of the "train message," a brief telegraphic message calling attention to the message which has been dispatched by a certain train. At destination a messenger is then sent to meet the train, to receive the message and deliver it to the proper office without delay. This latter feature is criticised by Mr. Godfrey as being unnecessary, in most cases, so on his own road the notification message is omitted, and, to avoid delay in delivery at destination, the train messages

are handled at once, with the same despatch as pertains to telegrams.

There is also exercised over messages handed into the telegraph offices a sort of censorship with regard to the necessity for delivery over the wires. For this purpose the service telegrams are divided into three classes: Messages pertaining to accidents take precedence over all others, and are coded in a manner to indicate that they are of first importance. Other messages which seem really to deserve immediate transmittal are coded in accordance with a secondary designation, and are sent over the wires and delivered as telegrams. The third class of messages are those which it is thought, upon scrutiny, may await sending by train. They are coded so as to indicate such method of transmittal and are forwarded by the next train and then delivered immediately, like telegrams, as above stated.

It has been found that the system works satisfactorily, relieving the wires of a great deal of overcrowding and making room for the dispatch of public or commercial messages which, as to a large extent in this country at the smaller towns, are sent through the railway offices and over the railway wires.

It is also to be noted that officials who are given authority to classify messages which are tendered for transmittal are instructed to be on guard against the slipping through of messages of a personal character, under the guise of service messages. In such cases the official in charge at the forwarding end uses his own discretion as to whether the message is of such character that it should be sent by train or be forwarded as a telegram, free, or charged to the sender at regular rates. As might be expected, such a method of "selection" has a deterrent effect upon all who might presume to be entitled to privileges with the telegraph service; and it is intimated that the native Indian employees have a weakness for the telegraph habit, out of a desire to magnify the importance of their affairs. Citing an instance of this kind, it was told that one of the Indian station-masters, in his bereavement, wired a message to his superintendent reading like this: "Assistant eloped with wife. My God, what a pity!" Far from receiving in reply any expression of sympathy from his superior, no official notice was taken of his distressful situation—not even as much as to permit the courtesy of the free use of the telegraph. Accordingly, a charge was entered against the poor man's account, to be deducted from his salary when pay day came round.

Such an extreme case was no doubt cited to illustrate the vigilant watchfulness by which the railways in that country manage to keep their wires reasonably free from irrelevant and unnecessary encroachment, greatly to the advantage of the service in handling the really urgent dispatches concerned with railway operation and the tariff-paying messages of the public.

Data Required on Freight Claims.

The interstate Commerce Commission will require quarterly reports from carriers covering certain information in

regard to freight claims. An order to this effect was issued on December 8, 1913, and the commission has now issued a circular stating in further detail its requirements in this respect. The purpose of these inquiries is to procure for the use of the commission information bearing upon the investigation and settlement of freight claims, and a statement of loss and damage freight claims adjusted. The forms require a statement of the number of claims presented directly to the carrier by or for shipper, consignee or owner of freight, divided under the head of loss and damage and overcharge. These are to be subdivided in the matter of interstate claims and intrastate claims into local and interline in both classes.

As to the disposition of claims, the forms require a subdivision in the matter of time intervening between the presentation of claims and the adjustment or declination of it. These require a statement subdivided into periods of 30 days up to 120 days, then a statement in regard to claims held for more than six months, and not over one year, and the number carried more than one year before disposition. These are also divided under loss and damage and overcharge, and it is required to be shown whether they are paid, declined or withdrawn. Statement is also required concerning

the general character of the claim with particular reference to matters which tend to delay payment or declination. Question 5 requires information respecting claims for conceded loss and damage, in which there is no evidence of irregularity in handling by carrier or carriers. Under this head must be given the number of claims of this class during the period in which this report was made, and a statement of the character of the documents, affidavits, statements and evidence required of claimants, and the nature and extent of the investigation made by respondent before adjustment or declination.

A large form calls for a classified statement of claims adjusted for loss and damage during the period under consideration, subdivided under 26 commodity heads. Subdivisions under this are robbery of entire package or partially so, unlocated loss, concealed loss, damage by fire, wrecks, defective equipment, errors of employees, rough handling of cars, improper refrigeration and ventilation, improper handling, loading or stowing and improper packages and packing of freight, delays, unlocated damage, amounts recovered from sale of refused and unclaimed freight, etc. The method of making these entries is fully explained by complete instructions.

Opinion on Railway Subjects.

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Rates Cannot Be Based on Physical Valuation.

"Railroad rates never have been, and never can be, made arbitrarily, based upon capitalization or physical valuation of property. Rates are the outgrowth of competition between carriers serving the same or different communities, competition of commodities and 'what the traffic will bear.' The right to exact reasonable rates does not necessarily imply that carriers shall derive a profit on each separate transaction. It is, however, an accepted principle, in dealing with total results, that the carrier is entitled to a fair return upon the value of the property devoted to public use; there is, nevertheless, the restriction that no more than a reasonable rate shall be charged, as the public has a right to rates not higher than the worth of the service. Holding, as I do, that rates cannot be made based upon physical valuation or capitalization, then I take the other horn of the dilemma by suggesting a complete regulation over the future issuance of railway securities as the means toward bringing about economical and proper methods in the management of our railroad properties."—J. C. Lincoln, manager traffic bureau, Merchant Ass'n. of New York.

No Rate Yard-Stick.

"The value of the property may be expressed in dollars in advance of any rate controversy. The rate of return may conceivably be established by fixed rules. The cost of the service may be approximated for any period of time and as of any date. Public policy may be outlined in general and specific language in legislative acts without reference to particular disputes. All the other considerations in rate-making may be indexed and catalogued for handy reference. But no one can state in advance the specific facts in a rate problem or controversy and the attendant circumstances and conditions. A certain combination of facts may require the application of a certain standard. A combination of facts similar to these but in different proportions may require a somewhat different standard. Instead of searching for one standard a set of standards may be sought, and that standard or combination of standards employed in

each particular case which is best adapted to promote justice to all parties in interest. It is more important that justice shall be achieved in a large way than that some specific standard shall be promulgated and adhered to under all circumstances. That is why I cannot give you a universal rate yardstick, but must content myself with directing attention to a few of its fundamental components."—Interstate Commerce Commissioner B. H. Meyer in address to American Economic Association.

Government Ownership if Present Tendencies Continue.

"Government ownership is not only a possibility, but a certainty, if wages and all other commodities are to go up in price and the price of transportation remain stationary, or be reduced, as it is being done continually."—H. U. Mudge, president Chicago, Rock Island & Pacific Ry.

Stockholders Should Influence Public Opinion.

"The officers of your company are too few in number to exert much influence on public opinion, and a large part of their time and energy, which should be devoted to that end, and to promoting safer and more efficient management, is consumed in appearing before commissions, to protect the company's revenues, and before legislative bodies, to argue against ill-advised and damaging laws. The present is an age of regulatory legislation, and the stockholders should endeavor to defend their own interests by opposing unwise legislation adversely affecting their company, and by correcting erroneous impressions current with the public. The ownership of your property is vested at the present time in over 23,000 stockholders, who could and should prove a potent protective force. Apathetic acquiescence on their part in the assaults of the demagogue and of the well-intentioned though unenlightened and irrational reformer, tends toward but one result, while concerted effort will do much to repel the attacks and mold public opinion.

The management has labored energetically to conciliate

the people of the communities traversed by the company's lines."—Chairman Kruttschnitt in annual report to stockholders, Southern Pacific Co.

Public Appreciation of Conditions Increasing.

"I have great confidence that Government ownership and operation of the railways will never become a fact in the United States, but that there will be a general recognition of the principle that a prosperous railway system under private management, but subject to reasonable public regulation, is the best assurance of progress in public transportation service.

In my opinion the most unfavorable factor in the railway situation is the tendency of railway-operating costs to increase more rapidly than revenues. On the other hand, the most favorable factor in the situation is the growing appreciation, on the part of the general public, of the universal interest in the railways and of the economic necessity for such a relation between railway earnings and operating costs as will enable the companies to provide increased facilities as they may be needed."—Fairfax Harrison, president, Southern Ry.

Forced Employment of Superfluous Men.

"One of the unfavorable features in the railway situation is the forced employment of superfluous men. This fact should not be confused with that of wage advances. Wage advances are not an unmixed evil; superfluous men on railways are. Demoralization, with resultant poorer service to the public, from the evil of idlers, especially in railways, is an obvious fact.

The public is hurt when non-essential men are kept on, and essential men, necessary for the better conduct of the business, are laid off. This is unfair at the start, and will in the end lower the efficiency of railways. Pressure of public opinion, exerted through its chosen representatives, presents the only way in which it can be remedied."—T. D. Underwood, president, Erie R. R.

Public Does Not Protest Against Immoral Action by the Government.

The justifiable apprehensions of railway officers are based upon continued legislative action in violation of the fundamental rule that economic control and economic responsibility must be united. The progressive separation of these elements under laws taking from the owners of the properties more and more of the degree of control over rates and operating methods which ownership formerly implied, though these owners must still accept all losses resulting from insufficient rates, unwarranted increases in wages, or the employment of an excessive number of men, seems to be unwise from either the economic or the political point of view. The lack of public protest against the immoral actions of the Post Office Department, under which the railways have been forced for years to carry the mails at ruinously low rates, and, more recently, to take over the transportation of the parcels-post traffic, with compensation for only a beggarly fraction of its total, points to a disregard, when railways are concerned, of ordinary principles of fair dealing and common honesty that is not less than ominous."—L. F. Loree, president, Delaware & Hudson Co.

Depressive Regulation Will Eventually Wreck.

If there is to be no amelioration of conditions, it would seem that depressive regulation, if persisted in, will surely wreck the railroad properties, which will inevitably lead to an attempt by the Government to operate them as their owner. Undoubtedly, the people of this country are op-

posed to government ownership with all the tyrannies and oppressions it may bring, and yet they appear to be approving those policies which will render individual ownership so unprofitable that it will become impossible. Railway service must inevitably deteriorate by lack of adequate means to maintain it, and these means cannot forthcome from the rate schedules now in effect. Increased business will not serve the purpose, for of late years the railways generally have been operated to the limit of their facilities and extra business over and above their limits entails a disproportionately high cost. Through diminished net returns due to unremunerative rates, the credit of most of them is so impaired that they cannot secure funds to increase their facilities or make necessary improvements. Neither can these be provided for out of surplus net earnings. If the people insist that the railway service to which they have been accustomed and to which the business of the country is adjusted should still obtain, or that a higher standard of service, to meet the exigencies and demands of trade and commerce, should be inaugurated, they must understand that such service can be furnished only through the ability of the investors who back the railways to pay the bills.—B. F. Bush, president, Missouri Pacific Ry.

Union Pacific to Distribute Its Baltimore & Ohio Stock.

The executive committee of the Union Pacific R. R. decided at a meeting held in New York city, January 6, to recommend to the directors at their special meeting set for January 8, that the \$82,087,800 Baltimore & Ohio stock owned by the Union Pacific be distributed among the shareholders as an extra dividend, in addition to \$3 a share in cash. It was decided also to recommend that, because of these extra dividends, the Union Pacific's regular annual dividend rate be reduced from 10 per cent to 8. The official announcement said: "The executive committee decided to recommend to the board of directors, which meets Thursday, to distribute among the holders of the common stock of the Union Pacific Railroad Co. the Baltimore & Ohio stock owned by it, together with \$3 per share in cash. It is proposed to distribute to the holder of each share of Union Pacific common \$12, par value, in Baltimore & Ohio preferred, now yielding 4 per cent, 48 cents; and \$22.50 value, in Baltimore & Ohio common, now yielding 6 per cent, \$1.35 and, \$3 in cash, say at 6 per cent per annum, 18 cents, or a total of \$2.07. The executive committee also recommends that, if carried into effect, the regular annual dividend be correspondingly reduced—that is from 10 per cent to 8 per cent per annum." About \$42,500,00 of the Baltimore & Ohio stock was acquired last July from the Pennsylvania Railroad, which received from the Union Pacific an equivalent amount of Southern Pacific stock which the Union Pacific was obliged to give up as the result of the Supreme court's decision forcing the dissolution of the Union Pacific-Southern Pacific system. The balance was acquired in 1906 during the regime of the late E. H. Harriman. In all, Union Pacific owns \$53,607,000 Baltimore & Ohio common and \$28,480,000, preferred. At the prices ruling on the day of the announcement the market value of this \$82,087,000 stock is \$70,000,000. As Union Pacific has \$216,633,000 common stock the \$3 per share cash dividend to be declared calls for \$6,948,000 cash, making the total money value of the forthcoming disbursement \$76,498,000. The effect of the distribution is to decrease the earning power of the Union Pacific 2 per cent. The investment on which this 2 per cent was earned now becomes the property of the individual stockholders. The recommendation set forth above was duly transmitted to the directors at their meeting, on Thursday. On the same day, however, action to restrain

them from distributing the company's holdings of Baltimore & Ohio stock to the road's common stockholders was begun in the state supreme court, at New York city, by a group of preferred stockholders headed by James T. McCaddon. The complainants set forth that the Baltimore & Ohio stock represents capital investment and was not acquired out of earnings of the Union Pacific.

Annual Report of the Chief Inspector of Locomotive Boilers.

The tabulated data contained in this report shows a marked decrease in the number of casualties due to failure of locomotive boilers and their appurtenances, when compared with the report for the preceding fiscal year. Attention was concentrated especially on the more serious accidents in an effort to reduce the number of fatalities. The result of this policy is shown by a reduction of over 60 per cent in the number killed and 10 per cent in the number injured by failures of locomotive boilers and their appurtenances during the fiscal year ending June 30, 1913, as compared with the preceding year.

Five hundred and ninety-two accidents resulting from failure of locomotive boilers and their appurtenances were investigated by the division of locomotive boiler inspection during the year ending June 30, 1913. While the division regards the period since the law became effective has been too brief to permit a comparison to be made which will accurately show its value, it offers the following comparison of some of the most serious as well as some of the most frequent accidents during the first and last quarters of the fiscal year ending June 30, 1913, which is thought to fairly represent the benefits which result from government supervision over the condition of locomotive boilers and their appurtenances.

	Accidents during first quarter, 1913.	Accidents during last quarter, 1913.
Crown-sheet failures ...	18	9
Water glasses bursting.	36	16
Lub. glasses bursting....	11	6
Squirt-hose failures ...	161	64
Flue failures	15	11

A summary of the inspection work performed during the year shows the following:

Number of locomotives inspected	90,346
Number found defective	54,522
Number ordered out of service	4,676
Number having pressure reduced	472
Number having seams reinforced by welt plates....	561
Lowest reading of the waterglass raised	381
Number having the lowest gage cock raised	172
Strengthened by having heavier braces applied.....	281
Number requiring additional support of crown sheet..	147

From the above it appears that during the year 6690 locomotives were either held out of service for repairs, or ordered changed and strengthened to conform to the requirements of the law.

The report states that: "The number of locomotives found defective as shown above, viz., 54,522, does not indicate that this number of locomotives were found to be in violation of the law, but they were found to contain defects which should be remedied before the locomotives were again placed in service. The number found in direct violation of the law is represented by the number ordered out of service in accordance with section 6 of the law, which requires the district inspectors to issue a written order holding the locomotive for repairs when one is found that does not meet the requirements of the law or rules. No formal appeal from the action of any district inspector has been filed during the year. This, in view of the vast amount of work performed and the number of locomotives on which repairs were ordered, shows that while the inspectors have been diligent they have also used discretion and good judgment in the

enforcement of the law. It is believed that it also shows the existence of a spirit of co-operation and an earnest effort to comply with the requirements of the law on the part of a large majority of railroad officials.

"Specifications for practically all locomotive boilers in service were filed within the time prescribed by the law, but the variation in design and the widely different methods of calculation followed by the various railroads has delayed the work of checking them. Very satisfactory progress is being made in this important work, and it will soon be possible to show accurately the stresses on each part of every locomotive in service. The results obtained indicate that when the checking is complete it will be necessary in some instances to compare the data shown on the specification cards with actual measurements in order to insure the accuracy of the information furnished. Specifications are filed for all new locomotive boilers before they are put in service, and when repairs are made on boilers now in service which in any way affect their strength, the changes are reported on a suitable form; therefore our records are kept up to date.

"Shortly after our inspectors were placed in the field they frequently advised that they were finding locomotives in service with serious defects, such as sharp or badly worn flanges, flat wheels, cracked or broken wheels, loose wheels or tires, thin or badly worn tires, excessive lateral motion in engine trucks, drivers, and trailers, broken frames, broken arch bars, broken springs, and other defects, all of which are a fruitful source of accidents and derailments, but which are not covered by the locomotive boiler inspection law, or any other law. In fact, it was found to be a common practice on some railroads to continue in service on their own line equipment which if offered in interchange by a connecting line would be refused on account of its defective condition.

"Although this division has no legal authority to act in

Accidents and Casualties Resulting from the Failures of Locomotive Boilers and Their Accessories.

Nature of failure or defect.	Year ended June 30—					
	1913			1912		
	Accidents.	Killed.	Injured.	Accidents.	Killed.	Injured.
Arch-tube failures	20	3	27	18	.....	23
Arch-tube plugs defective .....	.....	.....	.....	.....	.....	.....
Ash-pan blowers defective .....	.....	.....	.....	.....	.....	.....
Blowers defective	13	1	14	.....	.....	.....
Blow-off cocks defective	16	.....	18	23	.....	22
Boiler checks defective	11	.....	12	11	1	11
Boiler explosions:						
A—Shell explosions .....	.....	.....	.....	3	27	41
B—Crown-sheet failures due to low water where no contributory causes were found	44	23	67	69	35	129
C—Crown-sheet failures due to low water where contributory causes or defects were found	28	6	50	23	15	38
D—Fire-box failures due to defective stay bolts, crown stays, or sheets	5	.....	8	1	1	1
E—Fire-box failures due to water foaming	1	2	.....	1	3	.....
Cross stay defective	1	.....	3	.....	.....	.....
Crown stays defective	1	.....	.....	.....	.....	.....
Dome caps defective	2	.....	2	2	.....	2
Draft appliances defective	4	.....	4	3	.....	4
Exhaust nozzle breaking	1	.....	1	.....	.....	.....
Fire doors defective	2	.....	2	.....	.....	.....
Flue failures	54	1	63	56	1	62
Flue-plug failures .....	.....	.....	.....	7	.....	8
Flue pockets defective	2	.....	2	3	.....	4
Flue sheets defective	1	.....	1	2	.....	245
Gage cocks defective	2	.....	2	4	.....	4
Grates defective	1	.....	1	.....	.....	.....
Handhole plate defective .....	.....	.....	.....	1	.....	1
Injectors and connections defective (not including injector steam pipes)	28	.....	28	47	.....	48
Injector steam-pipe failures	36	.....	47	31	.....	38
Lubricators defective	11	.....	12	11	.....	12
Lubricator glasses bursting	45	.....	45	49	.....	49
Lubricator piping defective	4	.....	5	.....	.....	.....
Mud ring defective .....	.....	.....	.....	1	.....	1
Patch bolts defective .....	.....	.....	.....	1	.....	1
Plugs in fire-box sheets defective	5	.....	6	1	.....	1
Plugs (fusible) defective	1	.....	1	1	.....	1
Plug in steam chest defective	1	.....	.....	.....	.....	.....
Plugs (washout) defective	20	.....	23	11	2	14
Rivets defective	2	.....	2	.....	.....	.....
Safety valves defective	1	.....	1	.....	.....	.....
Squirt-hose failures	266	.....	267	243	.....	245
Stay bolts defective	2	.....	3	.....	.....	11
Steam-beat hose defective	1	.....	1	.....	.....	.....
Steam leaks obscuring view of enginemen .....	.....	.....	.....	1	1	.....
Studs defective	20	.....	21	14	.....	16
Steam piping defective	5	.....	6	11	2	11
Superheater-tube failures	1	.....	1	1	.....	1
Tank hose defective	3	.....	3	.....	.....	.....
Throttle glands defective	3	.....	3	.....	.....	.....
Valves defective (not including safety valves)	6	.....	6	5	.....	6
Water-bar failures	1	.....	1	.....	.....	.....
Water glasses bursting	128	.....	128	163	1	168
Water-glass fittings defective	7	.....	7	8	.....	8
Total	820	36	911	856	91	1,005

such cases, we believe that travelers and employees on railroads are entitled to all the protection against accidents that can be provided. Therefore our inspectors were instructed while making their regular inspections to note any defective conditions on locomotives which were apt to cause accidents, and when any were found to advise the railroad official in charge, and if proper repairs were not promptly made to wire the chief inspector, who would bring it to the attention of higher officials. During the past year 1568 locomotives having defects of the above-mentioned character, 1052 of which were defective wheels, have been reported to this division and to the railroad officials. These defects have been discovered by such casual inspection of the different parts of the locomotive as could be made while our inspectors were engaged in their regular work of inspecting locomotive boilers and their appurtenances as required by law. There can be no doubt, therefore, that many more would have been found had a more thorough inspection been made. It is extremely gratifying to be able to state that a large percentage of the railroad officials appreciate this action on the part of our inspectors and take prompt action to remedy the defects to which their attention has been thus directed.

"In some instances, however, railroad officials have objected to this division requesting repairs to defects not covered by the law, have advised us that we have no authority over such matters, and have failed to make the repairs, even though the defects were of a nature that might cause serious accidents. For this reason the provisions of section 6 of the locomotive-boiler inspection law should be made to apply to every part of locomotives and tenders, as well as to locomotive boilers and their appurtenances, so that our inspectors would have legal authority to require proper repairs to be made to any part of the locomotive or tender when it is found to be in an unsafe or improper condition for service."

The report concludes with the recommendation that "congress be requested to enact necessary legislation to confer upon this division the authority to require repairs to be made to any part of a locomotive or tender when it is found to be in an unsafe or improper condition to operate in the service to which the same is put," and is signed by Frank McManamy, chief inspector of locomotive boilers.

The accompanying tabular statement shows the number and nature of locomotive boiler accidents together with the injuries resulting therefrom, during the two years that the boiler inspection service has been in operation.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The regular meeting of the Central Railway Club for January, was held Friday evening, Jan. 9, at the Hotel Statler, Buffalo, N. Y. Mr. Walter V. Turner, chief engineer of the Westinghouse Air Brake Co., presented a paper on "Air Brakes: Why Their Possible Utility and Performance is not Obtained in a Higher Degree in Actual Service."

This paper dealt largely with the principles underlying brake design and the importance of proper combinations and compromises in all that is involved. The aim of the lecture was to impress upon all concerned the importance: First, of the design of the air brake; second, the proportions of the design to be maintained in the installation and in service; and third, that these two requirements are vastly more important than what is generally intended by the expression "air brake maintenance;" that is, the cleaning, repairing and various other items involved in attempting to secure proper operation of the brakes.

Annual reports were presented and the result of the balloting for officers for the ensuing year were announced.

An extra meeting of the Western Society of Engineers, the annual meeting of the bridge and structural section, will be held Monday, January 12, at 8 p. m., in the society rooms, 1735 Monadnock Block, Chicago. The election of officers of the section will take place. Mr. W. M. Wilson will present a paper on "Movable Bridges." An extra meeting of the society, the annual meeting of the hydraulic, sanitary and municipal section, will be held Monday, January 19, at 8 p. m. The election of officers of the section will be held. Mr. John W. Alvord will address the meeting on "The Engineering Lessons from the Ohio Floods."

The annual dinner of the Traffic Club of New York will be held Wednesday evening, February 11, at the Waldorf-Astoria hotel, New York city. Members who were present last year will remember the taxing of the capacity for seating and service, and will understand the necessity of sending invitations and making up parties early. The price of dinner tickets will be as usual, \$6.00 per plate.

Necrology, 1913.

The following is a list of American railway officials, prominent employees and members of the railway supply fraternity whose deaths occurred during 1913, together with place and date of death:

- Adams, Francis H., ex-general storekeeper, Chicago & Northwestern Ry., Chicago, Ill.—July.
- Adreon, Edward L. J., president, Adreon Mfg. Co., St. Louis, Mo.—Nov. 18.
- Aird, Gordon A., general agent, Atchison, Topeka & Santa Fe Ry., Chicago, Ill.—July 15.
- Archibald, Peter S., ex-chief engineer, Intercolonial R. of Canada, Moncton, B. C.—March 16.
- Aucker, W. W., superintendent, floating equipment, Baltimore & Ohio R. R., Baltimore, Md.—April 8.
- Barnett, Wm. E., ex-vice president, New York, New Haven & Hartford R. R., Pinehurst, N. C.—Oct. 10.
- Barrett, Samuel E., president, Barrett Mfg. Co., Baltimore, Md.—Jan.
- Bennett, Nelson, railroad contractor, Tacoma, Wash.—July 22.
- Bettis, Horace I., auditor, San Pedro, Los Angeles & Salt Lake R. R., Tipton, Cal.—Nov. 14.
- Bonfield, T. P., president, Kankakee & Seneca R. R., Kankakee, Ill.—Jan. 21.
- Ponzano, Adolphus, inventor Bonzano rail joint, Philadelphia, Pa.—May 5.
- Borner, Wm., ex-assistant freight traffic manager, Pennsylvania Lines, Chicago, Ill.—Dec. 21.
- Boutell, Alexander A., president, Detroit Graphite Co., Atlantic City, N. J.—Nov. 15.
- Bowman, Peter E., ex-division superintendent, New York, New Haven & Hartford R. R., New Haven, Conn.—May 9.
- Brandeis, A. S., general solicitor, Louisville & Nashville R. R., Louisville, Ky.—March 4.
- Brendler, Otto, trainmaster, Chicago, Milwaukee & St. Paul Ry., Green Bay, Wis.—Feb. 28.
- Brown, Alexander, signal engineer, Chicago, Milwaukee & St. Paul Ry., Milwaukee, Wis.—July 7.
- Brown, Frank W., first assistant general passenger agent, Boston & Maine R. R., Concord, N. H.—Oct. 27.
- Buhrer, Caspar, roadmaster, Lake Shore & Michigan Southern Ry., Toledo, Ohio—March 23.

- Burt, Horace G., Chief engineer, Chicago Association of Commerce, former president Union Pacific R. R., Oak Park, Ill.—May 19.
- Carson, G. Ashton, president, Catawissa R. R., Philadelphia, Pa.—May.
- Charlton, James, chairman Transcontinental Passenger Association, Chicago, Ill.—November 19.
- Chase, G. R., Southwestern passenger agent, Chicago, Milwaukee & St. Paul Ry., Kansas City, Mo.—May 3.
- Cheever, A. S., ex-division superintendent, Boston & Maine R. R., Somerville, Mass.—Feb. 17.
- Coakley, J. J., superintendent, Terminal R. R. Association St. Louis, St. Louis, Mo.—April.
- Cook, John S., master mechanic, Georgia R. R., Baltimore, Md.—Aug. 28.
- Courtright, J. A., trainmaster, Cleveland, Cincinnati, Chicago & St. Louis R. R., Wabash, Ind.—Aug. 17.
- Coykendall, S. D., president, Ulster & Delaware R. R., Kingston, N. Y.—Jan. 14.
- Crary, George M., secretary, New Orleans, Mobile & Chicago R. R., Mobile, Ala.—August 16.
- Crissey, J. W., assistant engineer of construction, Lake Shore & Michigan Southern Ry., Chicago, Ill.—March 7.
- Crozier, Andrew S., Salesman, American Steel Foundries, Atlantic City, N. J.—June 14.
- Cull, E. H. B., division freight agent, Wabash R. R., New York city.—Jan. 30.
- Cushman, J. C., ex-secretary, Plymouth, Kankakee & Pacific R. R., Chicago, Ill.—June 4.
- Cutter, Joseph G., roadmaster, Northern Pacific Ry., Walla Walla, Wash.—May 29.
- Daniels, Fred H., chairman of the board of engineers, United States Steel Corporation, Worcester, Mass.—Aug. 31.
- Davis, Wm. E., passenger traffic manager, Grand Trunk Ry., Montreal, Quebec—May 15.
- Dedman, E. J., vice-president, Gainesville & Northwestern R. R.—May 16.
- Douglas, Earl P., ex-agent, Union Line, Des Moines, Ia.—Jan.
- Driscoll, J. J., trainmaster, Baltimore & Ohio R. R., Butler, Pa.—August.
- Dunneau, M., roadmaster, Chicago, Rock Island & Pacific Ry., Colby, Kan.—May 3.
- Eaton, G. H., assistant master car builder, Canadian Pacific Ry., Winnipeg, Man.—July.
- Eden, E. H., commercial agent, Delaware, Lackawanna & Western R. R., Minneapolis, Minn.—March 11.
- Elliott, Wm., founder, Elliott Frog & Switch Works, East St. Louis, Ill.—Sept. 26.
- Ellison, Col. J. M., passenger agent, Denver & Rio Grande R. R., Colorado Springs, Col.—Jan. 6.
- Emerson, H. E., ex-engineer, Great Northern Ry., St. Paul, Minn.—Feb.
- Emerson, Thos. M., president Atlantic Coast Line R.R., Washington, D. C.—Nov. 25.
- Ensign, John F., chief of the division of locomotive boiler construction, Interstate Commerce Commission, Washington, D. C.—Sept. 25.
- Evarts, Maxwell, general counsel, Southern Pacific Co., Windsor, Vt.—Oct. 7.
- Fell, Abraham, general western freight agent, Delaware, Lackawanna & Western R. R., Buffalo, N. Y.—March.
- Finley, William Wilson, president Southern Railway, Washington, D. C.—Nov. 25.
- Flagler, H. M., capitalist, builder of the Florida East Coast Ry., West Palm Beach, Fla.—May 20.
- Florence, Chas. A., export and import agent, Illinois Central R. R., Chicago.—Oct.
- Forsyth, Alexander, shop superintendent, Chicago, Burlington & Quincy R. R., Aurora, Ill.—May 19.
- Fouquet, John D., ex-architect, New York Central & Hudson River R. R., New York city.—Sept. 18.
- Fraser, Geo. M., traffic manager and superintendent, Nevada Copper Belt R. R., Mason, Nev.—Aug. 29.
- Fritz, John, prominent engineer and pioneer iron manufacturer, Bethlehem, Pa.—Feb. 18.
- Frost, Wm. H., pioneer railroad contractor, Independence, Kan.—April 18.
- Fry, Urias J., superintendent of telegraph, Chicago, Milwaukee & St. Paul Ry., Chicago, Ill.—Feb.
- Gillett, Ralph D., president, Hampden Railroad Corporation, Westfield, Mass.—Oct. 15.
- Gilman, D. H., railroad builder and organizer, Pasadena, Cal.—April 28.
- Gilmore, Frank M., president, E. D. E. Company, Chicago, Ill.—Dec. 18.
- Gilluly, Joseph, treasurer, Denver & Rio Grande R. R., Denver, Colo.—Feb. 6.
- Gordon, Wm. G., assistant auditor, Chicago Burlington & Quincy R. R., Hinsdale, Ill.—Nov. 1.
- Gossett, C. E., general master mechanic, Minneapolis & St. Paul R. R., Rochester, Minn.—Feb. 19.
- Grant, John M., ex-secretary, Grand Trunk Ry., Southsea, England—Sept. 8.
- Grafton, Wm. McC., signal engineer, Pennsylvania Lines West, Atlantic City, N. J.—Oct. 10.
- Hagerman, James, ex-general counsel, Missouri, Kansas & Texas R. R., St. Louis, Mo.—Nov. 14.
- Haskell, Edward A., division engineer, Boston & Albany R. R., Boston, Mass.—Aug. 24.
- Haskell, F. A., ex-general freight agent, New York Central & Hudson River R. R., Brooklyn, N. Y.—Nov. 3.
- Haug, James C., resident engineer, New Orleans & Northeastern, New Orleans, La.—July 6.
- Haupt, Samuel B., president and general manager, Susquehanna, Bloomsburg & Berwick R. R., Milton, Pa.—Sept. 28.
- Heimrich, John, president, Great Southern R. R., Portland, Ore.—June 11.
- Hill, David S., general superintendent, Lake Erie & Western Ry., Detroit, Mich.—July.
- Holliday, John W., superintendent, New England Railway Mail Service, Boston, Mass.—Aug. 24.
- Hooper, D. E., supervisor, bridges and buildings, Southern Railway, Lawrenceburg, Ky.—Oct. 20.
- Hopkins, E. O., ex-receiver, Peoria, Decatur & Evansville Ry., Chicago, Ill.—April 3.
- Hanson, Arthur S., general passenger agent, Boston & Albany R. R., Brighton, Mass.—July 28.
- Hudson, S. M., auditor, Ft. Worth & Denver City Ry., Rochester, Minn.—Sept. 30.
- Hughes, Charles A., ex-manager, Rogers Locomotive Works Paterson, N. J.—March 12.
- Hughes, Geo. M., president and general manager, New Jersey, Indiana & Illinois R. R., Brooklyn, N. Y.—Sept. 6.
- Ingham, Wm. A., ex-president, East Broad Top R. R., Philadelphia, Pa.—Sept. 23.
- Irwin, Geo. L., ex-division superintendent, Chicago & Northwestern Ry., Chicago, Ill.—Aug. 22.
- Jacobs, John, ex-roadmaster, Illinois Central R. R., Chicago, Ill.—June 6.
- Jones, Dwight A., president, Mississippi River & Bonne Terre Ry., St. Louis, Mo.—Dec. 7.
- Jones, Captain S. H., district passenger agent, Louisville & Nashville R. R., Birmingham, Ala.
- Johann, Jacob, ex-superintendent machinery, Chicago & Alton R. R., Springfield, Ill.—Nov.
- Johnson, Wm. P., ex-general passenger agent, Illinois Central and Lake Shore & Michigan Southern railways, Chicago, Ill.—Nov. 16.

Kerr, C. S., trainmaster, Chicago, Rock Island & Pacific Ry., Topeka, Kan.—March 6.

Kuersteiner, E. E., ex-bridge engineer, Louisville & Nashville R. R., Louisville, Ky.—March.

Lasier, N. B., general baggage agent, Baltimore & Ohio, Chicago Terminal R. R., Chicago, Ill.—May 27.

Lasseter, J., division superintendent, Southern Ry., Selma, Ala.—Feb. 17.

Law, Robert, formerly with the Chicago, Burlington & Quincy R. R., Los Angeles, Cal.—Feb. 7.

Leavitt, John Q., ex-roadmaster, Utah Central Ry., Garland, Utah—Sept. 27.

Lewis, B. T., western manager Railway Appliances Co.—Oct. 11.

Marble, John H., member, Interstate Commerce Commission, Washington, D. C.—Nov. 21.

Martin, Henry, vice-president and general manager, International & Great Northern Ry., Hearne, Tex.—Dec. 5.

Martin, Howard F., general sales manager, Eveland Engineering & Manufacturing Co., Wallingford, Conn.—Sept. 2.

Metheany, R. R., secretary and auditor, Grand Rapids & Indiana R. R., Grand Rapids, Mich.—April 7.

McAllister, Wm. R., general agent, Southern Pacific Co., Denver, Colo.—June 12.

McCabe, J. C., general freight agent, Chicago, Rock Island & Gulf Ry., Fort Worth, Tex.—May 3.

McCarrick, J. D., division freight agent, Southern Railway, New York city—Sept. 10.

McCrea, James, ex-president, Pennsylvania R. R., Haverford, Pa.—March 28.

McFetridge, roadmaster, Canadian Pacific Ry., Souris, Man.—July 14.

McKeen, W. R., ex-president, Vandalia R. R., Terre Haute, Ind.—Feb. 18.

McMillan, A. F., chief clerk, passenger traffic department, New York Central Lines, Chicago—Aug. 9.

Meeker, E. C., assistant eastern purchasing agent, Pullman Company, Brooklyn, New York.—April 19.

Miller, Roswell, chairman of the board, Chicago Milwaukee & St. Paul Ry., New York city—Jan. 3.

Montague, H. E., traveling passenger agent, Southern Pacific Co., Los Angeles, Cal.—Dec. 1.

Morgan, J. Pierpont, financier, Rome, Italy—March 31.

Moss, Arthur W., division superintendent, Pennsylvania R. R., Reading, Pa.—March 12.

Myers, F. H., division superintendent, Chicago, Milwaukee & St. Paul R. R., Minneapolis, Minn.—April 8.

Newhall, Daniel S., purchasing agent, Pennsylvania R. R., Philadelphia, Pa.—July 13.

Nicholson, George T., vice-president, Atchison, Topeka & Santa Fe Ry., Los Angeles, Cal.—March 29.

O'Mera, W. J., eastern passenger agent, Chicago, Burlington & Quincy R. R., New York city—Feb. 6.

Palmer, S. S., president, Green Bay & Western R. R., California.—Feb.

Parker, Geo. W., ex-general counsel, Alton, Terre Haute & St. Louis R. R., St. Louis, Mo.—Jan. 19.

Parrott, Joseph R., president, Florida East Coast Ry., Oxford, Me.—Oct. 13.

Peck, A. E., superintendent, St. Louis Southwestern Ry., Pine Bluff, Ark.—March.

Petheram, J. W., ex-chief engineer, Missouri, Kansas & Texas Ry., Dallas, Tex.—March 26.

Pfender, C. E., auditor and traffic manager, Chicago & Illinois Western R. R., Chicago, Ill.—Nov. 16.

Phillips, A. B., general foreman, Denver & Rio Grande R. R., Salt Lake City, Utah—Dec. 6.

Pope, A. A., president, National Malleable Castings Co., Farmington, Conn.—August 5.

Power, M. J., general storekeeper, Canadian Pacific Ry., Montreal, Que.—July.

Price, John, pioneer railroad contractor, Turon, Man.—Feb. 25.

Pugh, Charles E., ex-vice-president, Pennsylvania R. R., Old Point Comfort, Va.—April 8.

Quackenbush, A. W., ex-master mechanic, Quincy, Omaha & Kansas City R. R., Kansas City, Mo.—April 19.

Rhame, Mitchell D., engineering department, Chicago, Milwaukee & St. Paul Ry., Minneapolis, Minn.—Dec. 9.

Raoul, Capt. W. G., ex-president, Central of Georgia Ry., Atlanta, Ga.—Jan. 17.

Rawlins, Fred L., superintendent of telegraph, Southern Pacific Co., San Francisco, Cal.—Oct. 17.

Ray, Wm. F., general superintendent, Boston & Maine R. R., Boston, Mass.—Sept. 26.

Rice, Henry F., ex-general superintendent, Chicago, Rock Island & Pacific Ry., Des Moines, Ia.—June 7.

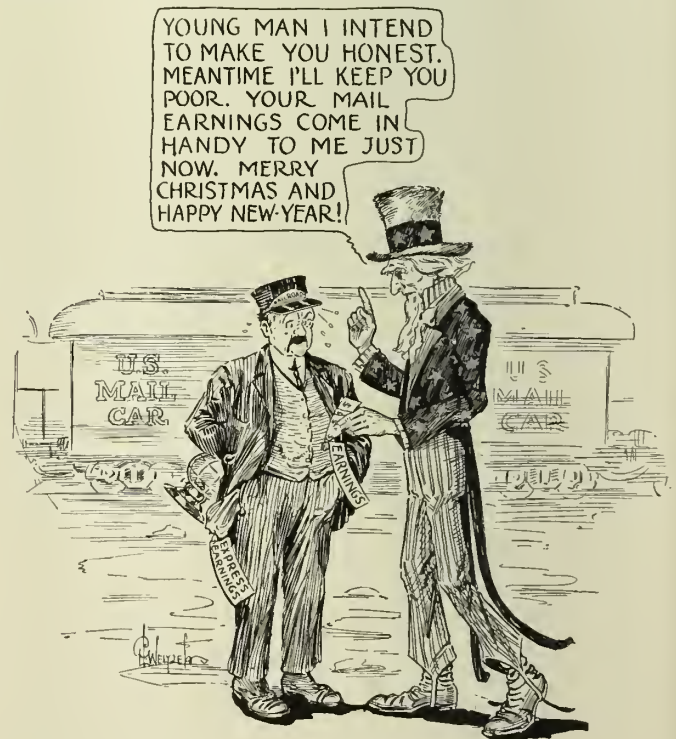
Robertson, F. C. N., general auditor, Pullman Company, Montreal, Que.—Sept. 9.

Robinson, Chas. J., ex-assistant paymaster, Southern Pacific Co., San Mateo, Cal.—July 21.

Ross, James, railroad builder and financier, Montreal, Que.—Sept. 20.

Rump, G. A., commercial freight agent, Wabash R. R., Hamilton, Ohio—April.

Sandberg, C. P., designer of Sandberg rail sections, London, Eng.—Dec. 4.



"The parcels post takes business away from the express business of the railway and reduces earnings in that way, but the government pays nothing for the extra weight carried, as the test weighing was before the parcels post began . . . What an outcry there was, and justly so, when it was found some years ago that an importer in Brooklyn was defrauding the government through false weights. . . . Here are the railways struggling to make both ends meet, and the government deliberately takes service from them worth, exclusive of parcels post, at least \$15,000,000 a year, and no pay. What kind of an example is this for the great United States government to set to the younger men of the country?"—Howard Elliott in an address to the Railway Business Association.

- Sargent, George M., founder, Congress Brake Shoe Co., Atlantic City, N. J.—Jan. 16.
- Savage, F. S., passenger department, Atchison, Topeka & Santa Fe Ry., Topeka, Kan., Dec. 20.
- Scaife, Charner T., claim agent, Illinois Central R. R., Chicago, Ill.—March 10.
- Schaffer, John, supervisor of bridges and buildings, New York Central & Hudson River R. R., Rochester, N. Y.—Sept.
- Schlacks, Henry, ex-superintendent machinery, Denver & Rio Grande R. R., Chicago, Ill.—May 16.
- Siebert, Robert S., president, East Broad Top R. R., & Coal Co., Oak Lane, Pa.—May 24.
- Leymour, Robert Bicknell, railway construction engineer, Oak Park, Ill.—Feb.
- Shepard, Frank P., railway contractor, St. Paul, Minn.
- Simpson, Lieut. Col. Wendell L., U. S. A., purchasing agent Panama R. R., Garden City, Long Island—April 23.
- Smith, James, ex-general traffic manager, Wabash R. R., Ft. Wayne, Ind.—Sept.
- Smith, R. F., president, Cleveland & Pittsburgh R. R., Cleveland, Ohio—March.
- Smith, W. E., chief engineer maintenance of way, Northern Pacific Ry., St. Paul, Minn.—Aug. 26.
- Sprigg, Wm. O., ex-division superintendent, Lehigh Valley R. R., Tompkinsville, N. Y.—Oct. 26.
- Stauffer, D. McN., ex-editor, Engineering News, New York city—Feb. 7.
- Stilson, George, roadmaster, Grand Trunk Ry., Hamilton, Ont.—Dec. 5.
- Sutherland, D. S., ex-division superintendent, Michigan Central R. R., Detroit, Mich.—Dec. 17.
- Sweeney, Michael, ex-vice-president and general manager, Trinity & Brazos Valley Ry., Houston, Tex.—Dec. 22.
- Taft, Edward A., manager express department, New York, New Haven & Hartford R. R., Boston, Mass.—July 29.
- Taylor, C. M., mechanical superintendent, Chicago, Rock Island & Pacific Ry., Topeka, Kans.—Sept. 3.
- Taylor, J. H., general district superintendent, Great Northern Ry., Superior, Wis.—July 14.
- Teillott, Thos. R., ex-superintendent, Pittsburgh, New Castle & Lake Erie R. R., Schenectady, N. Y.—August.
- Thomas, John Wilson, president, Nashville Chattanooga & St. Louis Ry., Nashville, Tenn.—Dec. 17.
- Tracy, real estate and tax agent, Chicago & Alton R. R., Chicago, Ill.—April 18.
- Trimble, J. McD., ex-general counsel, Kansas City, Mexico & Orient Ry., Kansas City, Mo.—Sept. 13.
- Vaughan, W. A., ex-general superintendent, Southern Railway, Atlanta, Ga.—Nov.
- Wakeman, E. B., ex-superintendent, Minneapolis Union Ry., Hollywood, Cal.—April 23.
- Walker, H. W., ex-general auditor, Grand Trunk Ry., Winnipeg, Man.—June 10.
- Ward, Francis E., ex-general manager, Chicago, Burlington & Quincy R. R., Chicago—June 6.
- Weller, John H., ex-superintendent, Dayton & Michigan R. R., Dayton, O.—April 22.
- Weymouth, F. P., ex-division superintendent, Northern Pacific Ry., Spokane, Wash.—Oct. 24.
- Wheeler, Herman, ex-assistant general passenger agent, Chicago & Northwestern R. R., New York city—June.
- White, E. T., district superintendent motive power, Baltimore & Ohio R. R., Baltimore Md.—Sept. 26.
- Williams, Alfred, vice-president, Ocean Shore R. R., Seattle, Wash.—Nov. 13.
- Williams, Henry A., assistant general superintendent, Southern Railway, Columbia, S. C.—Feb. 16.
- Williams, Capt. Jesse P., president, Georgia, Florida & Alabama Ry., Atlanta, Ga.—Aug. 5.
- Winne, W. N. D., comptroller, Chicago, Milwaukee & St. Paul R. R., Florida—Feb. 24.
- Wood, Chas. G., ex-treasurer, Vera Cruz & Pacific Ry., New York city—March 2.
- Woods, Alford, engineer, Pennsylvania R. R., Indianapolis, Ind.
- Woods, Edwin S., Edwin S. Woods & Co., Chicago—Nov. 15.
- Young, J. C., signal engineer, Union Pacific R. R., Omaha, Neb.—Feb. 27.
- Zollinger, L. R., engineer maintenance of way, Pennsylvania R. R., Merion, Pa.—Oct. 21.

The Railway Supply Man's Point of View.

Reciprocity in Favors.

In seeking for or taking advantage of the kind offices of a railway supply concern in connection with any kind of mechanical problem, should the railway company endeavor to reciprocate? Supply people frequently spend much time and money in aiding such investigation, only to find that the other fellow, who has stood aloof, gets the benefit of it. In other words, if two competitors, one takes off of his price what the other expends in lending aid to the prospective purchaser. Should such cases be decided on price only, irrespective of what the competitors have done?

Theory is an awfully convenient thing, and is of use a good many times. We might theorize quite at length on reciprocity in favors and arrive at some very interesting conclusions—not only interesting, but true. Actualities, however, are more to the point, and we generally have to make use of them in order to prove our theory. Herbert Spencer is a great fellow for taking one of his theories and proving it with a homely illustration. There is so much to be said about reciprocity in favors, and so much theorizing to be done over it, that we will skip immediately to the illustration, which will possibly point to the normal just as satisfactorily, and a good deal more briefly.

A certain railroad was in the market for certain appliances to go on a new lot of freight cars which they were buying. Before any bids were invited for the cars or the specialties that went on them, our company was called in to talk with this road about certain particular appliances, in the manufacture of which we are the recognized leaders, for the reason that we have been at it longer, and have sold more than any other concern in a like line. What was wanted of us was our advice in general in regard to the use of the appliances in question. Our experience was of value; our investigations, extending through many years, were worth money to this railroad buying the cars.

In order to prove the statements which we made, it was necessary for us to go to a considerable amount of trouble and expense. To the best of our recollection, our expense account on that particular lot of cars ran a trifle over \$400. We proved to the railroad that our advice to them was correct.

Then the bids for the cars were put out, and we bid our regular price. However, our competitor got the business, because his bid was a trifle lower than ours. Now, our competitor didn't make as good an appliance as we were

making, and the railroad admitted as much, but as the material of which this specialty was constructed was the same in the case of the competitor's appliance as it was in ours, and as their design of construction was fairly good, the railroad felt that the expert knowledge which became theirs because of our service would enable them to make use of the inferior appliances, and they decided to let the contract to the competitor and save a little money.

Without getting back at all to theory, let us analyze the situation for a moment and see at what point we will arrive if this becomes a settled policy with all railroads. This railroad in question is not a small road. It is one of the larger roads; its managing officials are looked upon by the public as being energetic, capable and broad-minded in their policies; the road is an old one, and an influential one. The policy, moreover, is not an unusual policy with them. Mind you, in all this we are not criticising the railroad at all. They do what any purchaser should do—buy equipment that will render satisfactory service, and buy it at the lowest price.

Haven't we got to go a little bit further in our buying than simply the question of price, and the service rendered by the article bought? Is not the railroad in the position of buying, not only material from the manufacturers of railway supplies, but are they not also buying expert knowledge from the men who solve their problems for them? If the special instance referred to is to become a settled policy on the part of all railroads, what is to be the effect? Are the better railway supply concerns to be encouraged, or those of only mediocre ability?

Most assuredly a railway supply manufacturer cannot afford to solve a given problem for the railroads, make a better article, and sell it at the same price as the "plagiarist." True, we have our patent protection, but this does not always mean a complete protection. The railway supply manufacturer may spend time, energy and money in the developing of things that cannot be patented. It is very apparent that there are many cases in which railroads are having trouble with some special appliances, where investigation on the parts of manufacturers develops the fact that the general design is correct, but that the material is at fault. No patent is going to protect a manufacturer against the time spent in finding out that a malleable casting used in a special place is better than pressed steel. Yet it sometimes costs money to find these things out.

The problems of the railroad managements are many. A portion of their problems are being solved by the railway supply manufacturers of the better type—those manufacturers who originate—investigate—who believe in honesty in manufacture. Are manufacturers of this type going to go out of business because railroads are not willing to reciprocate by placing orders with such concerns at a slightly higher price?

This problem is up not with one railway supply concern, but with many of them. Many an earnest talk is had behind the closed doors of the railway supply business of this country as to whether their policy for the coming year will be to discharge certain high priced men who are spending their time in finding some way of doing things better, and stop this policy of improvement, and for the future sell what they have on a purely competitive price basis.

Reciprocity in favors—the acting upon it means progress in railroad construction, and what is more, it means real economy in the long run, and the apparent saving in buying the cheapest will be more than offset by a real saving in buying the fittest appliance from the concern who is manufacturing it from expert knowledge and long experience.

If government ownership of railways comes (which Heaven forbid) what will be the effect on the railway

supply business? Will purchases be conducted on tenders open to everybody? Will the general business be open to everybody and will everybody have an equal chance? Will merit rule or will the business man who is the best politician carry off the prizes? How will invention and improvement generally be affected? Will companies be organized on the basis of political pull? Or will the United States at once become a "Altruria" without the shadow of imperfection? How do you see it, from your own point of view?

Some railway supply men apparently have not yet read the Brandeis questions propounded by the Interstate Commerce Commission to the railways in the Official Classification Territory, in connection with the 5 per cent rate increase. The Review was, we believe, the only paper to secure and publish these 78 questions in full. Manufacturers will find special interest in Groups C. and D., as these have direct bearing upon their business. There is naturally great curiosity regarding the answers which will be made.

Promises vs. Deliveries.

THE SORROWS OF A RAILWAY PURCHASING AGENT.

Mr. Kilpatrick may or may not be a real purchasing agent, but he knew something about the business. The following is from a business story, entitled, "Axle Grease," in the Saturday Evening Post. Undoubtedly there are times when the supply department sweats blood. Our moral would be, "Don't delay ordering supplies until you want the things 'yesterday.'"

One summer afternoon, while riding through Ohio on the observation platform of a fast train, I fell into conversation with a haggard-looking man, who told me his name was Kilpatrick and his business that of purchasing agent for a railroad.

"I've got dyspepsia so darned bad," he said, "that it hurts me just to see other people eat; and the cause of it is the trouble I've had trying to buy stuff for my line."

"That ought to be easy enough," I answered. "Usually it's the fellows with the goods to sell that have dyspepsia."

"Is that so?" he exclaimed. "Well, I don't know where you were brought up, sir; but it isn't so—not by a great big jugful! If you'd ever been a purchasing agent you would know better. It's the purchasing agent who does the real work. Why, half the time I am out of the supplies I need most, just because those houses lie to me so and trick me!"

I wanted to draw him out, so I asked in a rather mean tone:

"Why don't you buy of reliable houses?"

"Where are they?" he snapped, and glared at me.

"Do you mean to say there aren't any?" I inquired.

"Well, if there are they haven't got into the railroad-supply business up to date. Of course there may be exceptions, but the general run of 'em will take your order and then take their time about filling it. They are smooth enough on the talk, but they fall down on the performance. They don't deliver! And I tell you the legwork I have to do to meet my requisitions is something awful!"

"Then if I were you I'd pass them up next time; they'd never get a re-order."

"That's not so easy, my friend," he declared. "You have to buy where the goods are. One fall I ordered a lot of lanterns—to be delivered January first. I didn't get any of them until the middle of March—and then only a few! Factory broke down, you know, and new plant not ready on account of delay of contractors! Oh, there are more than a million kinds of excuses for failure to deliver! I told those fellows they'd never get another order from my road; but they came round as nerry as ever next time and I let 'em have an order, because the other fellows in the business were worse yet on the hold-up."

"Then one time we needed some conductors' punches, and needed 'em bad," he went on. "I ordered from the Blank Company and they promised to get 'em to us by the middle of June. Did they do it? Nix!"

"And say!" added Kilpatrick, suddenly sitting up straight.

"Say! Did you ever buy coal for a railroad?"

"No—I never had a job of that sort," I admitted.

"It's the fiercest game a man ever went up against! I'm not buying the coal now, but I've done it. It's a nightmare to think about it! We were always on the verge of a coal famine; and, no matter where we ordered, the coal never came on time. Often we had to confiscate cars of coal that didn't belong to us in order to prevent our engines from going dead out on their runs. The lambasting I used to get from the operating department came near getting me a site out in the graveyard. I couldn't sleep nights thinking about the fast mail being stalled, maybe, up on some heavy grade. I couldn't sleep a little bit and had to have cold wet towels sopped on my head; or maybe I'd have to get up and soak my feet in hot water to get the think out of my brain. That's what it means to be purchasing agent for a railroad!"

When we got to our destination I shook hands with Kilpatrick and told him I hoped to meet him again. And I did meet him; in fact, Kilpatrick was instrumental in changing the trend of my business. The next time I had an opportunity to talk with Ches Goodhue I said to him:

"Ches, I believe there's a chance to do something in the railroad-supply business. We might make it a much bigger business than stable supplies; indeed, there does not seem to be much of a limit to it. If we make it a matter of assembling allied lines of railroad goods, and sell the roads service and brains, we'll get all the purchasing agents like this man Kilpatrick. We'll have to specialize hard with the things railroads want; but I reckon we know how to do that."

At that time, as we discovered by investigation there were plenty of houses generalizing in supplies of this sort, but very few that made even a pretense of specializing. There were general merchants in plenty selling railroad supplies, but few purveyors to the railroads. Goodhue & Shoop were practically the first house to undertake the plan on a really broad scope.

Reverie in a Pullman Berth.

To think the railroads are in such a plight,
And all this service does not pay a cent!
It makes one's conscience toss a bit at night,
And wonder—whoop, that rail back there was bent!
Is there a chance that we have been unjust,
And things in truth are as they make appear?
A railroad man, somehow, is hard to trust—
Whoop—whoop—they need new ties along in here!

No doubt the government in time will take
The business over, and the truth shall out,
But that boots nothing for the present's sake—
Whoop—whoop—what is this engineer about?
There is no telling if it pays or not,
With all the juggling railroad people do;
Their figures will prove anything—Great Scott,
I thought that trestle work had given through!

I doubt me if there is not justice on
Both sides of this great question, truth to tell;
Perhaps—what's that my head has struck upon?
Can't say I like this travel very well.

No doubt, if they laid any money by,
They wouldn't let things come to such a phase.
Whoop, here we go! I'll say before I die,
I think they ought to have that five-cent raise!

—St. Louis Post-Dispatch.

American Arch Co.

At the annual meeting of the American Arch Co., John P. Neff and William L. Allison were elected vice-presidents. Mr. Neff is a graduate of the mechanical engineering department of Purdue University, of the class of 1895. He became a special apprentice of the Chicago & Northwestern, where for a considerable time he had charge of the locomotive testing plant. He was afterward machinist, assistant roundhouse foreman, division motive power foreman at Wasceca, Minn., master mechanic at Huron, S. D., and at Boone, Ia. In 1904 he resigned railway service and became engineer of tests and subsequent mechanical engineer of the American Locomotive Improvement Co. When that company was taken into the newly formed American Arch Co., Mr. Neff became mechanical engineer and subsequently assistant to the president which position he has held until this promotion.

Mr. Allison received his education in the Davis Military School at Winston-Salem, N. C., and was in government service as deputy marshal for 3½ years. He then entered the service of the Baldwin Locomotive Works, where he remained six years; the last year as engineer of tests. From January, 1914, to Aug., 1909, he was mechanical engineer of the A. T. & S. F. Ry at Chicago. In 1909 he entered the employ of the Franklin Railway Supply Co. and for two years was mechanical engineer at the New York office. Since then he has been western sales manager for that company, the Rome Merchant Iron Mills, the Economy Devices Corporation and general western sales manager of the American Arch Co.



John P. Neff.



William L. Allison.

Franklin Railway Supply Company.

The Franklin Railway Supply Company has enlarged and reorganized its sale department. Walter H. Coyle has been elected second vice-president in charge of sales. William L. Allison will remain in charge of the Company's office at Chicago as western sales manager. J. H. Steiger will continue in charge of sales on the Pacific coast, with office in San Francisco, as will also Pedro M. Armendariz in charge of sales in Mexico with office in Mexico City. Ralph G. Coburn has been promoted to eastern sales manager, and Alan Lichtenhein to Canadian sales manager, both with offices at 30 Church street, New York.

Mr. Coyle was born at Salamanca, N. Y., December 27, 1878, and was educated in the public schools of Meadville, Pa. He was for 11 years in the service of the Erie Railroad in the mechanical and traffic departments and in January, 1905,

became identified with the Kent Manufacturing Co., Kent, Ohio, and in June of the same year entered the mechanical department of the Franklin Railway Supply Co. at Franklin, Pa. In June, 1911, he was made assistant to the vice-presi-

ber 23, 1847, and received his education at Wyman's Institute in St. Louis. He entered the office of the city comptroller in 1865 as a clerk, and remained there twenty years—the last eight years as comptroller. He became vice-president and general manager of the American Brake Company in



Walter H. Coyle.



Ralph G. Coburn.



Alan Lichtenhein.

dent, with headquarters at New York, and was placed in charge of the sales department of the central territory, which position he held until his election as second vice-president, as noted above.

Mr. Coburn was born at Boston in 1882, graduated from Harvard in 1904, and entered the service of the American Glue Co. He remained with that company about four years, being in charge of its western factories and having his headquarters at Des Moines, Iowa, and Chicago. On May 1, 1909, he opened the Chicago office of the Franklin Railway Supply Co. as resident sales manager. On June 1, 1911, he was made assistant to the vice-president, in charge of eastern-southern territory, with headquarters at New York, which position he held until his appointment as eastern sales manager.

Alan Lichtenhein was born May 24, 1887, and is a graduate of both Williams College and the Harvard Law School. Upon the death of his father, who for many years occupied a prominent position in the Canadian railway supply field, he entered the service of the Franklin Railway Supply Co. in Canada, and now succeeds to his father's position in charge of Canadian sales of that company.

SUPPLY TRADE NOTES.

—The Pittsburgh Railway Appliance Co., Pittsburgh, Pa., capital stock \$25,000, has been incorporated by Frank Moore, Frank T. Reese, A. E. Read, Guy L. McIntyre and A. M. Imbrie.

—E. M. Chadwick, formerly with the Fairbanks Company, has been appointed manager of the Buffalo branch of Manning, Maxwell & Moore, railway and machinists' tools and supplies and electric traveling cranes; and D. A. Hamilton, formerly with the Reed Prentice Co., of Worcester, has been appointed assistant at Manning, Maxwell & Moore's Detroit branch.

—McCord and Company, Chicago and New York, announce that Edward J. Williams, former distributing officer of the Panama canal and treasurer of the Canal Zone, has been elected treasurer of the company.

—Edward L. Adreon, who died after a short illness undoubtedly seriously affected by the recent deaths in his family, at his home in St. Louis, December 29, was one of the veterans of the railway supply business. He was generally looked upon as the dean of the railway manufacturing industries in the Southwest. His business judgment was remarkably sound, his views broad, and his friendships wide-spread and warm. Mr. Adreon was born Decem-

ber 23, 1847, and occupied that position since 1910, when he resigned the general managership to his son (who recently died), while he remained vice-president. Since August 1, 1888, Mr. Adreon had also been southwestern manager of the Westinghouse Air Brake Co. and the Westinghouse Traction Brake Co. He was interested in several other companies as stockholder and director—notably the Chicago Railway Equipment Co. and the Locomotive Stoker Co. He was an executive member of the Railway Business Associa-



Edward L. Adreon, Late Southwestern Manager of the Westinghouse Air Brake Co.

tion, in which he felt a deep interest and was present at the annual meeting and dinner in New York, shortly before his death.

—The M. C. B. and Master Mechanics' Associations, Jos. W. Taylor, secretary have just sent out the following notice regarding the June convention: "Atlantic City, N. J., has been decided upon as the place for holding our conventions in 1914. The Master Car Builders' Convention will be held on Wednesday, Thursday and Friday, June 10, 11 and 12.

and the Master Mechanics' Convention on Monday, Tuesday and Wednesday, June 15, 16 and 17, 1914. The meetings will be held, as was done last year, in the Greek Temple, on the ocean end of the Million-dollar Pier. The Marlborough-Blenheim Hotel has been selected as the headquarters for both conventions. The president, executive committee and secretary will have offices there; accommodations will be furnished for meetings of the various committees. A schedule of hotels, hotel rates and accommodations guaranteed by the Hotel Men's Association of Atlantic City is appended hereto, for the information of the members. Attention has been called to the fact that last year a considerable number of our members stopped at hotels not represented on the schedule herewith and from whom the Hotel Men's Association received no financial assistance in carrying out its contract with our committee on arrangements. It is hoped that the hotels shown herein will be patronized in preference to any others. It is suggested that you make application for your reservation at once and if you have any difficulty in securing same report to this office and I will immediately take the matter up and see that you are located. The registration booth will be in the Entrance Hall of the Million-dollar Pier. In order that a correct record may be made of the members in attendance, it will be necessary to register once for each convention. Please, therefore, go to the registration booth before attending either convention, announce your name to the tellers, who will register your name and furnish you with badges for yourself and guests. A new badge, to be used during the convention, will be furnished when you register. The badges for the families and guests of members will be of a different design from last year, and should be procured as soon as possible after your arrival."

RAILWAY NEWS.

Baltimore & Ohio.—Engineers in charge of the Magnolia cut-off improvement of the Baltimore & Ohio R. R., which is one of the largest under way in the country at this time, report that the work is progressing rapidly and is about 40 per cent completed.

Boston & Albany.—After two years work the Boston & Albany R. R. has straightened its line at Middlefield, Mass., at a cost of \$553,000, and trains are now running over the east-bound track of the cutoff. The west bound track will be in service in about two weeks. Four old arch bridges built in 1853 have been eliminated and two new concrete structures built.

Boston & Maine.—The Fitchburg R. R. has petitioned the public service commission of Massachusetts for authority to issue \$1,900,000 twenty year 5 per cent bonds, dated January 1, 1914. The proceeds will be used to refund bonds of the company maturing on May 1, 1914.

Buffalo & Susquehanna.—Announcement has been made from the office of President E. R. Darlow that the Buffalo & Susquehanna Railroad Corporation has acquired and taken possession of the properties of the Buffalo & Susquehanna Railroad company, and of the assets of Harry I. Miller as receiver thereof, subject to the liabilities of the receiver. Mr. Miller is chairman of the board of the new corporation. The other officials and employees are the same as under the receivership.

Chicago & Eastern Illinois.—The Equitable Trust company of New York is expected to make public offering of \$1,000,000 of the \$2,000,000 6 per cent receiver's certificates, permission to issue which was granted a short time ago by the Federal court in Chicago.

Chicago, Milwaukee & St. Paul.—The Chicago, Milwaukee & St. Paul Ry. has applied to the Wisconsin state railroad commission for authority to issue \$30,000,000 bonds.

Denver & Rio Grande.—The Denver & Rio Grande R. R. has made surveys and, it is said, will reconstruct and double track its line from Thistle to Salt Lake City, Utah. The new line will permit 50 per cent heavier train loads. From Springville to Provo the existing main line will be retained, but from Provo to Lehi a new line, forming a semi-circle and skirting the edge of Utah lake, will be constructed, cutting out American Fork. The distance of the present main line between the point west of Castilla, from where the new main line will branch off, to Lehi, is 32.5 miles, but the detours over the existing line will add but a few miles, while giving the better grade. Between Lehi and Provo, and Springville and Castilla, there are numerous grades that will be eliminated through the new detours.

Denver & Salt Lake.—A special election in Denver, Colo., has been called for February 17 for the submission of the Moffat tunnel bond ordinance and any other propositions that

may be filed within 30 days of the date of the election. The Moffat tunnel ordinance provides for the issuance of \$3,000,000 bonds for a tunnel under James Peak, to be built in conjunction with the Denver & Salt Lake R. R. Under the contract entered into between the city and the railroad company, the latter guarantees the \$3,000,000 bonds, both as to principal and interest, and also provides for a sinking fund. The cost of the tunnel, over and above the \$3,000,000, will be borne by the company.

Erie Railroad.—The Erie Railroad will soon let the contract for double tracking of the road for the 40 miles between Meadville and Pymatuning Junction, Pa., to complete the two-track system between New York and Chicago. To eliminate the heavy grade in Stony Point it is planned to construct the line several miles west of the present one between Greenville and Meadville, almost paralleling the tracks of the Bessemer & Lake Erie R. R. To do away with the grade from Shenango to Greenville tracks will be placed 30 feet below their present level, which would also eliminate a number of grade crossings.

Hampden Railroad.—The Massachusetts railroad commission on December 26, by a vote of four to one, held that the lawful and proper cost of the completed Hampden Railroad, 14.85 miles, single track, including interest charges up to December 1, 1913, is \$3,300,000, instead of \$4,400,000, the amount claimed. As the commission had already approved the issuance of \$1,400,000 stock, the commission states that if the corporation is released from all liabilities except the outstanding stock in excess of \$1,900,000, order may be entered approving mortgage bonds to that amount to liquidate the same. The directors of the Boston & Maine R. R. voted last month to repudiate as premature the lease entered into in 1911 by the former management. On December 29 they voted, however, to buy or lease the railroad on terms as to price and conditions to be approved by the commission, and also to follow the recommendations of the commission that the Boston & Maine join with the Hampden road in petitioning the legislature for relief from the obligation to build branch lines into Chicopee and Holyoke, Mass., which it is in no financial position to undertake. Pending the application for legislation, the Boston & Maine will join with the management of the Hampden road in taking steps to enable the former to operate the line.

Illinois Terminal.—The directors of the Illinois Terminal R. R. have authorized an increase in capitalization from \$500,000 to \$5,000,000, and have also voted to sell their stock. It is reported that the decision to sell was reached in order that a St. Louis syndicate may acquire the road already built and extend it ultimately through Edwardsville and East St. Louis, Ill., and to Carondelet, Mo. The Illinois Terminal R. R. is about 14 miles long and extends from Alton to Le Claire, Ill. It is a steam line and is owned by the Illinois Glass Co., which has been enabled over its trackage to reach an outlet to the Wabash R. R. and Toledo, St. Louis & Western R. R.

Kansas City, Mexico & Orient.—A step toward the reorganization of the Kansas City, Mexico & Orient Ry. was made, January 6, when Judge John C. Pollock, in the federal court in Kansas City, Kan., ordered a decree of sale for the Orient properties drawn up. The effect of the order, it was said, would be the union of the Kansas City, Mexico & Orient Railroad Company, the Kansas City Outer Belt Railroad Company, a subsidiary, and the construction companies in one large concern, which would take care of the conflicting claims of all creditors. The decree of sale would transfer the properties to a reorganized company. The capital for the reorganization would come from persons now having money invested in the railroad. Judge Pollock said the date of sale and the minimum amount to be asked would be announced in about two weeks. Among the provisions of the plan was one guaranteeing to pay the construction companies enough to take up all their outstanding obligations, amounting to more than a million and a half dollars. The sum of \$4,502,599 would be set aside for the completion of that portion of the railroad between Wichita and Kansas City.

Lakeside & Marblehead.—The Ohio utilities commission has granted permission to the Lakeside & Marblehead R. R. to issue \$300,000 in bonds. Another \$50,000 was not allowed. It was the intention of the company to issue the latter amount in addition in order to reimburse stockholders for money spent for improvements. The \$300,000 will go to provide heavier rail and to purchase a car ferry.

Long Island.—Engineers of the Long Island R. R. are surveying in East Hampton, L. I., N. Y., for double track line to Montauk.

Licking River.—See New Roads and Projects under Kentucky.

Manistee & Grand Rapids.—See Railway News under Michigan East & West R. R.

Michigan East & West.—The Michigan East & West R. R., successor January 1, 1914, of the Manistee & Grand Rapids R. R., has been authorized by the Michigan railroad commission to issue \$1,000,000 stock. An extension is projected to Bay City, Mich., to connect with the Detroit, Bay City & Western R. R., now being built from Bay City to Port Huron.

Oregon Short Line.—The budget of the Oregon Short Line R. R. for 1914 has been made up. The executive committee of the Union Pacific system is asked to appropriate \$3,480,000 for the extension of branch lines, building feeders in Idaho and building new double track. It is said, there will be no requisition for new equipment for the coming year.

Pacific Great Eastern.—Passenger service was inaugurated by the Pacific Great Eastern Ry. out of North Vancouver, B. C., on January 1. Two gasoline motor coaches are operating between North Vancouver and Dundarave. It is expected that the new line will be open to Caulfields by July 1.

St. Louis, El Reno & Western.—Report that the Atchison, Topeka & Santa Fe Ry. had purchased the St. Louis El Reno & Western Ry. is denied.

Wheeling & Lake Erie.—In the federal court at Cleveland Ohio, on January 5, Judge William L. Day handed down a decision terminating the 5½ years of litigation that has involved the Wheeling & Lake Erie R. R. since it went into the hands of a receiver in June, 1900. The court upheld the plea of the minority stockholders, setting aside the contracts by which the Wheeling & Lake Erie and the Wabash R. R. were to turn over to the Wabash-Pittsburg Terminal Ry. 25 per cent of the gross receipts on all interchange of traffic as illegal and void. In the decision the claim against the road of the Central Trust Co. of New York for \$8,000,000 was sustained. This feature of the decision may necessitate a sale of the road unless an immediate reorganization to take care of the indebtedness is arranged. The decision states that the claim was allowed because the only money received on note was put into the railroad property. The collection of the \$8,000,000 will have to be made out of the \$12,000,000 in bond security held by the Central Trust Co.

PERSONALS.

William H. de France has been appointed superintendent of the Louisiana division of the Texas & Pacific Ry., with headquarters at New Orleans, La., succeeding N. G. Pearsall, assigned to other duties.

Joseph Wood, first vice-president, Pennsylvania Lines west of Pittsburgh, has resigned, to take effect February 1.

B. C. Mulhern, superintendent of the Pittsburg, Shawmut & Northern R. R. at St. Mary's, Pa., has been appointed general superintendent, with headquarters at St. Mary's.

J. D. Beaver, assistant superintendent and trainmaster of the Pittsburg, Shawmut & Northern R. R., has been appointed superintendent, with headquarters at St. Mary's, Pa., succeeding B. C. Mulhern, promoted.

J. M. Davis, until recently general superintendent of the Central district of the Southern Pacific Co. at San Francisco, Cal., has been appointed assistant general manager of the Baltimore & Ohio Southwestern R. R. and the Cincinnati, Hamilton & Dayton Ry., with headquarters at Cincinnati, Ohio.

R. R. Harris, car accountant of the Cleveland, Cincinnati, Chicago & St. Louis Ry., has been appointed superintendent of freight transportation, with headquarters at Indianapolis, Ind., succeeding J. R. Cavanagh.

J. R. Cavanagh, superintendent of freight transportation of the Cleveland, Cincinnati, Chicago & St. Louis Ry., has been appointed superintendent of car service.

J. C. Vison, auditor of miscellaneous accounts of the Southern Pacific Co. at San Francisco, Cal., has resigned to accept service elsewhere, and the position has been abolished.

F. W. Pope has been appointed auditor of freight accounts of the Southern Pacific Co., with office at San Francisco, Cal., succeeding W. T. Rowen, retired on account of failing health.

P. M. Ripley has been appointed assistant to Vice-President T. M. Schumacher of the El Paso & Southwestern system, with office at 99 John street, New York city.

W. D. Scott, general superintendent of the Great Northern Ry., at Seattle, Wash., has been appointed general superintendent of the Spokane, Portland & Seattle Ry. and the Oregon Trunk Ry., with headquarters at Portland, Ore., succeeding J. Russell.

J. Russell, general superintendent of the Spokane, Portland & Seattle Ry. and the Oregon Trunk Ry. at Portland, Ore., has been appointed general superintendent of the Western district of the Great Northern Ry., with headquarters at Seattle, Wash., succeeding W. D. Scott.

C. E. Benton, general attorney of the Missouri Pacific Ry. system, with office at Ft. Scott, Kan., has resigned.

W. P. Waggener, general attorney of the Missouri Pacific Ry. at Atchison, Kan., has had his jurisdiction extended to include the duties formerly performed by C. E. Benton, resigned.

W. A. McGovern has been appointed assistant superintendent of the Idaho division of the Oregon Short Line R. R., with headquarters at Pocatello, Idaho.

C. L. Hinkle, superintendent of the Toledo, St. Louis & Western R. R., has been appointed general superintendent, with office at Frankfort, Ind.

W. H. Andrews, superintendent of the Georgetown & Western R. R., at Georgetown, S. C., has been appointed general manager.

J. A. Emmart succeeds W. H. Andrews as superintendent of the Georgetown & Western R. R., with headquarters at Georgetown, S. C.

A. C. Elston, general agent of the Erie Railroad at Chicago, has been appointed superintendent of the New York division, with headquarters at Jersey City, N. J., succeeding J. B. Dickson, promoted.

George F. Turley, trainmaster of the Norfolk & Western Ry. at Portsmouth, Ohio, has been appointed general manager of the Virginia-Carolina Ry. and the New River, Holston & Western R. R., with headquarters at Abingdon, Va.

James Burke, superintendent of roadway, bridges and buildings of the Erie Railroad, at Cleveland, Ohio, has been appointed superintendent of the Chicago Terminal division.

T. F. Lowry, whose appointment as superintendent of the Minnesota division of the Northern Pacific Ry. was noted in our issue of January 3, was born in 1870 at London, Ont. He received a common school education and entered railway service in 1885. From 1885 to 1887 he was messenger boy and telegraph operator of the Michigan Central R. R. at St. Thomas, Ont.; 1887 to 1893, telegraph operator and train dispatcher, Buffalo, Rochester & Pittsburg Ry., and 1893 to 1911, operator, dispatcher, assistant superintendent of the Great Northern Ry. Mr. Lowry took service with the Northern Pacific Ry. in 1911 as assistant superintendent, was promoted to superintendent of the Fargo division, February 1, 1913, and became superintendent of the Minnesota division on January 1, 1914.

TRAFFIC.

W. B. Groseclose, assistant freight traffic manager of the Missouri, Kansas & Texas Ry., with office at Chicago, has resigned and the office has been abolished.

J. W. Allen, general freight agent of the Missouri, Kansas & Texas Ry., at St. Louis, Mo., has been appointed general agent of the freight department, with office at Chicago.

R. D. Williams, chief clerk in the general freight office of the Missouri, Kansas & Texas Ry., at St. Louis, Mo., has been appointed assistant general freight agent at the same place, succeeding W. W. Miller, promoted.

Ingram T. Sparks has been appointed traveling freight and passenger agent of the Southern Pacific Co. and Arizona Eastern R. R. at Phoenix, Ariz.

A. J. Patton has been appointed traveling freight agent of the Sunset-Central lines of the Southern Pacific Co. at Waco, Tex., succeeding Robert Burns, who has been transferred to Houston, Tex.

W. A. Rambach, assistant general freight agent of the Missouri Pacific-Iron Mountain system at St. Louis, Mo., has been appointed assistant to vice-president in charge of traffic of the Missouri Pacific, St. Louis, Iron Mountain & Southern, Denver & Rio Grande, and Western Pacific railroads, with headquarters at Chicago, succeeding E. B. Boyd, resigned.

J. F. Harris has been appointed assistant general freight agent of the St. Louis, Iron Mountain & Southern Ry., with office at St. Louis, Mo.

W. H. Alexander has been appointed assistant general freight agent of the Missouri Pacific-Iron Mountain system, with office at St. Louis, Mo., succeeding W. A. Rambach, promoted.

Roger P. Hurley has been appointed general agent, traffic department, of the Toledo, St. Louis & Western R. R. at Detroit, Mich. Mr. Hurley was formerly general agent of the Michigan Central R. R. at Detroit.

J. D. Cornell, general freight and passenger agent of the Rock Island Southern Ry., has removed his office from Monmouth, Ill., to Davenport, Iowa.

George H. Wilcox, assistant general freight agent of the Georgia Southern & Florida Ry. at Macon, Ga., effective January 1, has had his authority extended over the Hawkinsville & Florida Southern Ry. and the Macon & Birmingham Ry., with headquarters at Macon, Ga.

N. A. Beach, commercial agent of the Missouri Pacific-Iron Mountain system at Joplin, Mo., has been transferred in the same capacity to St. Joseph, Mo., succeeding J. O. Barkley, resigned.

C. H. Morrill has been appointed assistant general freight agent of the St. Louis & San Francisco R. R., with office at St. Louis, Mo., succeeding F. C. Dumbek, resigned.

Garnett King, general agent of the El Paso & Southwestern R. R. at St. Louis, Mo., has been appointed general passenger agent, with headquarters at El Paso, Tex.

L. C. Gaty, general auditor of the Jonesboro, Lake City & Eastern R. R., has been appointed also general freight and passenger agent, with headquarters at Jonesboro, Ark., succeeding H. M. Gregory, resigned to take service with the Arkansas railroad commission.

J. B. Gibson has been appointed traveling freight agent of the Kansas City Southern Ry. at Houston, Tex., succeeding H. G. Moran.

H. G. Moran has been appointed soliciting freight agent of the Chicago, Rock Island & Pacific Ry. at Houston, Tex., succeeding P. L. McCue, resigned.

Walter S. Franklin, Jr., has been appointed Southern freight agent of the Pennsylvania Railroad, with office at Atlanta, Ga.

Calvin Dutton, passenger agent of the St. Louis & San Francisco R. R. at St. Louis, Mo., after 35 years of service, has resigned, having reached the age of 70.

J. L. Greenwood has been appointed traveling freight agent of the International & Great Northern Ry. and the Texas & Pacific Ry. at Los Angeles, Cal., succeeding C. K. Blech, resigned.

A. E. Sinclair has been appointed traveling freight agent of the International & Great Northern Ry. and the Texas & Pacific Ry., with headquarters at San Francisco, Cal., succeeding R. C. Melvin, resigned.

W. N. Carmody, traveling freight agent of the Missouri Pacific-Iron Mountain system at Kansas City, Mo., has been appointed commercial agent at Fort Scott, Kan., succeeding B. E. Sells, transferred.

B. E. Sells, commercial agent of the Missouri Pacific-Iron Mountain system at Fort Scott, Kan., has been transferred to St. Joseph, Mo., succeeding N. A. Beach, transferred as noted elsewhere in this column.

Russell Hebbethwaite, traveling passenger agent of the Queen & Crescent route at Cincinnati, Ohio, has been appointed district passenger agent, with office at Indianapolis.

Frank Fouts has been appointed general agent of the Denver & Rio Grande R. R., with office at Ogden, Utah.

F. G. Browder, Jr., division freight agent of the Atlanta & West Point R. R. and Western Ry. of Alabama, with office at Montgomery, Ala., has been appointed assistant general freight agent at Montgomery.

E. G. Hitt, commercial agent of the Atlanta & West Point R. R. and Western Ry. of Alabama, at Montgomery, Ala., has been appointed division freight agent at Montgomery, succeeding F. G. Browder, Jr., promoted.

J. T. Conley, whose appointment as general freight agent of the Chicago, Milwaukee & St. Paul Ry. has already been noted in a previous issue of the Railway Review, entered railway service in 1877 as a telegraph operator at La Crosse, Wis. He has since been continuously in the service of the Chicago, Milwaukee & St. Paul as traveling freight agent at Milwaukee, Wis.; division freight and passenger agent at Winona, Minn.; commercial agent at St. Paul, Minn., and assistant general passenger agent at the same place. In 1902 Mr. Conley became assistant general freight agent at Minneapolis. His appointment as general freight agent, with office at Chicago, was effective January 1, 1914.

George H. Cornell has been appointed traveling passenger agent of the Southern Pacific Co., with headquarters at Los Angeles, Cal.

ENGINEERING.

H. C. Williams, assistant chief engineer of construction of the Louisville & Nashville R. R., at Louisville, Ky., has been appointed chief engineer of construction, with headquarters at Louisville, succeeding J. H. Peyton, who has accepted office with another company.

George P. Turner has been appointed assistant engineer, assigned to valuation work, Union Pacific R. R., with headquarters at Omaha, Neb., vice H. Bortin, resigned. Mr. Turner's appointment was effective January 1, 1914.

OBITUARY.

George W. Booth, comptroller of the Baltimore & Ohio R. R., died suddenly at his home in Baltimore, Md., January 6, aged 69 years.

William A. Boehm, formerly traveling freight agent of the Minneapolis, St. Paul & Sault Ste. Marie Ry., at Cincinnati, Ohio, died at his home in that city, January 1, aged 26 years.

Charles C. Riley, general superintendent of transportation of the Baltimore & Ohio R. R., with headquarters at



Charles C. Riley, Late General Superintendent of Transportation of the Baltimore & Ohio R. R.

Baltimore, Md., died in Washington, D. C., January 6, having been suddenly stricken with a hemorrhage of the brain. Mr. Riley was born October 1, 1864 and was educated at Butler University and Central College of Physicians and Surgeons at Indianapolis, Ind., 1880 to 1883. He entered railway service July 1, 1883, as a clerk in the freight office of the Cincinnati, Indianapolis, St. Louis & Chicago Ry. at Indianapolis. From April 17, 1897, to December 7, 1900, he was superintendent of car service and superintendent of transportation of the Baltimore & Ohio Southwestern R. R.; October 21, 1901, to July 6, 1903, car service agent of the Chicago Great Western R. R., and July, 1903 to September, 1904, superintendent of car service of the Erie Railroad. Mr. Riley was then superintendent of transportation of the Erie until November, 1911. He then became assistant to general manager of the Baltimore & Ohio R. R., and since May, 1912 has been general superintendent of transportation of the Baltimore & Ohio R. R., Baltimore & Ohio Southwestern R. R. and the Cincinnati, Hamilton & Dayton Ry.

Charles E. Ways, assistant to the general traffic manager of the Baltimore & Ohio R. R., died at his home in Baltimore, Md., January 3, aged 72 years. Mr. Ways entered railway service in 1853. His first permanent office as telegraph operator in the service of the Baltimore &

Ohio R. R. was at Frederick Junction, Md. He went through many thrilling experiences during and just previous to the Civil war. Mr. Ways was operator at Martinsburg, W. Va., at the time John Brown captured the Government Armory at Harper's Ferry. He went to Harper's Ferry and worked an instrument in a building near to the one in which Brown and his men had barricaded themselves and he witnessed all of the fighting which led up to John Brown's capture. His own life was many times in danger both at this time and during the war. From 1863 to 1865 he was chief operator of the Baltimore & Ohio at Baltimore; 1865 to 1867, assistant manager, United States Telegraph Co., 1867 to 1878, general agent of the Baltimore & Ohio at Hagerstown, Md., and 1878 to 1881, division freight agent of the same road, lines and branches east of the Ohio river. Mr. Ways was assistant general freight agent of the Baltimore & Ohio from 1881 to 1888 and from 1888 to 1897 general freight agent at Baltimore. He was appointed assistant to the freight traffic manager March 1, 1897.

NEW ROADS AND PROJECTS.

Alberta.—J. D. McArthur, president of the Edmonton, Dunvegan & British Columbia Ry. has been quoted as saying that surveyors are in the field on the line of the Alberta & Great Waterway Ry. and the construction work will



Charles E. Ways, Late Assistant to General Traffic Manager, of the Baltimore & Ohio R. R.

soon begin at a point five miles north of Edmonton, Alta., where the line to Ft. McMurray will connect with the main line of the Edmonton, Dunvegan & British Columbia.

Arkansas.—Press reports state that negotiations are pending for the purchase of 1500 acres of coal lands in Logan, Johnson and Yell counties, Arkansas. If the deal is completed the Fort Smith, Subiaco & Eastern R. R. will be extended to Dardanelle to a connection with the Rock Island lines. The Rock Island is then expected to enter Fort Smith via Paris, where the Arkansas Central R. R. joins the Subiaco road.

Colorado.—The citizens of Grand Junction, Colo., have been asked by W. K. Palmer, engineer of the Albuquerque, Cortez & Salt Lake R. R. to meet with him at an early date to discuss plans for the proposed road. The city is asked to secure right of way from the Montezuma county line to Grand Junction and thence to the Utah state line and also provide part of the funds necessary to complete permanent survey. Mr. Palmer is quoted as saying that construction will be commenced next spring.

Illinois.—See Railway News under Illinois Terminal R. R.

Kentucky.—The Licking River R. R. has been torn up and part of the material taken to Morgan county, Kentucky, and a standard gage railroad has been built from Redwine, Ky., on the Morehead & North Fork R. R., six miles, to

Elk Fork, on the Elk Fork branch of Licking river, under the name of Elk Fork & Licking River R. R.

Another line, narrow gage, the Owingsville & Olympia R. R., has also been built from the same material from Owingsville to Olympia Springs, Ky., a distance of nine miles. Charles Mynhier, Owingsville, Ky., is general manager.

Incorporation of the Tug River & Kentucky R. R., which will penetrate the rich coal fields for a distance of 17 miles from a point on the Norfolk & Western Ry. at some point near Williamson, Ky., is announced. The board of directors is as follows: L. E. Johnson, Roanoke, Va.; Joseph I. Doran, Philadelphia, Pa.; William G. McDowell, Philadelphia, Pa.; N. D. Maher, Roanoke, Va.; W. J. Jenks, Bluefield, W. Va.; Henry Bannon, Portsmouth, Ohio, and W. A. Ginn, Ashland, Ky. The principal office of the company will be at Ashland.

Michigan.—See Railway News under Michigan East & West R. R.

Missouri.—A charter has been granted to the Cassville & Western R. R. The company has an authorized capital of \$100,000 and proposes to operate a standard gage railroad five miles in length from Cassville to Exeter, Mo.

E. E. Scofield, president of the St. Louis, Arkansas & Pacific R. R., upon returning to Fort Smith, Ark., from New York announced that he had financed the road with capital to be supplied by French and English banks. The road is to be 810 miles in length, from St. Louis to the Gulf of Mexico. The route from St. Louis to Clarksville, Mo., has been decided upon and permanent survey will soon be made.

The Missouri public service commission will be asked for permission to issue bonds to build the Bismarck, Bellevue & Western Ry., which will run between Bismarck and Bunker, Mo., 53 miles. This proposed road will make connections with other lines at Bismarck and Bunker and will open up the highly cultivated Bellevue valley, as well as the virgin hardwood forests in that section of Missouri. Several miles of roadbed have been graded and plans have been made to have the railroad in operation by April, 1915. Among those interested are E. E. Evans, of Bismarck, president of the company; Edward T. Eversole, Potosi; James P. Ward, Irondale; Joseph C. Williams, Farmington; Redmond Block, Edge Hill, and O. S. Meyer, Isaac H. Hedges and Charles E. Hamilton, of St. Louis. Holman & Laird, Chemical building, St. Louis, Mo., are the engineers of the road. The authorized capital of the company is \$1,000,000, with a proposed bond issue of a similar amount.

See also Railway News under Illinois Terminal R. R.

Ontario.—A new railroad to be known as the Norfolk & Elgin Ry., will ask for incorporation at the next session of parliament. It will commence at Simcoe, Ont., and will go to a point within three miles of the shore of Lake Erie and thence to Port Burwell, Ont.

Pennsylvania.—A press report states that the Pennsylvania Railroad will follow the coal development and build lines into Greene county, Pennsylvania, and in case of an extension, the new road will run from Rices Landing to New Geneva, connecting at the latter place with the Buckhannon & Northern R. R.

Quebec.—F. H. Clerque, president of the North Railway company, is quoted in press reports as stating that construction of the proposed line will be commenced next spring. The company proposes to build from Montreal, Que., to Hudson bay, connecting with the National Transcontinental at Bell River, 350 miles from Montreal.

Wisconsin.—The Marinette, Merrill & Minneapolis Ry. has announced the change of its plans and it is now proposed to construct the proposed stearn road from Merrill to Antigo, Wis., instead of from Merrill to Prentice. Construction work will start about April 1. John O'Day, Merrill, Wis., is president.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Carolina, Clinchfield & Ohio Ry. expects to purchase soon several additional Mallet and Pacific locomotives.

Freight Cars.

—The Chesapeake & Ohio Ry., according to report, is inquiring for 1000 gondola cars for the Hocking Valley Ry.

—The Carolina, Clinchfield & Ohio Ry. will soon be in the market for 500 to 1000 70-ton coal cars.

Passenger Cars.

—The Delaware, Lackawanna & Western R. R. is inquiring for 10 passenger cars.

—The Brooklyn Rapid Transit Co. has awarded contract for 100 steel subway cars to the American Car & Foundry Co.

Signals and Interlocking.

—The Louisville & Nashville R. R. has awarded contract to the Federal Signal Co. for materials for a new 24-lever mechanical interlocking plant at Lewisburg, Tenn.

—The New York Central & Hudson River R. R. recently awarded contract to the Federal Signal Co. for an 80-lever electric interlocking machine which is being installed at Rome, N. Y.

Machinery and Tools.

—Illinois Central R. R. is equipping its new shops at Nonconah, Memphis, Tenn., with machine tools, powerhouse and mill building equipment as follows: One 36-in. vertical drill press; one 40-in. x 18-ft. engine lathe; one 24-in. x 10-ft. engine lathe; one 1½-in. double head bolt cutter; one 24-in. crank shaper; one double-head emery grinder; one combination triple punch and shear; one 2½-in. pipe machine; three 72-in. x 18-ft. 150-hp. fire tube boilers fitted with Burke furnace; two boiler feed pumps; one feedwater heater, one washout system complete; two 1200-ft. duplex air compressors. The old machinery in the mill building at Memphis is to be removed and arranged for group and individual drive.

—The Transcontinental Ry. is completing locomotive and car shops at Quebec, Que., to be known as the Leonard shops. The work of designing and laying out the entire plant is in the hands of W. J. Press, of the commissioners of railways, Ottawa. The new shops will consist of 11 buildings in all, including locomotive, erecting, machine and boiler shops (under one roof), forge shop, freight car shop, power house, planing mill, dry kiln, lumber shed, forge stores and scrap bins, oil houses, stores building and office building for the executive staff. The total area covered will be 5½ acres. It will be some time before machine tool and equipment specifications will be ready.

Iron and Steel.

—The Erie Railroad, according to report, has closed contracts for 70,000 tons of rails.

—The New York Central Lines, it is said, has awarded contracts for 70,000 tons of rails. It is expected that 70,000 or 80,000 tons are yet to be distributed.

Bridges.

—The Philadelphia & Reading Ry. has awarded contracts for a bridge at Sellersville, Pa., on the Bethlehem branch, also contracts for signal bridges at Hopewell and Newtown Junction, N. J.

—The Green Bay & Western R. R. has received bids for the erection of a 70-ft. reinforced concrete bridge over Wolf river at Shiocton, Wis.

—The Buckhannon & Northern R. R., S. D. Brady, Morgantown, W. Va., chief engineer, recently awarded contract to the McClintic-Marshall Co. for a bridge at Fairmount, W. Va., and a viaduct, total of about 1600 tons of steel.

—The city of Birmingham, Ala., has directed the Southern Ry., Louisville & Nashville R. R. and the Sloss-Sheffield Steel Co. to construct a viaduct on First avenue from 26th St. to 30th St. The cost would be about \$178,000 and, according to the ordinance, work is to be commenced within four months.

—The Rock Island Lines, C. A. Morse, chief engineer, Robt. H. Ford, engineer of track elevation, have awarded contract to Raymond Concrete Pile Co., of New York and Chicago for approximately 200,000 lineal feet of Raymond concrete piling for foundation of retaining walls, abutments, etc., in connection with their track elevation work in Chicago. The Spokane, Portland & Seattle Ry., Alex. M. Lupfer, chief engineer, has adopted Raymond concrete piles for foundations of abutments near Cooks, Wash.

Buildings, Terminals, Etc.

—The St. Louis, Iron Mountain & Southern Ry., it is said, will erect a depot at Benton, Ark., to cost \$25,000.

—The Kansas City Southern Ry., according to report, will appropriate \$150,000 for a new station at Texarkana, Ark.—Tex.

—A report says that the Minneapolis, St. Paul & Sault Ste. Marie Ry. will expend about \$2,500,000 at Ashland, Wis., for one new ore dock of steel and concrete; a new roundhouse; a cut-off from Ashland to Saxon, and general improvement of the Ashland yards and division headquarters.

—The Atchison, Topeka & Santa Fe Ry. is said to have

prepared plans for a water supply system at Flagstaff, Ariz. A large reservoir and an 8-in. pipe line will be built at a cost of about \$160,000.

—The New York, New Haven & Hartford R. R., according to report, has had plans prepared for a \$100,000 station to be erected between Pawtucket and Central Falls, R. I.

—The port directors of Boston, Mass., have asked for bids for the construction of railroad yards to cost \$100,000 and to be located near the Commonwealth docks.

—The Norfolk & Western Ry. is reported as having prepared plans for new shops at Williamson, W. Va.

—The Southern Pacific Co. has built a round house at Susanville, Cal., and will erect a shop building at that place.

—The Buffalo & Susquehanna R. R. is preparing to build round house and shops at Du Bois, Pa.

—The Denver & Rio Grande R. R. and Western Pacific Ry. are expected to make early announcement with reference to the construction of new joint yards at Salt Lake City, Utah.

—Arrangements are being completed by officials of the Missouri, Kansas & Texas Ry. in co-operation with the chamber of commerce of Parsons, Kans., for the formal opening January 8 of the new passenger station.

—The Illinois Central R. R., it is said, is planning to build a new freight depot and make additions to its yards at Evansville, Ind.

—The Delaware, Lackawanna & Western R. R. has received bids on its proposed new passenger station at Buffalo, N. Y., and it is expected that contract will be awarded within a few days. The Lackawanna will make an expenditure of about \$500,000 for the improvements planned.

—The terminal commission of Buffalo, N. Y., is considering plans of the New York Central Lines for the proposed new passenger terminal. The commission is expected to decide soon on one of seven plans which have been submitted.

—The Lehigh Valley R. R. has commenced work on a new passenger station at Ithaca, N. Y.

—The Pennsylvania Railroad, it is said, will abandon its terminal at the foot of Exchange place, Jersey City, N. J. The plan, according to report, contemplates connecting the Harsimus cove freight yard at the foot of Sixth street, Jersey City, with the contemplated Exchange place yard, giving the company a yard nearly one mile in length.

—The Canadian government has entered into an agreement with the Canadian Pacific Ry. and the Grand Trunk Ry. for the construction of a union station at Quebec on the site of the present Palais station, a tunnel from Wolfe's Cove into the station and a station on the Champlain market site to accommodate the river traffic. Another agreement between the government and the city of Quebec provides for the construction of large shops for the National Trans-continental Ry. at St. Malo, which will be annexed to Quebec city. The shops are to be exempt from taxes and water rates for 20 years.

—The Rock Island Lines have awarded contract to T. S. Leake & Co., 537 South Dearborn street, Chicago, for erecting the proposed new freight house and freight platform of the Rock Island-Memphis Terminal Ry., at Memphis, Tenn. Bids for the construction of a subway on the terminal site will be opened in the office of C. A. Morse, chief engineer of the company, within a few days. Contracts for grading were let some time ago. The depot will front upon Calhoun avenue between Third and Fourth streets, and will extend southward to Webster avenue. The buildings will be about 200 feet wide, and the central depot will be about 400 feet long and two stories high. The freight sheds and platforms will extend from the southern end to a distance of 400 feet, making the total length 800 feet. Steel, concrete and brick will be used in combination to make a fireproof structure. The estimated cost of this work, according to a report, is about \$250,000, but, including the site, the construction of the subway at Georgia avenue and the tracks, etc., the total cost of the terminal work is placed at about \$1,000,000.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, DEC. 30, 1913.

Third point support for brake beams, 1,082,495—Edwin G. Busse, Chicago, Ill., assignor to Chicago Railway Equipment Co., Chicago, Ill.

Device to prevent rails from spreading, 1,082,496—George W. Carr, Sr., Inverness, Miss.

Journal cooling device, 1,082,503—William H. Clingham, Chicago, Ill.

Piston packing, 1,082,523—Harry A. Hoke and Clarence J. Barley, Altoona, Pa.

Tube cleaning machine, 1,082,544—Karl Matheus, Chicago, Ill.

Railway signal lantern, 1,082,577—Alfred A. Ziegler, Boston, Mass.

Equalizing arrangement for locomotives, 1,082,592—Harry A. Hoke, Altoona, Pa.

Railway Crossing, 1,082,607—John W. Perkins, Port Norfolk, Va.

Locomotive headlight, 1,082,623—John L. Carnley, Ruble, Miss.

Car door mechanism, 1,082,664—Arthur M. Waitt, Sharon, Conn., and Weymer H. Waitt, New York, N. Y.

Railway tie, 1,082,674—Anthime Bernier, New York, N. Y.

Exhaust nozzle, 1,082,701—Lawrence C. Mooney, Montgomery, Ala.

Rail filing machine, 1,082,732—Alfred Caro, Charlottenburg, Germany.

Reversing gear for locomotives and the like, 1,082,733—William F. J. Casey and Gustav Cavin, Kingston, Ontario, Canada.

Mine locomotive, 1,082,740—William F. Eckert and William C. Whitcomb, Rochelle, Ill.

Triple valve for air brakes, 1,082,758—Spencer G. Neal, Los Angeles, Cal., assignor to California Valve & Air Brake Co., Los Angeles, Cal.

Flange oiler, 1,082,798—Thomas Carrick and Walter A. Baisley, San Francisco, Cal.

Car standard, 1,082,816—J. Farmer Menees, Greenwood, Miss.

Car coupling, 1,082,822—Willard F. Richards, Depew, N. Y., assignor to Gould Coupler Co., New York, N. Y.

Railway cab signal, 1,082,824—Hiram G. Sedgwick, Mill Valley, Cal., assignor to the National Safety Appliance Co.

Automatic train stop, 1,082,825—Hiram Sedgwick, Mill Valley, Cal., assignor to the National Safety Appliance Co.

Insulating means for railway ties and chairs, 1,082,826—George H. Shane, Denver, Denver, Colo., assignor to the Steel Railway Tie & Appliance Co., Denver, Colo.

Automatic system of block signaling, 1,082,840—Samuel Marsh Young, New York, N. Y.

Locomotive exhaust tip, 1,082,928—John Carlson, Searsport, Me.

Car replacer, 1,082,936—William J. Dixon, Kansas City, Mo.

Automatic train pipe coupling, 1,082,941—Hans Frederick, Fort Madison, Iowa.

Journal box wear plate, 1,082,943—Daniel F. Gonware, Chicago, Ill.

Combined conductor's valve and emergency switch, 1,082,951—Frank Hedley, Yonkers, and James S. Doyle, Mount Vernon, N. Y.

Automatic control system for electric railways, 1,082,956—Benjamin F. Hutches, Jr., Allendale, N. J.

Car roof, 1,082,974—Thomas N. Russell, Chicago, Ill., assignor to Chicago-Cleveland Car Roofing Co., Chicago, Ill.

Appliance for securing rails upon the ties, 1,082,977—Frank G. Smith, Elizabeth, N. J.

Car door fastener, 1,083,001—Frank W. Chaffee, Albany, N. Y.

Rail chair, 1,082,034—Adolph E. Schotte, Sharon, Pa.

Rail joint, 1,083,036—Fred Steinbrenner and Charles Slemenda, Pittsburg, Pa.

Railway tie, 1,082,037—David Stevens, Seattle, Wash.

Metallic railroad tie, 1,083,064—Hugh J. Downey, Modesto, Cal.

Cross tie for railway rails, 1,083,077—Hillery K. Fletcher, Montpelier, La.

Means for supporting and releasing car stakes, 1,083,118—John D. Mauch and Frank Martin, Rib Lake, Wis.

Car coupling, 1,083,121—Charles Arthur McKeran, Wilmerding, Pa.

Adjustable car step, 1,083,127—William D. Osterhoudt, Poughkeepsie, N. Y.

Folding car step, 1,083,131—Cal Pepple, New Weston, Ohio.

Babbitting machine for locomotive cross heads—Robert Reiber, New Castle, Pa.

Steel car, 1,083,176—Charles H. Anderson, Seattle, Wash.

Rail joint, 1,083,177—George W. T. Anderson, Jacksonburg, W. Va.

Insulating rail fastener, 1,083,181—Albert J. Bates, Chicago, Ill.

Automatic air car coupling, 1,083,189—George M. Clark and Henry W. Clark, Ball Ground, Ga.

Means for transmitting train orders, 1,083,197—Ernest W. Dean, Harrington, Del.

Car roof, 1,083,240—Richard Webb Burnett, Montreal, Quebec, Canada.

Hose coupling for air brakes, reissued, 13,666—Francis Roberts and Vernon John Roberts, Auckland, New Zealand.



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The First Roads to Be Valuated.

The Interstate Commerce Commission has named five railroads on which the work of valuation was to be started on Jan. 12. These roads are the Elgin, Joliet & Eastern Ry., the Kansas City Southern Ry., the Norfolk & Southern Ry., the San Pedro, Los Angeles & Salt Lake R. R. and the Atlanta, Birmingham & Atlantic R. R. It was stated by Mr. Prouty, who has charge of the valuation work, that these roads were selected because they were regarded as typical of transportation conditions in the different sections in which they were located, and also because they were small roads.

Danger to Trackmen by Covering Ears.

The general manager of the Pennsylvania R. R. has asked that the attention of all concerned be drawn to this notice: "Three track laborers were struck and killed by an extra freight on December 26, on one of our divisions at a crossover, while they were engaged in cleaning snow from switches. All of these men wore caps with mufflers to protect their ears. The wearing of ear mufflers by trackmen renders their hearing less acute while being worn, and while it is not desirable to prohibit the practice of wearing mufflers, foremen should be warned to pay particular attention to the men who wear them, in regard to warning the men of approaching trains. All foremen should be advised of this at once, in anticipation of the severe weather during the next two or three months."

Proposed Memorial to Murdoch.

Mr. R. Barclay Murdoch has written to the Railway Engineer, of England, proposing the establishment of some kind of a memorial to William Murdoch, one of the early builders of the locomotive. He sets forth his claims in the following language: "If the whole civilized world is indebted to William Murdoch—as is now generally conceded—for his application of coal-gas to lighting, it is even more so for his improvements on the steam engine, particularly for its application to the purpose of transport. Recent investigations of existing documents and other existing evidence prove conclusively that he was the first to apply steam-power to mechanical locomotion in a practicable form. But he was not in a position to patent his production, and his employers not only would not help him to do so, but they did all they could to discourage him. Consequently when he at length left Cornwall, Richard Trevithick, who had undoubtedly seen Murdoch's steam carriage, took up the idea and constructed one on a large scale capable of carrying several persons. This was copied, and more or less improved upon, by other engineers in the North, until George Stephenson so far perfected it as to make it suitable for the transport of goods and passengers upon railroads as we now have them. But Murdoch showed the way, in spite of Watt's dictum that he was 'hunting shadows' and that 'Providence would have to work a miracle before a vehicle could propel itself.'"

Preliminary Report on Terminal Electrification, Chicago Association of Commerce.

In the annual report of the Chicago Association of Commerce reference is made to the work of the committee on

smoke abatement and electrification of railway terminals. It appears that the engineering staff of the committee has completed its researches concerning sources of atmospheric pollution and that the facts gathered together are now in process of being prepared for final presentation. It appears also that most of the materials necessary to solve the question of the necessity for the electrification of Chicago's railway terminals and the mechanical feasibility of such electrification are in hand, but that the information so far gathered as to the financial practicability of such an undertaking is not sufficient at this time to enable the committee to determine this phase of the problem. Studies are being made also concerning the financial practicability of carrying out the necessarily extensive program for electrification of the railway terminals in the event that such electrification shall finally be recommended by the committee.

Government Railway for Alaska.

The Alaska railroad bill, involving the expenditure of \$35,611,000 for the construction of 733 miles of railroad from a point on the southern coast of Alaska to the Yukon river, was taken up as unfinished business by the United States senate when it met on Monday, Jan. 12. According to the present program its consideration will be continued until the bill is disposed of. It is intended to make only \$1,000,000 immediately available. It is predicted that the bill will pass the senate. The designation of the route over which the road is to be built is left to the discretion of the president. There are four available seaports on the south coast: Seward, Valdez, Cordova and Controller Bay. From Seward north for a distance of 72 miles runs the Alaska Northern R. R. From Cordova runs the Copper River & Northwestern R. R., 159 miles in length, which is owned by the Alaska syndicate, and which now is used exclusively to carry copper from the valuable mines owned by this syndicate. It is thought to be not improbable that the government will find it feasible to take over one or the other of these roads as the first division of a general railroad system.

Wreck on the Georgia Southern & Florida Ry.

Because of a broken rail, it is alleged, a southbound passenger train on the Georgia Southern & Florida Ry. was wrecked at a trestle one mile north of Cordele, Ga., early on the morning of Jan. 9. The accident resulted in three fatalities and in injuries to 27 others of the passengers and crew. Most of the casualties occurred to the passengers in the "Jim Crow" car which was of wooden construction. The private car of Mr. J. B. Munson, vice-president and general manager of the road was also derailed but its occupants escaped with relatively inconsequent injuries.

Union Pacific-Southern Pacific Dissolution.

In protesting against certain remarks attributed to Samuel Untermyer in a recent address before the Illinois Manufacturers Association, in which it was intimated that in the dissolution of the Union Pacific-Southern Pacific rail merger, the Union Pacific was able to control the make-up of the new Southern Pacific board of directors, Mr. Julius Kruttschnitt recently gave the following version of the transaction: "What actually was done in selecting the existing board of directors of the Southern Pacific Company, is as follows: Independent stockholders representing 215,000 shares or 15 per cent of all shares entitled to vote, appointed a protective committee, which co-operated to the fullest extent with their associate stockholders. Second—At the annual meeting of stockholders 9583 independent owners of 1,046,309 shares of stock uncontrolled and uninfluenced by the Union Pacific, selected those of their number who should manage the company's affairs. The result achieved was the election of fifteen directors, including two members of the protective committee, that represent the will of 80 per cent of the owners nu-

merically and 72.3 per cent of all shares entitled to vote. Third—The Union Pacific management and its agents were excluded from participation in the election. Not a single share of stock owned by the Union Pacific was voted, or in any way affected the result."

Railway Strike in South Africa.

Resenting the retrenchment policy which the management had sought to put into effect, some 35,000 employees of the South African State Railways went on strike at midnight of Jan. 7. The situation at once became critical and was made more so on Jan. 13 when a general strike was declared by the South African Trades Federation in sympathy with the railroad men. This step immediately met with response on the part of the miners at several points. The government retaliated at once by declaring martial law. The centers of disturbance include such points as Johannesburg, Pretoria and Bloemfontein. The Orange Free state and the Transvaal district are quite generally involved in the difficulty which, while it gave promise of being the most serious of the several strike movements that have beset that territory during the past two or three years, appears to be yielding to the prompt and vigorous application of the principles of martial law.

Bridge Wreck on the St. Louis & San Francisco R. R.

A peculiar accident occurred on the St. Louis & San Francisco R. R. at Trinity Park, near Fort Worth, Texas, on the night of Saturday, Jan. 10. It appears that a horse in some manner, got onto the 186-foot span bridge at the point where the wreck occurred, and that a freight engine in backing across the bridge struck the horse, derailing the tender, which in striking one of the vital members of the bridge, caused the structure to collapse. The engineer, his fireman and a brakeman were killed, leaving no witnesses for the coroner's inquest. The railway officials are at a loss to account for the circumstances by which this accident was brought about and are making an investigation.

Pension Plan, Pullman Company.

The Pullman Company has lately announced the details of a pension plan which has been adopted for the benefit of its 33,000 employees which provides that employees who reach the age of 70 years and have been twenty years in the service of the company will be pensioned at the rate of 1 per cent for each year of service of the average monthly pay received during the last full year of employment. The lowest pension allowance is fixed at \$15 a month. Employees who have been twenty or more years in the service and have been disabled may be retired and pensioned. Women may be retired at the age of 65 years. No man or woman over 45 years of age will be hired hereafter unless by special arrangement. More than 7000 men employed as porters will be among those entitled to come under the provisions of the plan.

Further Hearings, Tap Line Cases.

The United States Supreme Court according to report, has set Feb. 24 as the date for hearing further arguments in the tap line cases. The hearing will be on an appeal from a decision of the Commerce Court, now out of existence, which decided that tap lines are entitled to a division of joint rates on all business received from trunk line carriers. The decision was written by Judge Julian W. Mack, and the appeal was perfected by the Interstate Commerce Commission, the Department of Justice at Washington and the Atchison, Topeka & Santa Fe Ry. The proceeding involves claims by tap lines amounting to approximately \$5,000,000 and affects all railroads owned by shippers throughout the country. The Commerce Court reversed a decision of the Interstate Commerce Commission in the case, and the latter body, on its

own motion, has arranged for a hearing Feb. 4 in Washington with a view of mapping out plans for a compilation of reparation claims. The proceeding has been pending since 1910. A series of hearings was held in various cities throughout the country during which more than 10,000 pages of testimony were taken. The commission decided that fifty-seven of the ninety-nine tap lines involved, practically all of which are owned by lumber companies, were not entitled to a division of joint rates on the ground that they are merely plant facilities. The order of the commission was enjoined by the Commerce Court, which held that all of the tap lines are common carriers of outside traffic and are entitled to a part of the joint rate on all tonnage received for transportation from trunk lines. It is expected that the Supreme Court will announce a decision in the case within a few months.

Shippers Approve Higher Rates.

A statement recently given out by the Illinois Manufacturers Association, shows a decidedly changed attitude on the part of shippers generally respecting the matter of increased freight rates. Quoting the statement: "Conditions with the railroads have changed materially since our association successfully opposed the request of the railroads for an advance in 1910. The increase in wages, in taxes, in expenditure to insure greater safety to both men and the public, and that caused by legislation of the full-crew variety, have so augmented the operating expenses of the railroads in general that the net revenues are insufficient to provide for that degree of rehabilitation and extension of facilities which prompt and efficient service to the shipper demands. The association is convinced that shippers can better afford to pay a uniform advance of 3 per cent, than suffer in the future any impairment of railroad service." Sentiment of this character together with a flood of letters being sent by shippers to members of the Interstate Commerce Commission on behalf of the roads will doubtless aid very materially in securing favorable consideration by that body.

Favor Rate Increase.

Among the commercial organizations which have just adopted resolutions favorable to the five per cent increase of railway rates, and asking for prompt action on the matter, are the New York Hide and Leather Association, the National Business League of America, and the Chamber of Commerce of the State of New York. Whether the opinion and desires of almost the entire business interests of the country are to be respected, remains to be seen.

Short Course in Highway Engineering, University of Illinois.

The University of Illinois announces a short course in highway engineering to be conducted at the University under the direction of the civil engineering department, beginning Monday, Jan. 19 and continuing for the remainder of the month. The purpose of the course is to aid the newly appointed county superintendents of highways of the state of Illinois in preparing for their duties, and also to help any who may aspire to become the assistants of the county superintendents of highways, or who seek employment under the state highway commission. It is hoped that the instruction given, the demonstrations made, and the machinery exhibited will prove of interest also to contractors, contractor's foremen, and to highway commissioners and others interested in road improvement. While it is not expected that the product of the short course will be experienced, efficient road engineers; it is believed that even experienced civil engineers who have not made a specialty of road engineering, may receive valuable help. Likewise men without experience in general engineering or in road work, may receive valuable suggestions concerning road and bridge construction, and may also acquire some first-hand knowledge of

road materials and machinery. There will be no charges of any kind by the university and the course will be open to any one without examination or other conditions, except to register upon arrival.

Universal Mileage Books in California.

California advices are to the effect that an arrangement is being perfected whereby all steam railroads and all interurban electric lines in California, as well as many steamship and stage lines will honor mileage books purchased at any point in the state whenever presented on lines of communication controlled by companies in the agreement. The matter of direct shipment of freights on these roads to all points reached by them at a through freight rate is also said to be under consideration. Heretofore the local rate has been charged when shipments have been re-routed over the electric lines and vice-versa. The general plan appears to have been agreed upon. The mileage books will call for a rate of $2\frac{1}{2}$ cents per mile, but on stage and steamer lines, and in cases where the regular rate of travel on the steam roads is in excess of three cents per mile, the $2\frac{1}{2}$ -cent rate probably will be exceeded.

Affairs of the New York, New Haven & Hartford R. R.

The outcome of the conferences which have been in progress for some weeks past, between officials of the New York, New Haven & Hartford R. R. and the United States department of justice, will be a reorganization of the railroad system, by which it voluntarily divests itself of its most important subsidiaries. An announcement to this effect was made on January 10, giving the terms of a preliminary agreement which has been entered into between the corporation and the federal authorities, to meet the latter's ideas of compliance with the Sherman anti-trust law. The announcement was signed by Howard Elliott and A. T. Hadley, chairman and member of the board of directors, respectively, and read as follows:

"An agreement has been reached between the department of justice and the New Haven Railroad. The New Haven, in addition to the cancellation of the Boston & Albany agreement, which becomes effective February 1, will dispose of its holdings in the Boston & Maine R. R., the various trolley systems, the Merchants' & Miners' Transportation Co., the Eastern Steamship Corporation and the Maine Steamship Co., under a plan, the details of which will be worked out as promptly as possible with representatives of the department of justice by Chairman Howard Elliott and Messrs. Moorfield Storey, of Boston, and Walker D. Hines, of New York, special counsel of the board of directors.

"Concerning other steamer lines, application has been made, under the Panama Canal act, to the Interstate Commerce Commission, and their disposition will be determined by that body. Until the plans are worked out and put into effect, the management and operation of the properties will be continued as at present. The conference was between the Attorney-General and Special Assistant to the Attorney-General T. W. Gregory, Assistant Attorney-General Jesse C. Adkins and Special Assistant to the Attorney-General Frank M. Swacker, representing the department of justice, and Howard Elliott, Arthur T. Hadley and L. S. Storrs, representing the New Haven Co."

A supplemental statement was issued by Chairman Elliott later on the same date. Mr. Elliott said the result of the negotiations of the last six weeks with the department of justice meant numerous changes in the general structure of the New England transportation system. He believed, however, that these could be brought about without serious dis-

location if all parties would work together and have patience.

Continuing, Chairman Elliott's statement said:

"The attorney general, while insistent upon an arrangement, which conformed to the law as interpreted by him, was broad-minded in considering the business and commercial welfare of New England and of the railroads in New England. He stated frankly that he recognized the obligations incumbent upon the directors to conserve, just as far as circumstances will permit, the full value of all of the properties, and so far as the department properly may, will help the directors to discharge their obligations in protecting the stockholders in working out the details of the plans for the various properties.

"The New Haven management, while it could not agree fully with all of the views of the department of justice, nevertheless felt that in the interest of a peaceful solution of the New England railroad situation, it was wise to yield and to work in full harmony with the department in bringing about an adjustment.

"The general business and transportation situation in New England is difficult, but the properties are inherently sound, and with courage and patience, without doubt, will be made not only good properties to serve the public, but, in due time, better properties for returning an income to the owners of the securities. There is, of course, a large amount of detail to be considered in reaching a final conclusion as to methods of segregating the properties. This work will be undertaken in a fair spirit by the department of justice and the New Haven company. Pending the adjustment of the details with the government and while new financial plans are being completed improvements of all kinds will necessarily be postponed and no money spent except such as is absolutely necessary for safety."

An obstruction to certain plans for financial re-habilitation of the New Haven system was encountered, on Friday, January 9. The Massachusetts Supreme court annulled the recent order of the state public service commission which gave consent to the issue by the New York, New Haven & Hartford R. R. of \$67,700,000 of convertible debenture bonds. The court declared the approval of such a convertible issue beyond the authority of the commission. The proposed bonds carried an option of exchange for stock at par after five years from date. The unanimous opinion of the court said:

"The approval of the commission of an issue of stock must relate to the present and not to a remote future. This is required by the legislative intent disclosed by the review of the statutes. The amount of stock which the commission intelligently can approve to be issued is inseparable from the price at which it is to be issued. The price at which the public interest may require that it may be issued during a period of ten years, beginning five years hence, is impossible of ascertainment now. But the approval of convertible debentures, with the right to take stock at par in payment during that period, involves fixing a price of the stock during the like period. An order entered now that stock be issued at par during that period of time can afford no security that the corporation will get an adequate return for its stock, or that rates, and charges fixed upon such a capitalization will be fair, or that the rights of other stockholders will be guarded properly.

"The mandatory requirement of the statute that the commission shall base its decision as to the amount of stock to be issued upon the price at which it is to be put out is inconsistent with the underlying idea of a convertible bond such as is proposed in the present proceeding. It has been argued with earnestness that a convertible debenture has become highly desirable in view of present conditions. This, however, is a matter rather for legislative than judicial consideration.

"No request has been made for the approval of an issue of bonds without the convertible-into-stock feature. Apparently no vote has been passed by the stockholders for an issue of that kind. Hence, the only matter to be considered upon this aspect of the case is whether approval of an issue of convertible debentures such as is set out in the order of the commission is within its legal power. The conclusion

follows that the order approving the issue of convertible debentures and of stock was beyond the authority of the commission, and hence must be quashed.

"The plaintiffs as stockholders plainly have a right to invoke the protection of the court against a proposed issue of convertible debentures and stock such as here is proposed."

Construction Work on the National Transcontinental Railway of Canada—II.

BRIDGE WORK.

There are about 220 bridges on the line, the aggregate length of which is about 11 miles and the weight of the structural material 61,000 tons. The cost of these structures will be about \$6,000,000.

Among these bridges there are a number of structures of noteworthy length and height. The maximum length of span is 300 ft., in the bridge over the Winnipeg river. The viaducts have generally been built in tower spans of 40 ft. and intermediate spans of 60 ft. Plate girders have been used in spans up to 100 ft. in some of the structures. All the bridges have been designed to Dominion government specifications, the locomotive loadings being 180 tons, with 49,400 lbs. on each pair of drivers. A general description of some of the most notable of these bridges follows:

The Salmon River bridge, on District "A," 57 miles from Moncton, is 1320 ft. long and required 1089 tons of structural steel. It is built in four 40-ft., four 60-ft., and two 80-ft. deck plate girder spans, four towers of 40-ft. span and four 150-ft. deck truss spans. The bridge over Caton brook, 182 miles from Moncton, has eleven 60-ft. and ten 40-ft. deck plate girder spans, with ten tower spans of 40 ft., and weighs 1198 tons.

The heaviest structure on the Eastern division is the Little Salmon River viaduct, 4000 ft. long, 200 ft. high, and requiring 6995 tons of structural steel. It is located 185 miles west of Moncton. It is built with twenty-five 100-ft. 3 in. and twenty-four 58-ft. 9-in. through plate girder spans, with 24 towers of 58-ft. 9-in. span. This structure was described in detail, with illustrations, in the *Railway and Engineering Review* of Dec. 28, 1912.

The Little River viaduct, at Mile 192 from Moncton, has eleven towers of 40 ft. span, with nine 60-ft., two 80-ft. and one 100-ft. deck plate girder intermediate spans. The weight is 1264 tons.

The Cap Rouge viaduct (Fig. 18), on District "B" (Mile



Fig. 17—Progress View of Erection on Fourche du Pin Bridge, N. T. R.



Fig. 23—Grand Trunk Pacific Bridge over the Winnipeg River, at Minaki.

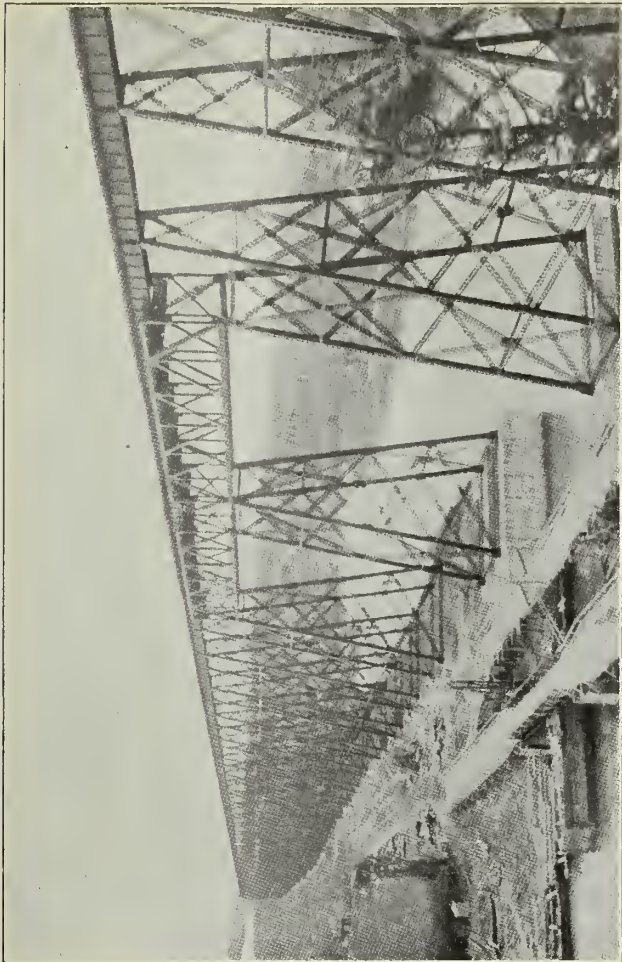


Fig. 12—Cap Rouge Viaduct, N. T. R.; Length, 3335 Ft.

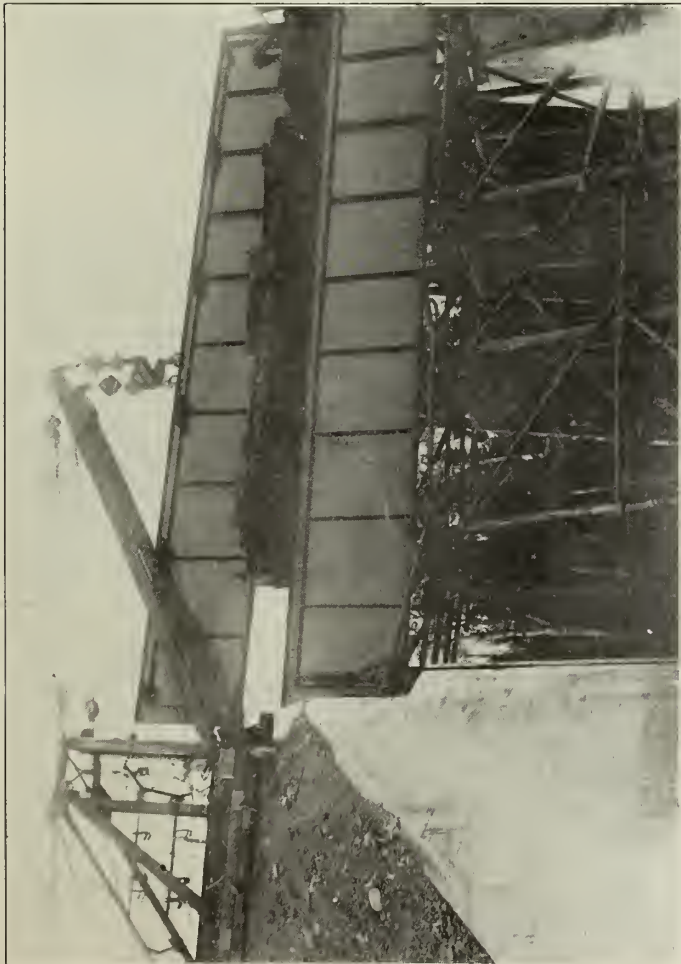


Fig. 16—Placing Plate Girders at River Eau Chaude Bridge, National Transcontinental Ry.

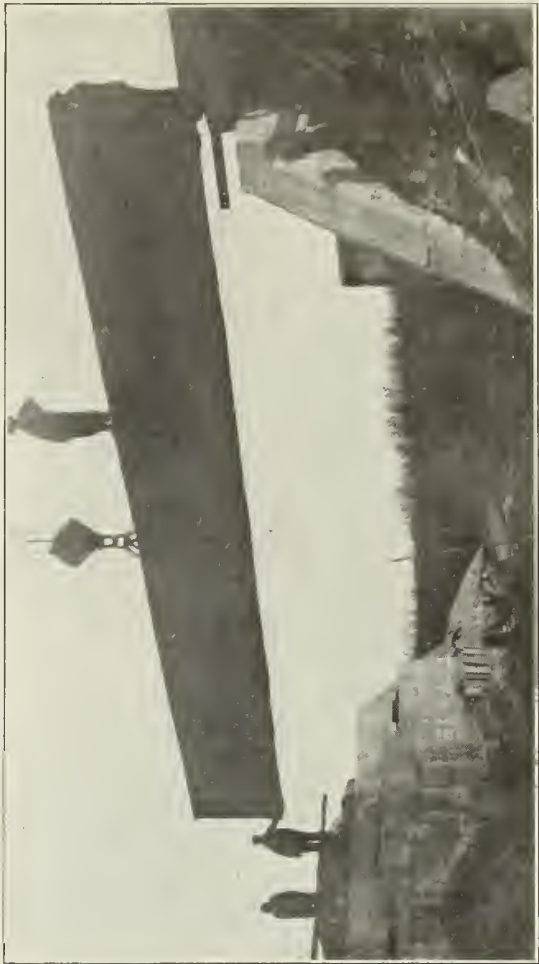


Fig. 20—Setting In Girders at Boucher Creek Bridge, N. T. Ry.

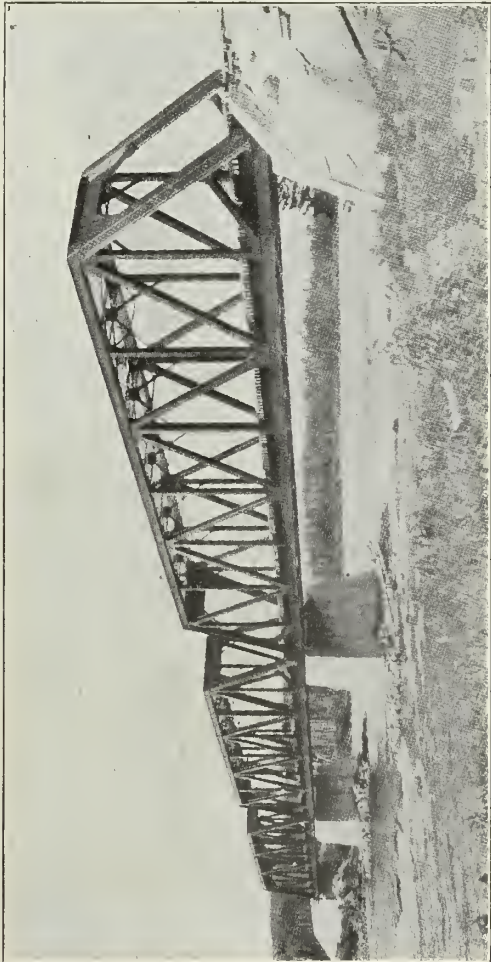


Fig. 19—St. Maurice River Bridge, Third Crossing, National Transcontinental Ry.

463), is 3335 ft. long and weighs, in structural steel, 4228 tons. It has 30 towers of 40 ft. span and one rocker bent, thirty-two 40-ft. and twenty-seven 61-ft. deck plate girder spans, with one 125-ft., one 150-ft. and one 160-ft. deck truss spans. At the first crossing of the St. Maurice river (Mile 589), there are six 140-ft. through truss spans; at the second crossing (Mile 648.4), three 200-ft. through truss spans, skewed; and at the third crossing (Mile 655.8), three 200-ft. skewed through truss spans.

The Hurricanaw river, which flows into Hudson bay, is crossed (at Mile 887.9) by one 300-ft. through truss span and two 70-ft. deck plate girder spans (Fig. 21). The Mistongo River bridge (Mile 1002) has eleven towers of 30-ft. span, eleven 30-ft. deck plate girder spans on the towers, eleven 60-ft. intermediate deck plate girder spans and one 80-ft. deck plate girder span.

The Abitibi river (Mile 1020, on District "D") is crossed by a 1135-ton structure consisting of four 30-ft., two 57-ft. 10-in. and three 60-ft. deck plate girder spans, two 210-ft. deck truss spans, with four towers of 30-ft. span and one



Fig. 26—N. T. R. Station at Cochrane, Ont., 1029 Miles from Moncton.



Fig. 27—Grand Trunk Pacific Ry. "Great Lakes Express," at Ft. William Station.



Fig. 28—Grand Trunk Pacific Ry. Terminal at Ft. William, Ont.

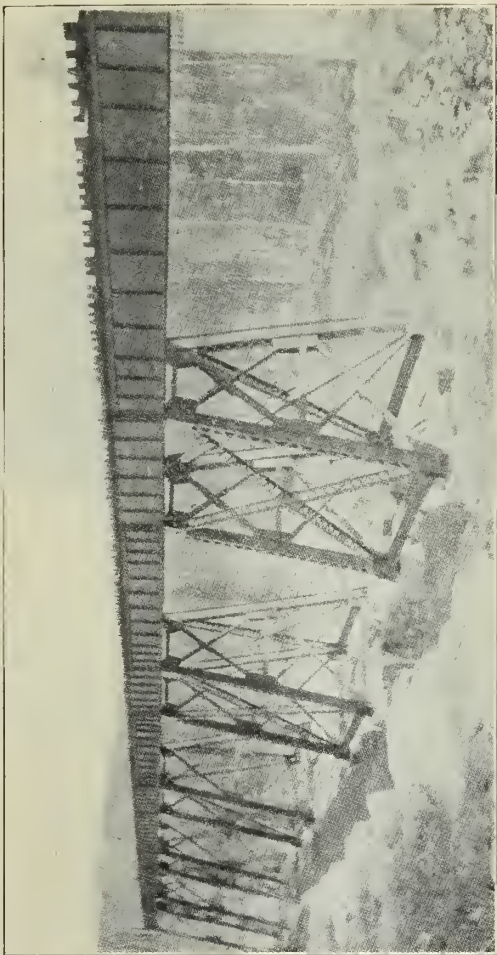


Fig. 22—Mishtongo River Bridge, Ontario, on National Transcontinental Ry.

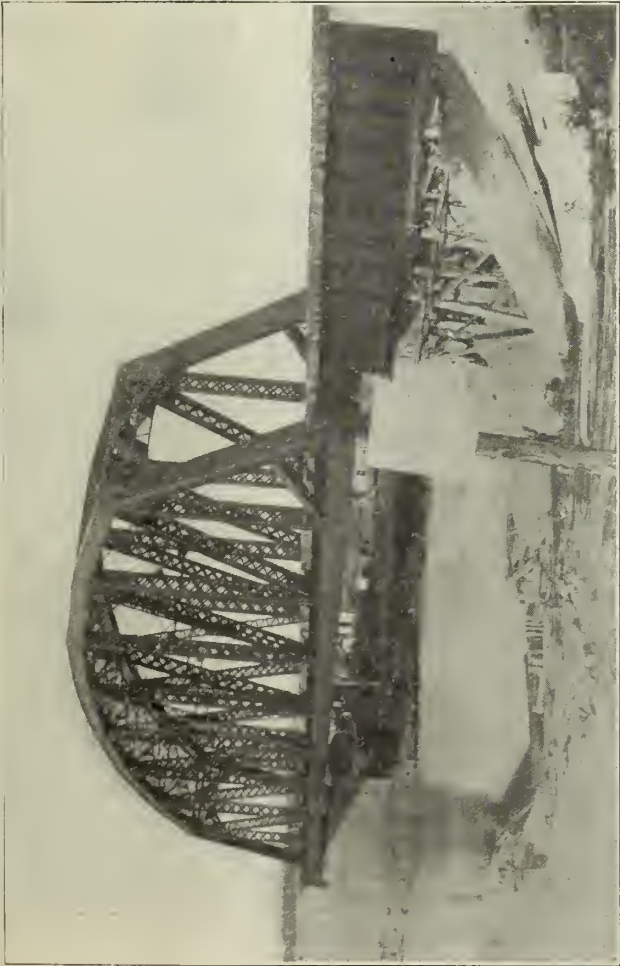


Fig. 21—Hurricanaw River Bridge, National Transcontinental Ry.

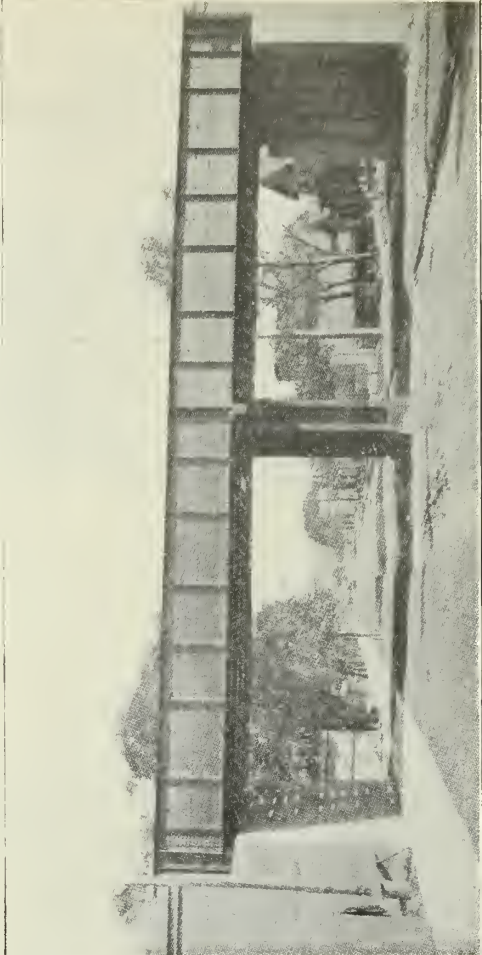


Fig. 25—Bridge Crossing Notre Dame Street in Winnipeg, N. T. R.

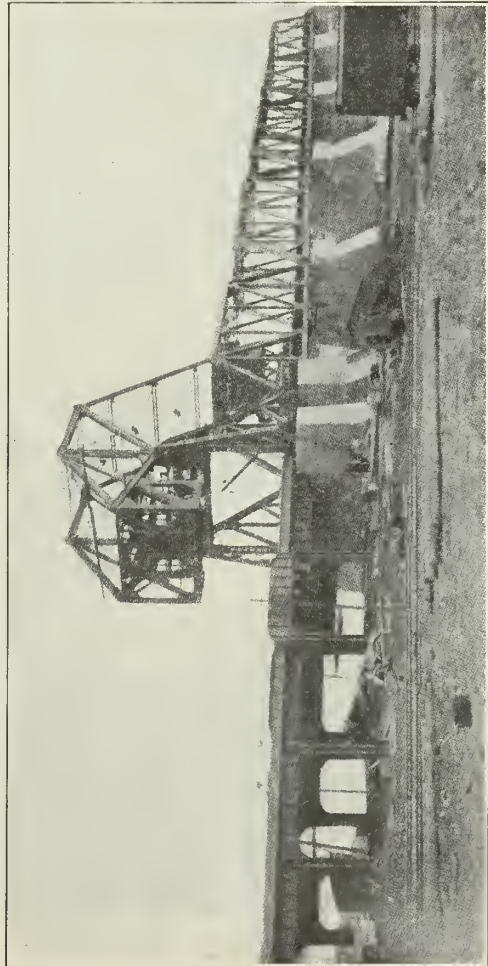


Fig. 24—Red River Bridge at Winnipeg, Including a 130-Ft. Strauss Bascule Lift Span.



Fig. 29—Grand Trunk Pacific Ry. Bridge over the Kaministiquia River at Ft. William.

rocker bent. At the crossing of the Mattagama river (Mile 1060) there are two 260-ft. through truss spans. The Red River bridge at Winnipeg, has four 150-ft. through truss spans and one double-track 71-ft. deck plate girder span. The weight of structural steel is 3237 tons.

TRACK.

The track is laid with 80-lb. rails, Am. Soc. C. E. section, in 33-ft. lengths; 18 ties to the rail on tangents and 20 on curves. Most of the ties are jack pine, with tamarack, hemlock, cedar and spruce in smaller quantities. Track-laying machines, with both single and double booms, were used in the work of construction. The work of ballasting, on a large part of the mileage, remains yet to be done.

The engineering work has been in charge of Gordon Grant, chief engineer of the Transcontinental Railway Commission, Mr. R. F. Uniacke, bridge engineer, with six district engineers, reporting to whom are division engineers in charge of 40 to 50 miles of road in supervision of resident

engineers in charge of 10 to 15 miles each. The chairman of the Transcontinental Railway Commission is Mr. R. W. Leonard with Mr. Duncan MacPherson, assistant chairman, who has kindly put us in possession of the data from which this article has been written. Mr. R. C. W. Lett, tourist and colonization agent, Grand Trunk Pacific Ry., has done us the courtesy of supplying photographs from which the accompanying illustrations were reproduced.

Baltimore & Ohio's Situation at the New Year

Officials of the Baltimore & Ohio R. R. look back over the records of business during 1913 with a feeling of satisfaction at the results during part of the twelve-month period, while at the same time they share the trepidation which pervades business circles as the year draws to a close. With the ascending of some of the clouds which settled upon business during the last



Fig. 30—Part of Fort William Terminal, Grand Trunk Pacific Ry.

quarter of the year they are hopeful as to the returns for 1914.

The Baltimore & Ohio being one of the largest trunk line systems, it typifies the railroad situation as a whole, operating as it does through the most prosperous section of the country east of the Mississippi river. Its conditions are representative of the eastern railroads, so that the results of its year's operations may be regarded as barometric.

During the first half of the year the Baltimore & Ohio, in common with other American railroad systems, showed large gains in gross earnings and material increases in the volume of traffic which it handled. While these steady increases were being realized, the expenses incident to operating the property showed inclining tendencies, so that while the company was actually earning more money than at any time during its history, the net results of operations were not in keeping. The margin between earnings and expenses out of which net earnings are calculated, grew smaller as the year drew to a close; until during November, the latest period for which earnings and expenses

Ohio during 1913, the records show that the policy of improving the tracks and placing into the service modern equipment has gone on in the same order as for the past few years when the work of bringing the road up to the highest standard was undertaken. Records of track construction completed during the year show a total of 18.20 miles of new track put into operation as second and third tracks. There were also 11.1 miles of new construction started during the year, this being embraced in the Magnolia cut-off improvement east of Cumberland, Md.

Of the new track completed, 6.86 miles were second track and 11.33 miles third track. Classified by states was as follows: second track, Pennsylvania, 2 miles between Rockwood and Garrett; New York 1.66 miles, between Annadale and Princess Bay, Lon Island; Ohio, 3.08 miles between The Bend and Defiance; Indiana, .12 mile at Clark Junction. Third track, West Virginia, 4.64 miles between Green Spring and Okonoko; Pennsylvania, 6.7 miles between Rockwood and Garrett.

The latest compilation of mileage statistics of the Baltimore & Ohio shows the first track mileage to be 4373.37 miles; second

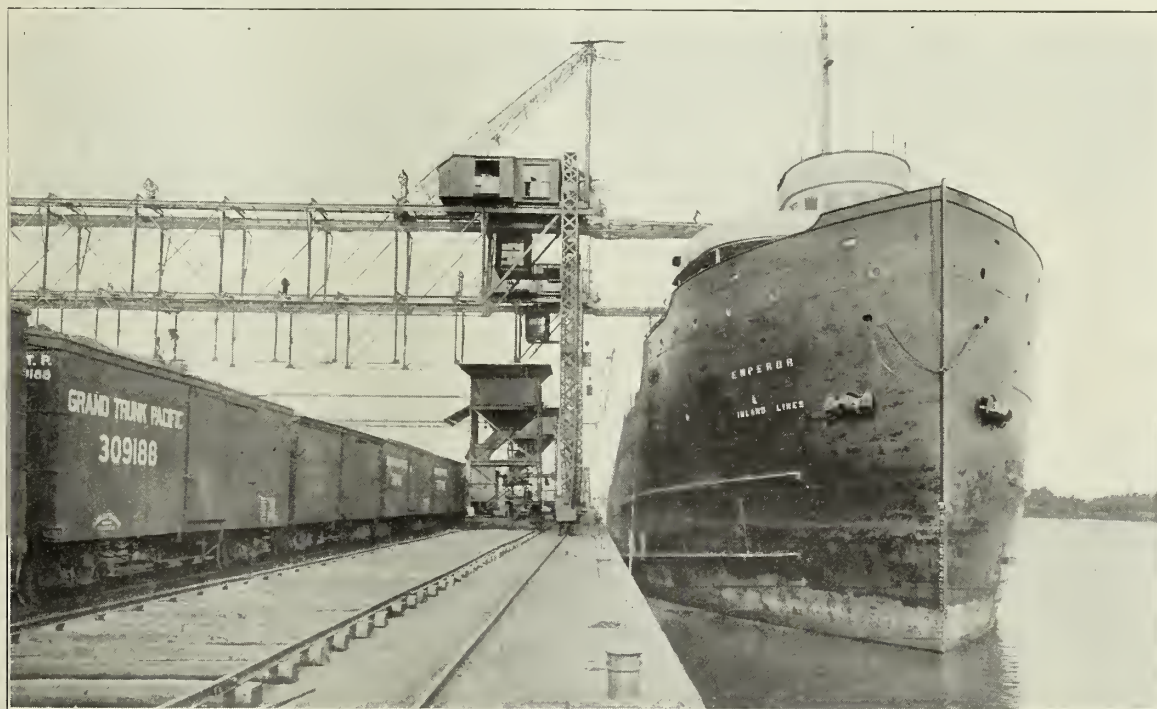


Fig. 31—Coal Unloader, Grand Trunk Pacific Ry. Dock at Ft. William.

have been made public, there was a big drop which, should it continue, would be disastrous.

The falling off in railroad earnings during the last quarter of the year greatly impaired the credit of the companies, emphasizing at the same time the urgent need for an increase in freight rates which the eastern railroads have applied to the Interstate Commerce Commission to grant as a means of providing relief for the situation. The railroads explain the rise in expenses as due to the higher cost of living, generally speaking, as experienced through higher prices for supplies and material of all kinds, new equipment, higher rates of pay to employees, increased taxes and other costs. It was testified by the Baltimore & Ohio authority on wage matters that the increase to employees has cost the roads concerned in the rate movement \$48,618,970 more to do business in 1913 than in 1910, the Baltimore & Ohio's portion of this expense having been \$4,000,000.

While the present state of business was impending for some time, it did not assume an acute stage until comparatively recently, prior to which time the Baltimore & Ohio carried out its program of betterment begun four years ago, and which has totaled about \$100,000,000.

Recapitulating, the betterment program of the Baltimore &

track, 1188.37 miles; third track, 168.48 miles; fourth track, 40.43 miles, making a total mileage of 5770.65. There are also 2902.03 miles of sidings owned by the company, making the grand total of mileage operated 8672.68 miles.

The new equipment placed in service consisted of 3822 freight cars, 111 passenger cars and 150 locomotives. The freight cars were of the hopper and gondola types, of 100,000 pounds capacity. Thirty of the new engines were of the Pacific type for passenger service, 110 Mikado type for road service on freight trains and 10 Mallet locomotives, used as helpers and as road engines in freight service. Of the passenger cars, there were added to the service 40 coaches, 40 baggage cars, 15 postal cars, 5 baggage and mail cars and 4 dining cars, all of the cars being of steel.

The National Fire Protection Association on December 15, organized a Chicago chapter of the national body, comprising the members living in Chicago and vicinity. The chapter starts with a membership of 200, and it is expected that this will increase to more than 1000 before the end of the year. This association is comprised of active and associate members who are as associations and individuals interested directly or indirect-

ly in the reduction of loss by fire. This is a subject which deserves the attention of engineers, manufacturers, and all others responsible for life and property. The National Fire Protection Association has already organized chapters in New York, Boston and Winnipeg, and other chapters are contemplated. Frank D. Chase, M. Am. Soc. C. E., Peoples Gas building, Chi-

ago, is president of the new Chicago chapter, and Wm. S. Boyd, 76 West Monroe street, Chicago, is secretary-treasurer.

In order to simplify matters, each article is kept in its own definite place, together with directions for use. An inven-

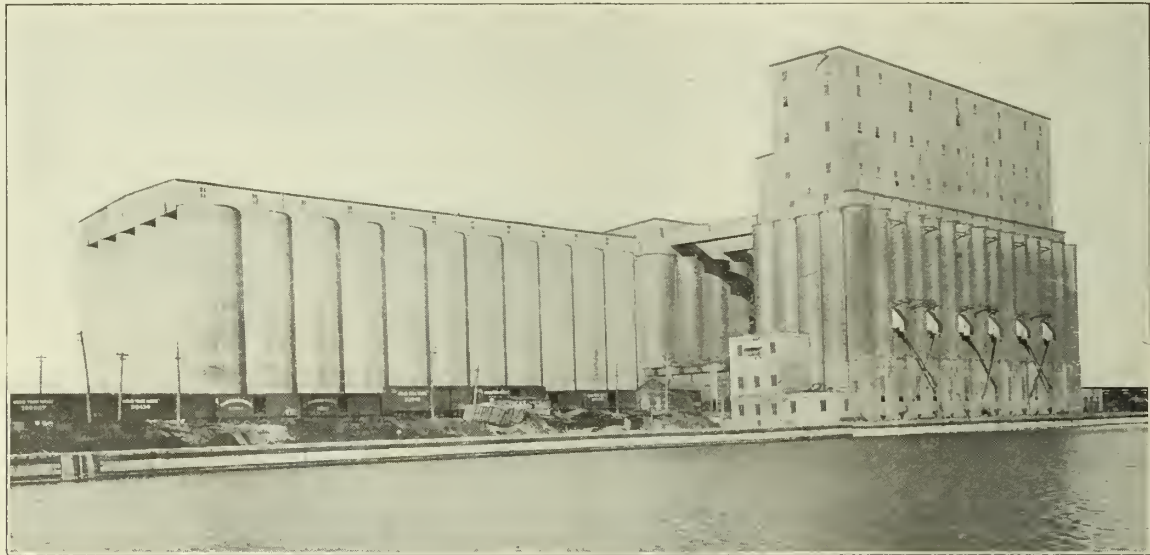


Fig. 32—Side View of Grand Trunk Pacific Ry. Grain Elevator at Ft. William; Capacity, 7,500,000 Bushels.

cago, is president of the new Chicago chapter, and Wm. S. Boyd, 76 West Monroe street, Chicago, is secretary-treasurer.

Equipment of a Car for Bridge Testing, Prussian State Railways.

SYNOPSIS.—Article by A. Nixdorff, state councilor and member of the board of works, Prussian State Railways, in *Zeitung der Vereins Deutscher Eisenbahnverwaltungen*, reprinted in the *Bulletin of the International Railway Congress*, October, 1913. Fitting of an old passenger coach, at an expense of about \$600, to carry instruments for bridge testing. The car is arranged for systematic storage of apparatus and for office work.

In the case of the annual tests of iron bridges, and especially in that of the main tests which have to be made every five years, the shifting of the appliances and instruments required for making the tests, from one bridge to another, has always been troublesome. As experience shows, these appliances and instruments, which are bulky and heavy, are often mislaid, lost, or damaged, while they are being conveyed in baggage cars from the nearest station to the place where the tests are going to be made, and while they are loaded or unloaded; and a considerable expenditure on wages, repairs and replacements results.

Accordingly, a so-called bridge-testing car was introduced a few years ago in the Breslau directorate (and also, we believe, in a few other directorates). This car contains all the appliances and instruments required for testing bridges and measuring stresses. It is taken from the place where it is kept to the bridge which is to be tested, either by one of the scheduled passenger trains or by the locomotives used for loading purposes in the tests.

In the Breslau district an old fourth-class car was used for conversion into a bridge-testing car. The inside is divided into two compartments by a light partition. The appliances and instruments are kept in the larger compartment and the smaller compartment serves as an office in which the results of the tests made are worked out and are at once entered in the bridge books. The larger compartment contains inter alia, all the different deflectometers of Klopsch, Griot and Bonsack, several instruments of the Manet-Rabut

tory is also provided, and after any article has been used it must be put back into its place.

In the smaller compartment, which serves as an office for the staff carrying out the tests, there are two chairs and a table, a wash-stand, clothes racks and, a very important item, a portable telephone with a large bell, which can be connected with the telephone line running along the railway, in order to enable the neighboring stations to communicate, if necessary, with the staff carrying out the tests. Both compartments can be warmed by means of an iron stove which is fitted in the partition. As regards the use of the car and its contents, special regulations were drawn up when it was introduced, the chief of which are: the appliances and instruments and all the other gear used in testing iron bridges are always kept in the car. The car is marked "Bridge-Testing Car" on its two sides and is kept normally at the chief station in Breslau. Appliances kept in the car are not lent separately to the different traffic offices and way and works departments, but only the car as a whole, for which application has to be made in good time to the directorate. The car is taken to the station nearest the place where the tests are to be made, and back from it, by passenger trains to which it is coupled; or it can form, together with the locomotives used as load in the tests, a special train, and the locomotives in question then haul it to the place where the tests are made. The car must not be coupled to a freight train, because the shocks and vibrations are liable to injure the more delicate instruments. When taking over the car the representative of the traffic office or of the way and works department has to check the contents of the car, with the help of the inventory provided, and to see that the different appliances and instruments are in proper condition; and before he returns the car he has to append a corresponding declaration to the inventory. After the load tests have been completed, the car must be locked up and sent back to the sheds at the chief station in Breslau, unless it is at once wanted for tests elsewhere. Each office has a key for unlocking the car. In order to avoid unnecessary haulage, the different offices have to arrange between themselves when they are going to use the car.

Good results have been obtained in the Breslau district

with this car. A similar car would probably prove useful in all the other districts, except perhaps that of Berlin, where the very busy traffic would make it impossible, or at all events, difficult to use it. The advantages of a bridge-testing car are, from the economic point of view, that all appliances and instruments which are available in one given district, are kept together in one lot, so that it is easy to check whether they are all there, and to see whether they are properly used, and hence they remain a longer time in good condition and also are less liable to become lost; from the technical point of view, that the tests can be better suited to each individual case, because the most suitable apparatus can be used, a large selection being available, and that consequently more accurate and more reliable tests can be made. From the hygienic point of view there is also the advantage that the staff making the tests can use the car as a shelter, should the weather suddenly turn bad.

New Construction for 1914.

The Randolph & Cumberland Ry., Carthage, N. C., contemplates reduction of grades on the division from Cameron to Carthage, in addition to straightening track, increasing number of ties at curves, making four fills where there are now small trestles, and running a $\frac{1}{4}$ -mile side-track into a gravel pit. A new station will be built at Mooshaunee.

The Rock Island Southern Ry., at Monmouth, Ill., which has been using leased tracks of the P. T. Co., will construct $1\frac{1}{2}$ miles of track on private right of way from the city limits of Galesburg into town.

The Salem, Falls City & Western Ry., Portland, Ore., has electrification in prospect, but the plans have not yet been decided upon definitely.

The San Benito & Rio Grande Valley R. R., San Benito, Tex., will build from Fernando to San Benito, 21 miles, and from Santa Maria to Lalonia, Tex., 28 miles.

The San Luis Central R. R., Denver, Colo., may build about 1 mile of side and yard tracks during the year.

The Southern Pacific Co. contemplates the following extensions of block signals during the year: From Patterson

Flanigan, Nev., 16-lever U. S. & S. Co.'s mechanical interlocking machine; Eugene, Ore., 12-lever U. S. & S. Co.'s mechanical interlocking machine. All of this work is to be done by this company's forces.

New main track will be built at the following points: 5.390 miles on the Oregon Eastern Ry., from Oakridge, Oregon, west, to end of grade; 100.296 miles on the Willamette Pacific R. R. from Eugene to Marshfield, Oregon; 21.031 miles on the Central Pacific Ry., from 10 miles west of Susanville to Westwood, Cal.; 20.309 miles on the Colusa & Hamilton R. R. New second track will be built from Colfax to Blue Canyon, Cal., 8.49 miles, on the Central Pacific Ry.

The St. Louis & Hannibal Ry. will gravel-ballast a considerable mileage of its track.

The Sumpter Valley Ry., Baker, Oregon, will build a mile of passing tracks and lay heavier rail on 2 miles of road.

The Tampa & Gulf Coast Ry., Odessa, Fla., will build or complete 45 miles of main line between Tampa and St. Petersburg, Fla.

The Toledo & Ohio Central Ry. will install automatic block signals on 1 mile of single track, build a 48-lever power interlocking plant, install six automatic distant signals and extend four of its mechanical interlocking plants.

The Union Pacific R. R. has work in progress on a 4-track, main-line, conveyor type, all-steel coaling station, at Columbus, Neb., and on another of similar design at Cheyenne, Wyo. It will ballast $68\frac{1}{2}$ miles of track, from Menoken to Marysville, Kans., on the Topeka branch. On the Hastings & Northwestern R. R., which is operated by the Union Pacific R. R., a 34x136-ft. cut stone and brick depot, on concrete foundation, is in progress at Hastings, Neb.

The Union Terminal Ry., St. Joseph, Mo., will install automatic block signals on $1\frac{1}{2}$ miles of road.

The Wabash R. R. had in contemplation, during the past year, the installation of automatic block signals on sections of line mentioned below, but the work was postponed. It will probably be resumed this year. East Ashley to West Ashley, Ind., 3 miles; E. Helmer to W. Helmer, Ind., 2 miles; E. Wolcottville to W. Wolcottville, Ind., 2.8 miles; E. Benton to W. Benton, Ind., 2.5 miles; E. Lakeville to W.

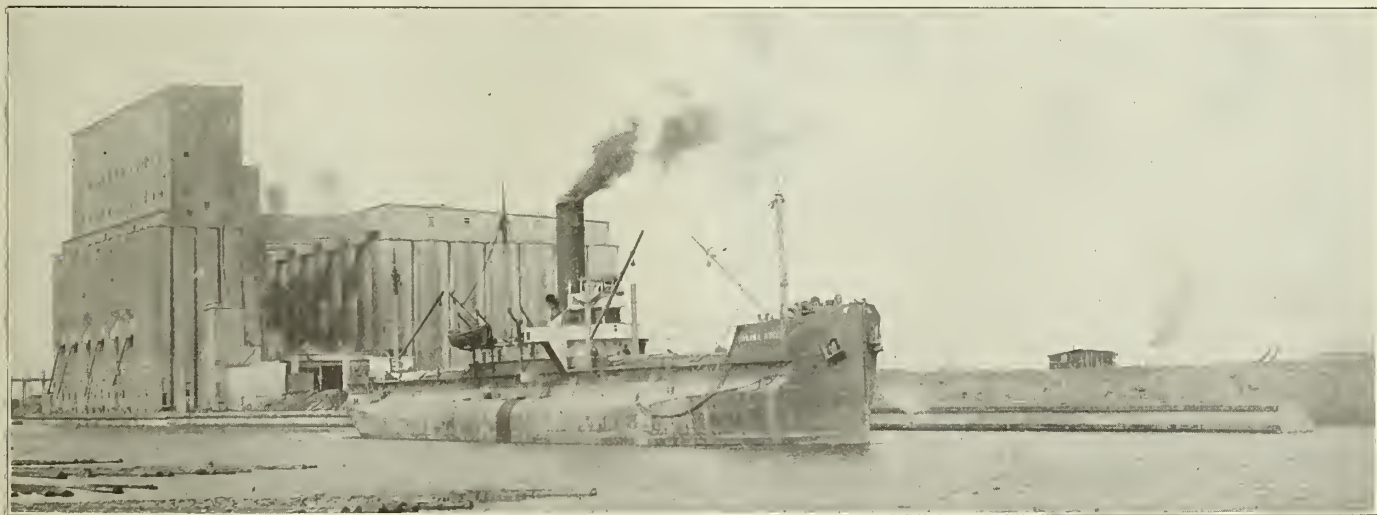


Fig. 33—End View of Grand Trunk Pacific Ry. Grain Elevator at Ft. William.

to Tracy (single track), 25.2 miles; Gold Run to Colfax, 10.8 miles (double track); Encinal to High Street, 2.4 miles, d. t.; High Street to Blanding Jct., 1.4 miles, d. t.; Mastick to Park Street, 2.1 miles, d. t. Interlocking plants will be built at the following points: Davis, Cal., 80-lever G. R. S. Co.'s model 2 electric interlocking machine; Palisade, Cal., 36-lever G. R. S. Co.'s model 2 electric interlocking machine;

Lakeville, Ind., 2.8 miles; E. North Liberty to W. North Liberty, Ind., 3.5 miles; E. Kingsbury to W. Kingsbury, Ind., 2.0; E. Crocker to W. Crocker, Ind., 2.8 miles; E. Butler to W. Butler, Ind., 2.6 miles; total, 24 miles.

The Warren, Johnsville & Saline River R. R., Warren, Ark., has planned the construction of a 6-mile extension to its line, to the Saline river.

The Waterloo, Cedar Falls & Northern R. R. will build 24 miles of line from Urbana to Cedar Rapids, Iowa. On 6 miles of this the grading is now 80 per cent completed and the bridges have been erected.

The Waycross & Western R. R. will build 33 miles of road from Sirmans to Adel, Ga., on the G. S. & F. line.

The Wildwood & Delaware Bay Short Line R. R., Wildwood, N. J., will build 2500 ft. of new line.

Air Seasoning of Ties.

By WILLIAM H. KEMFFER, FOREST PRODUCTS LABORATORY, MADISON, WIS.
(Continued from page 74.)

FACTORS WHICH INFLUENCE THE RATE OF SEASONING.

Climatic and Meteorological Conditions.—The accelerating effect of warm, dry weather on the rate of evaporation and the retarding effect of cold or wet weather were seen very plainly in those seasoning tests which were started at different times of the year, and also in tests where the weighings were continued from one summer through the winter into the succeeding summer. Timbers which had become fairly dry ceased to lose moisture, or even gained weight, during the wet or the cold, damp weather. But timbers cut in the unfavorable periods showed a moisture loss during subsequent unfavorable weather, and by the time of the warm dry weather they had so far seasoned that the rate of loss was fairly constant throughout both periods.

The effect of climatic variations in the different places where the tests were made was less on the whole than the effect of the changes in a given locality throughout the year. Each locality had its favorable and its unfavorable

tions should also be taken into account. Thus in the case of a timber-treating plant drawing supplies from different parts of the country, it would be worth while to consider whether the timber should be held for seasoning at the plant or in the locality where cut.

Species and Form of Timber.—Variations in the rate of seasoning among species may be due to differences either in moisture content or in permeability of the wood. Of two pieces of wood differing in moisture content, other conditions being equal, the one with most moisture will dry the more rapidly, and in a comparatively short time both pieces will reach about the same condition. This rule does not apply strictly between different species, even when of similar structure, and in pieces of the same size and form, but with conifers the usual variation between the species does not seem sufficient to necessitate separate treatment.

Sapwood of the conifers contains, as a rule, very much more moisture than does the heartwood, and a difference

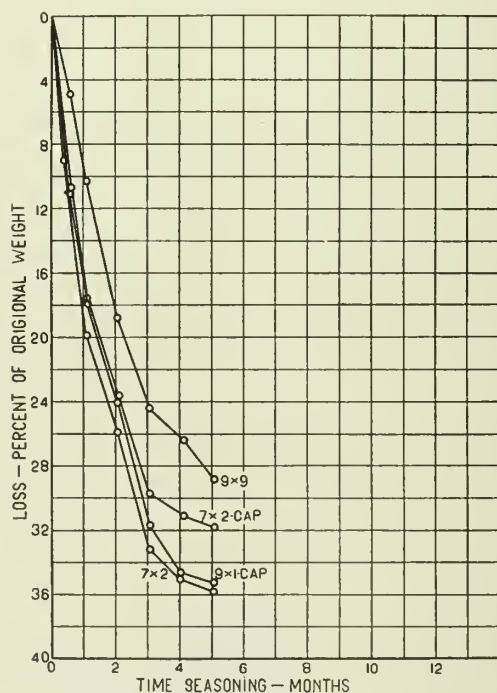


Fig. 22—Comparative Seasoning of 9x9, 9x1 and 7x2 Piles.
(Loblolly Pine Ties, Silsbee, Texas; Cut in March.)

periods. Although direct comparisons of climatic effects cannot be made because different species were studied in the different localities, the effect of hot, dry and long summers can be seen plainly in some of the curves. The curves for the New Mexico ties (Figs. 1 to 10) exemplify very rapid seasoning; those for Northern Michigan (Figs. 15 and 16) exemplify short summers and slow seasoning.

By considering the effect of the time of year on rate of seasoning, timber may be cut at such time as to obtain either slow or rapid drying. When timber is cut in one part of the country to use in another part, climatic condi-

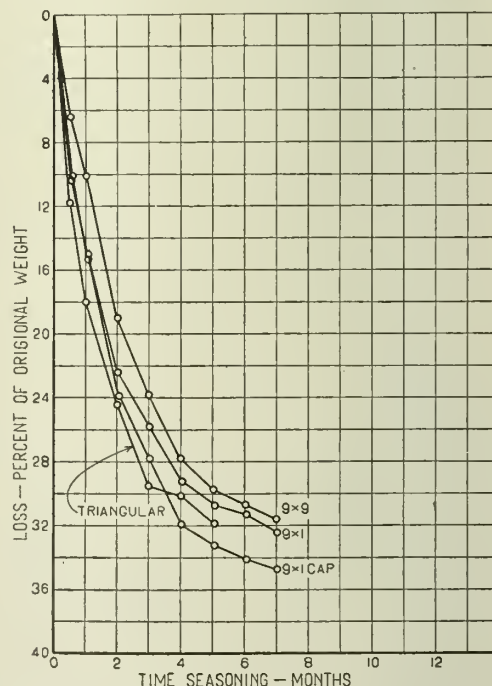


Fig. 23—Comparative Seasoning of 9x9, 9x1 and Triangular Piles.
(Loblolly Pine Ties, Silsbee, Texas; Cut in January.)

in the proportion of heartwood and sapwood in two timbers of the same species accounts for a large part of the difference in moisture content. But sapwood loses moisture more rapidly than the heartwood, and this tends to equalize the time required for the two pieces to become air dry. This fact is shown strikingly in the case of loblolly pine cross-arms of the heart, sap and intermediate grades. Although these three classes varied from 51.5 to 105.8 per cent in their average green moisture content, all grades were in practically the same condition five weeks after seasoning began. Furthermore, so far as the data pre-

sented afford a basis for comparison, ties of different coniferous species, all seasoned under the same condition, differed usually much less in time required to become air dry than in amount of moisture lost. As example of this, we may compare Douglas fir and "red" or "black" pine in New Mexico (Figs. 1 to 9 and especially Fig. 5). This rule is not true in all cases, however; tamarack from Northern Michigan, cut in winter, reached an almost constant weight

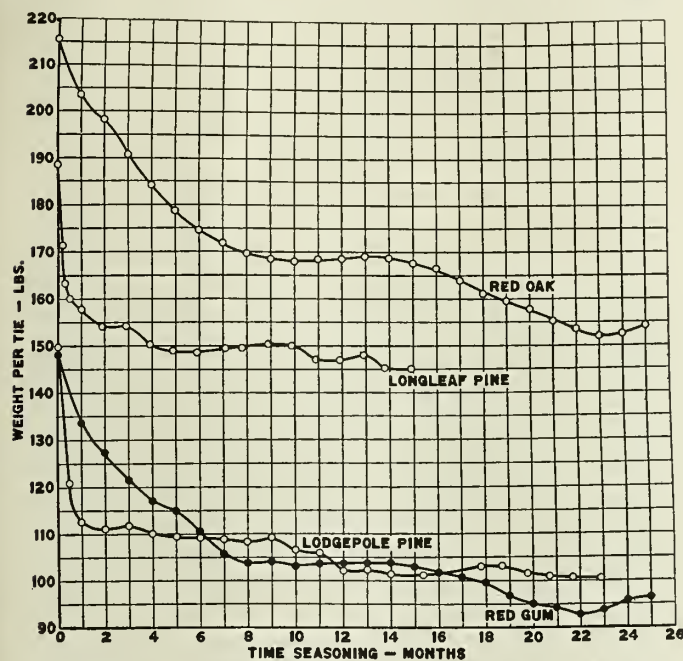


Fig. 24—Losses in Weight of Ties with Long-Continued Seasoning.

in 8 months (4 months after favorable seasoning weather set in,) but hemlock, cut in the fall, was still losing weight after 10 and 12 months' seasoning. Between the conifers and certain of the hardwoods the difference in the time required for seasoning is very great and the hardwoods also vary much among themselves. Chestnut and the oaks give up moisture slowly, while beech, birch and maple season somewhat more rapidly. But there is very little information on the rate of seasoning of these species.

The size of the piece influences the time required for seasoning, because it affects the relation of the volume of a timber to its surface area and the distance which the moisture on the interior must traverse to escape from the surface. This influence, however, is not as great as might be expected.

Manner of Exposure.—The extent to which timber is exposed to atmospheric influence has an important bearing on the evaporation of moisture from its surface. The exposure is affected chiefly by the manner of piling the timber. In many of the tie-seasoning tests various forms of piles were used, and it was found that the influence of the pile form on the rate of seasoning was very slight. However, these tests were made on isolated piles, usually of 50 ties each. If weather conditions are favorable isolated piles permit rapid seasoning, however closely the ties are stacked, but if the piles themselves are crowded together the influence of the form of pile undoubtedly becomes more pronounced. Even in the small isolated piles more difference was apparent. Figs. 22 and 23 indicate that the more open piles season more rapidly, although some of the differences shown are due to differences in the initial moisture content of the ties. The curves are based on loblolly pine ties seasoned at Silsbee, Texas.

The combined effect on the rate of seasoning of close piling of ties and retention of their bark is indicated by tests made on hemlock at Escanaba, Mich. Ties that had been in

the yard,* piled solidly with the bark on, in accordance with the usual practice at that time, weighed 40 lbs. per cu. ft. at the end of one year. The average weight of peeled hemlock ties in various isolated piles seasoned for one year ranged from 36 to 38 lbs. per cu. ft., and was usually between 36 and 37 lbs.

Attempts to determine the effect of the position of piles with regard to wind direction showed negligible results. On this point, it should be recalled that the conditions of exposure in the case of the single pile show far greater variation than in the case of an assemblage of piles in a crowded timber yard.

Site, too, has an important effect on seasoning. Chestnut poles in Maryland which were fully exposed to sun and wind lost 25 lbs. per pole more in 10 months than others partly protected by a hill and surrounding trees; and poles skidded over dry ground lost 35 lbs. more per pole in eight months than others skidded over ground which was wet and covered with rank vegetation.

It is axiomatic that the rate of evaporation varies with the degree of exposure to atmospheric influences. The form of the pile, its position with regard to prevailing winds, the "lay" of the ground, the presence of underbrush or trees, and the height of the timbers above ground all affect the rate of seasoning just in proportion as they hinder, or promote, free circulation of air and free access of sunshine. Rank vegetation, wet soil, or neighboring bodies of water affect seasoning by increasing the humidity of the atmosphere.

The retardation of seasoning by insufficient exposure requires, of course, carrying a larger stock of timber in the yard, and so involves higher interest and insurance costs. In case of timbers shipped after a given period, slow seasoning requires higher freight costs because of the greater

*The tie yard of the Chicago & Northwestern Ry.'s wood-preserving plant.



Fig. 25—Ties Piled for Rapid Seasoning, in 7x2 Form.



Fig. 26—Ties Piled for Rapid Seasoning, in 8x1 Form.

weight of water to be transported. Retardation of seasoning also extends the period of danger from insects or fungi which thus have more opportunity to attack the timber before it becomes immune by drying.

Soaking.—The extreme rapidity with which saturated wood loses moisture when exposed to drying conditions is doubtless responsible for the belief that the seasoning of timber may be facilitated by soaking it in water. In the tests to determine the effect of this process, timbers which had been soaked for short periods, upon removal from the water, lost the extra moisture so fast that they soon reached practically the same condition as similar timbers not immersed. Whether the soaked timber ultimately reaches a lower moisture content is still open to question. Hemlock ties at Escanaba, Mich., soaked 10 to 20 days, contained slightly more moisture at the end of one year than ties of the same lot which had not been soaked. Loblolly pine cross-arms at Norfolk, Va., soaked 10, 20 and 30 days, contained less moisture after five months than the unsoaked arms. The same is true at the end of one year for chestnut poles which had been submerged two weeks.

DETERIORATION OF THE WOOD WHILE SEASONING.

Knowledge of the factors which affect the rate of seasoning is important for the prevention of injury to the wood during the drying process. The complaint is not at all uncommon that cross-ties or other timbers of certain species, such as the soft pines, the gums, beech and maple, will decay before they will season. It is believed that this can be prevented usually by piling the timbers so as to dry

rapidly. The tree should be barked as soon as felled, and the timbers piled openly. Injury by insects may be prevented in the same manner.*

While quick seasoning prevents injury by decay and insects, it is not always necessary nor desirable. Timber cut and set drying in hot weather checks more seriously than in cold weather, and sometimes becomes "case-hardened" and very resistant to preservative treatment. Timber cut in the late autumn or winter seasons more slowly and evenly; if peeled and properly stacked, or skidded off the ground, it dries enough before warm weather to resist attack by insects or fungi. But whatever the time of cutting, careful attention is needed in piling the timber, either more openly or more closely, according as local climatic and other conditions are found to require.

The belief is prevalent that the difference in the behavior of timber cut at one time of the year from that cut at another is due to inherent differences in the condition of the wood itself. It is frequently stated that wood cut during the winter when the "sap is down" is of better quality or more durable than that cut when the "sap is up." These effects in themselves are doubtless real, but they must be attributed very largely to external conditions rather than to internal conditions of the tree before it is felled. Moreover, contrary to popular belief, a tree contains as much or more sap in winter as in summer. It was shown by early European investigations that the moisture content of trees is relatively high during January and February; during the spring, when transpiration (evaporation) through the buds of young leaves is active, the wood moisture decreases, although the conductive tissues are also more active and the sap flows more freely at this time. Later in the summer the moisture again increases because, perhaps, the mature leaves permit less evaporation; in the autumn months another period of lower moisture content occurs.† The time and extent of these fluctuations vary in different species, and doubtless also with conditions of the weather.

Degree of Dryness Attainable.—The term "air dry" has heretofore been used as a matter of convenience to indicate the lowest moisture condition reached by the various timbers. In most cases, further losses would have oc-

*For further information in regard to the prevention of injury to timber product by insects, consult the publications of the Bureau of Entomology, U. S. Department of Agriculture, particularly the following: Bulletin 58, Part V, "Insect Depredations in North American Forests." Circular 128, "Insect Injuries to Forest Products." Circular 156, "Insect Damage to Mine Props and Methods of Preventing Injury."

†From investigations by Hartig in "Die Technischen Eigenschaften des Holzes," by H. Nordlinger, 1860.



Fig. 27—Wrong Method of Piling Poles for Seasoning.



Fig. 28—Right Method of Piling Poles for Seasoning.



Fig. 29—Bridge Stringers Piled so as to Permit Air Circulation and Hasten Drying.

curred if the tests had been continued. In Fig. 24 the weights of lodgepole and longleaf pine, red oak and red gum ties are shown for periods of from 15 to 25 months. In the case of lodgepole pine in Montana seasoned for nearly 2 years, 75 per cent of the total loss of weight occurred within the first 2 months, and 97 per cent within 12 months. The curve for longleaf pine in Texas is similar to that for lodgepole; in a test lasting 15 months 91 per cent of the total loss occurred within 5 months, although the ties were still losing very slightly at the end of the test. The red oak ties were cut in Arkansas and seasoned for 2 years; they dried more slowly than the pine ties, only 75 per cent of their total loss in weight occurring within the first year. These ties were gaining weight when the last records were taken. This was on account of winter weather, but had the test been continued into the third summer, further decrease in weight doubtless would have occurred. Red gum ties seasoned for two years under conditions similar to the red oak lost within the first year 81 per cent of the total amount of water evaporated.

Seasoning After Treatment.—Curves (not here shown) were plotted to indicate the gain in weight of lodgepole pine ties during treatment with 3 per cent (approximately) zinc chloride solution and the loss during subsequent seasoning. The ties, which were air seasoned when placed in the cylinder, were subjected to steaming as a part of the treating operation, and gained, on an average, approximately 60 lbs. per tie. When last weighed, a little more than 2 months after they were treated, they were

3 lbs. heavier per tie than before the solution was injected. The same test was applied to ties treated without steam; the result was the same except that the increase in weight was 10 lbs. less per tie. All of this increase was lost by the end of the seasoning period employed in the first case. The results in both cases are based on two-truck loads of from 28 to 30 ties each.

Red oak ties, treated at the Forest Products Laboratory (Madison, Wis.), lost 61 per cent of the weight gained during treatment. These ties were treated with approximately 46 lbs. of 3 per cent zinc chloride solution per tie and were piled about 5 months in the winter and spring (from February to June). Hard maple ties under the same conditions gained 63 lbs. (2.5 per cent solution) per tie and lost 78 per cent of this amount. There are, however, no data which afford a comparison between these losses and the losses from green untreated ties under similar conditions.

Under some conditions at least the zinc chloride apparently retards the evaporation of water very appreciably, as shown by the fact that loblolly pine ties treated with a 2.5 per cent solution and seasoned 8 months at Lafayette, Ind., then weighed 3.1 lbs. more per cu. ft. than before they were treated.

SHRINKAGE.

The drying of wood is accompanied by a shrinkage of its volume which begins usually when all water has been evaporated from the cell cavities, and the cell walls themselves begin to dry out. When this condition is reached, the moisture content is, as a rule, less than 30 per cent but the moisture content in a large stick is not evenly distributed and the outer portions dry first, so some shrinkage occurs almost as soon as seasoning begins. Shrinkage tangentially is nearly twice as great as radially. Longitudinal shrinkage is so small that it may be disregarded.

Efficiency in Technical Education.

BY DR. W. F. M. GOSS.

The following remarks by Dr. Goss, which are abstracted from his recent presidential address before the American Society of Mechanical Engineers, clearly point out some of the leading deficiencies in our present system of technical instruction. The greatest of these is the absence in the teaching staff of men who are qualified leaders, not only in the engineering profession but gifted with the capacity of leadership among the students as well. This is largely due to the inability of most



Fig. 30—A Good Way of Piling Fence Posts.

institutions to pay sufficiently large salaries to attract and hold such men.

An attempt to outline the problems of the technical school must recognize the fact that great advances in any art or profession await the coming of great men. The modern need in the field of engineering is for men who can perform the exceptional task; whose qualities of character are so sound and strong that they instinctively perceive the way of truth and follow it, and who can rank with the world's great leaders in science and industry. The achievements of the technical school center in the quality and strength of its instructional staff. Great leaders in the work of the technical school are few, and the unfortunate fact is that throughout the years that are past, few men have been in training where the service now demands many. An important reason for this is to be found in the limitations which have been put upon the salary budget. The man who builds great bridges or who directs the activities of a great industry, is none too gifted to guide the efforts of ambitious youth, and hold before the student large ideals of life. And yet, in the industries a man may receive in a month an amount equivalent to the annual salary of many college professors.

It is clear to all who know the field that while the school must suffer some years to come, through its deficiencies in the past, a new policy should be entered upon as speedily as possible. It should be expressed in such terms as will convince the exceptional man, looking for a career, that it will be worth his while to prepare himself by study, by professional practice, by travel, by activities as a scientific investigator, by every process which can develop and broaden, for a life-work as a member of a college faculty. Few among American technical schools can today offer professorships which in themselves are sufficiently attractive to justify a young man in securing for himself so elaborate a preparation. The remedy cannot ordinarily be applied by the college itself; it must come as the result of interest shown at the sources of financial supply.

Not only is it required in the interest of higher efficiency, that the American technical school have an instructional staff of the highest possible quality, but it is also required that such a staff be not overburdened with routine duties. The American youth is greatly influenced by the personality of his instructor. While the exceptional student will view his problems broadly, will add his own personality to that which the professor gives, and thus work out large and vigorous conceptions, the normal student is as a disciple following a master; he admires the master's skill, he thinks in terms of the master's thoughts, and is very likely to be influenced by the master's limitations. If the engineering graduate sometimes degenerates into an animated slide rule, may it not be possible that he has been instinctively led to such a career through ill-conceived tread-mill processes in the classroom? If so, the remedy is to be found in reforming the work of the class-room, and one sure road to such a reform is that which opens the way whereby men of large caliber may have time in which to impress themselves upon their students.

Masterful leadership eliminates entirely the feeling once entertained by the students, that the instructor is a task-master, and that to be obedient to him, the student must perform the task. The great teacher, freed from the burden of excessive routine, may easily recognize differences in ability and will encourage the student who must plod and inspire to unusual performance the brilliant student who knows no limit to his achievement save his physical strength. Assuming the technical school to be in possession of an ideal instructional staff, the way will open for progress through many channels of secondary importance. It is altogether possible that in our present-day routine too much time is given to things which are simple. Much that is now studied

may perhaps be read. The habit of studying intensely a few books to the entire exclusion of the great mass of historical and biographical engineering literature affords the student but little opportunity of acquiring a habit of rapid and intelligent reading, which in itself is an accomplishment worth striving for.

The practice of the shop laboratory, the drawing-room, the surveying field and the study of descriptive texts, rightly interpreted, are important adjuncts in the training of the engineer, but the time has ceased to be when such activities constitute the chief characteristics of the technical school. Year by year the technical school has increased the emphasis given to processes which are mathematical. The progress of the next decade will be seen in the thoroughness with which high standards in such work are accepted and advanced. The intensive work of the course must be based upon fundamental theory, and the fields to which such theory is applied must be broadened. The engineering graduate is no longer required to be prepared to operate machines, but he must have a well-trained mind, and he must possess power to perfect his qualifications along any specialized lines in the shortest possible time. To this end, the years in college must be spent in acquiring an understanding of principles and in the development of those aspects of theory which are difficult to acquire after one's college days are over.

The technical school cannot content itself with routine service, it must enshroud its classroom and its laboratories with an atmosphere of scientific achievement; its professors should be leaders not only as classroom instructors, but nation-wide leaders, even world-wide leaders, in the complex and highly diversified fields of the science which they represent. The laboratories available for the use of such men should multiply. Every technical school should aid, as individual schools have already aided, in setting forth new interpretations of physical phenomena. The laboratory must be more than a shop, more than an engine room, more than a collection of testing machines. No great laboratory can be ordered ready-made. It cannot be produced in response to a decree. Whatever its dimensions or cost, it can be great only in so far as it reflects a purpose which is scientifically sound, and employs means which are scientifically correct. Its significance is necessarily limited to the qualities of the men who create and operate it. A laboratory which has been evolved through the activities and desires of a master is not only priceless for the school that possesses it, but necessary as a source of information of the highest value, to the field of practice which it is designed to serve.

Engineering Articles During the Past Month.

ISSUE OF DEC. 27, 1913.

New Passenger Station of the Michigan Central R. R., at Detroit, Mich.

Railway Sewers and Drains.

Specifications for 600-Volt Direct-Current Overhead Trolley Construction.

ISSUE OF JANUARY 3.

Block Signal and Interlocking Extensions in 1913.

New Car and Locomotive Repair Shops, Boston & Maine R. R., near Lowell, Mass.

Construction Work on the National Transcontinental Ry., of Canada—Part I.

Review of Railway Engineering During the Year.

Railway Construction in 1913.

Auxiliary Track Built in 1913.

New Construction for 1914.

ISSUE OF JANUARY 10.

Roger's Pass Tunnel, Canadian Pacific Ry.
Control of Shifting Sand, Southern Pacific Co.
Signal Instruction on the Chicago & North Western Ry.
The Engineering Problem of Electrification.
Air Seasoning of Ties.
Program for the Convention of the Wood Preservers.

Wreck of a Passenger Train on the Mobile & Ohio R. R.

Collapse of a pile trestle bridge under a derailed train. The bents were sway braced but the structure was not braced longitudinally. As usual, derailment started with the tender wheels and these bunched the ties. The bridge had guard timbers but no guard rails.

Mr. H. W. Belnap, chief inspector of safety appliances for the Interstate Commerce Commission, has made a report covering his investigation of a passenger train accident that occurred on a bridge of the Mobile & Ohio R. R. near Buckatunna, Miss., Oct. 19, 1913. This wreck resulted in



The Buckatunna Bridge and Train Wreck, Mobile & Ohio R. R.

the death of 17 passengers, and injury to 139 other passengers and 6 employees.

The train was the second section of a northbound train and consisted of 1 baggage car and 3 coaches. The baggage car had a steel underframe while the coaches were all of wooden construction. This train was conveying a detachment of troops from Fort Morgan, Ala., to the Alabama-Mississippi Fair at Meridian, Miss. It left Mobile, Ala., at 12:03 p. m., passed State Line, the last telegraph station south of the point of derailment and nearly 5 miles distant therefrom, at 1:45 p. m., and at about 1:50 p. m. was derailed at a point about 300 ft. south of bridge No. 67-B, which was about 3 miles south of Buckatunna.

The engine was not derailed and passed over the bridge, coming to a stop at a point 932 ft. beyond the initial point of derailment. The tender, the forward wheels of which were the first to leave the rails, remained on the roadbed until the bridge was reached. It is probable that the de-

railed wheels of the tender bunched the ties, so that the wheels of following cars fell through the bridge causing the whole structure to collapse under the weight and momentum of the train. In the meantime the tender had broken away from the engine and come to a stop on the outside of the curve at a point about 350 ft. south of the engine. Sixty feet south of the tender the baggage car came to rest with its forward end jammed into the bank of the creek. This car was badly damaged. The three coaches lay immediately behind the baggage car, the rear end of the first coach being telescoped by the forward end of the second coach for a distance of about 10 ft. All of these cars came to rest on their right sides, and on the outside of the curve.

The illustration shown herewith is a view looking in the direction in which the train was moving and shows the position in which the coaches came to rest after the collapse of the bridge. All of the coaches were so badly damaged as to be practically destroyed. The greatest loss of life occurred in the baggage car and in the first coach, only one passenger being killed in the third coach. In the baggage car many of the casualties were caused by an iron express safe and the heavy baggage and equipment of the troops that was thrown from one end of the car to the other by the shock of the derailment. The speed of this train at the time of the derailment is supposed to have been about 55 miles per hour.

The bridge in question was located in about the middle of a curve of 3 deg. 750 ft. in length. It was of wooden construction 225 ft. in length and 24 ft. above the ground at its highest point. It had 19 pile bents, made up of from four to six piles each. Two-ply stringers, 8x16 inches, were used, drifted to each cap with three-fourth-inch bolts. The bridge ties were 7x8 inches, 10 ft. in length. The second, third and fourth bents on each end were sway braced, and the eight higher bents in the center were double braced. The guard timbers were 7x8 inches, 20 ft. in length, located at a distance of 16 inches from the outside of the head of the rail, being fastened by lag screws to every second tie.

As examination of the track at point of derailment and running gear of the tender revealed no defects, it was concluded that the cause of the derailment was excessive speed. Two witnesses who were riding the rear end of the train at the time of the accident and were holding a watch, testified that the last mile before the point of derailment was reached, was made in 64 seconds and that the speed of the train was increasing. The curve on which the derailment occurred (3 deg.) was elevated to 3½ ins., which the inspector thinks was insufficient for the speed at which the train was traveling.

Mr. Belnap states that out of 16 derailment wrecks investigated since July 1, 1911, eleven were "tender derailments", forward wheels of the tender being the first to leave the rails, and he concludes with the following remarks:

"Derailments of this kind form one of the most perplexing problems with which operating and mechanical officers have to contend. They result from a number of causes, and often occur under such circumstances that the real cause is never definitely determined. On account of its comparatively short wheel base and high center of gravity, as well as the movement of water in the cistern, surging back and forth and from side to side, the tender is subjected to forces with which it is particularly difficult to deal and which are aggravated by any irregularity which may exist in the track. Derailments of this kind occur more or less frequently on every large railroad in this country. Such derailments should be given the closest possible study with the view of definitely ascertaining their causes and of eliminating them as far as practicable."

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WILLARD A. SMITH	- - - - -	President and Manager
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W. M. CAMP	- - - - -	Editor
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Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, JANUARY 17, 1914.

The bottom factor in the iron and steel situation is the known existence of a very large volume of withheld requirements and a secondary influence is the unwillingness of manufacturers to book large orders for future delivery unless at a pronounced advance, excepting of course steel rails. Quotations for quite a number of products have nominally advanced one dollar per ton. Liberal car orders have been placed within the week. More orders are in sight. Production has turned a corner upward and an output of 60 per cent is in sight. The general tone of the steel industry has sufficiently improved within a week to impart confidence and to draw out quite a number of inquiries for belated requirements.

While commercial organizations all over the country are still passing resolutions favoring the five per cent rate increase in the official classification territory and

deprecating delay, the Interstate Commerce Commission has decided to hear the protests and arguments of disgruntled shippers against the increase on special commodities. It was hoped that the Commission would not hold back the general question for individual cases which can be heard at any time. But it has decided that the swarm of traffic lawyers must be heard and it will let them talk while the railways are getting in their answers to the 78 questions. The hearing may thus be prolonged all summer as one shipping interest after another slips in and talks and talks. Meantime while the railways from policy are keeping quiet regarding the situation, the business public in getting warmer and warmer "under the collar." It knows that neither the answers to the Brandeis questions nor the protests of selfish individual interests will have any real influence in this decision; and it cannot quite see the justice of keeping business in chancery indefinitely, while coal, coke, cement, brick, shoe and other men hold a lawyers' talk-fest.

Double Track in the West.

Although the construction of new railroad in this country has not been progressing by leaps and bounds during the past few years, it is well not to lose sight of the important increase in the traffic capacity of existing lines. Two weeks ago we commented in these columns on the relatively large increase of mileage of railroad equipped with automatic block signals during the past year, and it is generally conceded that block signals, particularly of the automatic type, operate to increase traffic capacity. Yard tracks and sidings are very properly classed in the same category, but what it is desired to lay some emphasis upon at this time is the continual increase in mileage of second track; or, to put it in the most familiar way of speaking, increase in length of double-track railroad. This increase is all the more noteworthy from the fact that, from the standpoint of proportionate mileage, the single-track railroad is still the predominant type in the United States.

While the increase in length of second track has been largely confined to the territory east of the Missouri river, it is to be noted that several of the transcontinental lines have a considerable mileage of second track west of that dividing line, and one of them, the Union Pacific R. R., now has a relatively large percentage of its line double-tracked.

The progress of second track extensions in the thin-traffic plains and mountain territory is deserving of some comment. Two decades ago there was not much double-track road between Chicago and the Mississippi river, and but little or none west of that stream; and it is only about 10 years ago that double track reached the Missouri. At the present day the end of double track on the Union Pacific R. R. is more than 500 miles west of Omaha, with upwards of 200 miles of additional second track in stretches beyond. To be specific,

the Union Pacific R. R. is now completely double-tracked as far as Cheyenne, Wyo., 516 miles west of Omaha, and there are only relatively short gaps of single track between that point and Granger, 338 miles farther. Granger is only 146 miles from Ogden, and Ogden is just 1000 miles from Omaha. There is a considerable stretch of double track between Granger and Omaha. Altogether the mileage of second track on the Union Pacific is 727 miles, while on its connecting lines, the Central Pacific and Southern Pacific, the mileage is more than 200 additional. Coming eastward from San Francisco, nearly all of the Southern Pacific and the Central Pacific lines are double-tracked to Colfax, 143 miles from San Francisco, and through the state of Nevada there are considerable stretches of double track. The Atchison, Topeka & Santa Fe Ry. has one stretch of more than 200 miles of second track west of Kansas City, with relatively shorter pieces at other points. The Northern Pacific has a considerable mileage of second track between Tacoma and Portland, and at some other points west of Mandan, although the whole of it is but a small percentage of its transcontinental mileage.

While this 1200 miles or more of second track lying west of the Missouri river constitutes but a small percentage of the aggregate length of transcontinental line in that territory, it is, nevertheless, indicative of large traffic growth during the past decade. During that period three new transcontinental lines or parts of transcontinental routes have been built, by the Chicago, Milwaukee & St. Paul, the Western Pacific and the San Pedro, Los Angeles & Salt Lake companies, and all of these have become important factors in the competition for transcontinental business. An era of local development has now well set in, and feeder lines, especially in the Northwest, are being built or extended in all directions. Every acre of land reclaimed from the desert will contribute in some way to swell the aggregate movement that must find an outlet over the main routes, and the growth of the next ten years will no doubt make it necessary to add a second track to a large mileage of existing single-track road in the western half of the United States.

The Cost of Delaying Repairs.

There are probably something like two hundred thousand freight cars on bad order tracks or in shops at the present time. As traffic is generally light and no one knows just when it will get active again, car repairing has been generally stopped. By doing this the current outgo of expenditure for maintenance is reduced; but is it good policy?

Let us see! Labor is just now fairly abundant and work is needed. By stopping these repairs, good men are laid off and are obliged to seek other employment. When they are needed again the railway manager will be disposed to grumble because he has to take every-

thing that comes along. There will never be any reliable mass of railway employees which the roads can be proud of, until this "taking on" and "laying off" is utterly abolished or reduced to a minimum. It is a hardship to labor and a real detriment and expense to the employer. By going along steadily and repairing all equipment which needs it, the railway company may lose a little interest on money, but it is a mere bagatelle compared with what it saves.

In dull times material is cheaper, there are less annoyances and expense due to delayed deliveries, and if labor is not cheaper per diem it is very much more efficient. Those bad order cars can be repaired probably to-day, at one-half the real cost which will be incurred when the order goes out "Hurry up, and get everything into commission!" Then materials will be bought on rising markets and time and money wasted in waiting for them. Labor will be scattered and such as is hurriedly obtained will be poor and unreliable. It will be worked overtime, nights and Sundays, at higher rates. The cars will be shoved out as fast as may be with a lot of makeshift repairs. There will be an insufficiency of tools and room for doing work right.

We have known where repairs made under rush conditions after a period of accumulating bad order, rust and decay, have cost three times per car what they would have cost if the work was distributed through dull times as well as good. This is not a theory—it is simple fact—and as we have said before, maintenance of equipment probably costs during any given series of years twenty-five per cent more than it would cost under a plan of "keeping everything up as you go along." The policy which is so nearly universal is one of shiftlessness. We are told that it is imposed upon the management by the bankers, who insist that expenditures shall always be cut to meet declining traffic. The result is that railways are always buying on the highest market and bidding the market up on themselves.

Another result is unpreparedness, when business comes on. Then as it takes time to repair equipment, everybody rushes into the market to buy and get early deliveries. The market goes up under natural laws because everybody wants equipment and materials at the same time. Hence we have an alternation of fat years and lean years for the manufacturers—and the railways pay for it, both in actual money and inferior quality in what they get.

Railway managers would from the standpoint of real efficiency be thoroughly justified in demanding from their directors, or their bankers, if you please, two special things. The companies are under-officed; they need additional supervision. This means more brains and brains cost money, but earn vastly more than they cost. Then they need more working capital; that is, they need to be free from immediate financial stress in considering what shall be done with

the property. Capital used in keeping everything in good shape right along, day by day, will earn big interest.

A state of preparedness at all times is worth a great deal. "In time of peace prepare for war!" In time of dull business prepare for the days of car shortage and general congestion! Insure steady work for your shopmen and you can keep good men; and a good force of shopmen is a mighty big asset.

Some managements claim to do all this; but we read of these same roads putting on thousands of additional men on repair work at a time when big crops are imminent. We doubt whether the policy is developed on many roads as it ought to be; although there are great differences. We have read in the annual report of a "standard" road that equipment had been fully kept up during the fiscal year, and two months later have read that more than ten thousand men were added to the force at work on repairs on the same road in a single month. And the cost of locomotive and car repairs per mile run and per ton mile continues to go up; and to increase in a greater ratio than wages or materials.

The same remarks are applicable to maintenance of track. "A stitch in time saves nine" and saves a lot of trouble besides. If the engineering force had an

allotment of a maintenance fund to be expended during a year, it could so divide its work as to get vastly better results. There are necessarily seasons in this work and track repair cannot be done equally well at all times. If replacements are not made at the proper time there will be loss and even danger. Rails and ties should be laid in time to get their bearings and be thoroughly tamped before the ground freezes. Yet the time for doing this work is generally determined by financial considerations. The closing of the fiscal year in the middle of the calendar year has been responsible for much of this wasteful delay. Engineering work ought not to be treated in this hap-hazard way—neglected for months or a year and then hurried up. The record of expenditure for maintenance of way and structures for a few years, will show how it fluctuates. The management knows that this is bad policy; but it is under orders to cut its garments by a varying supply of cloth. Adequate working capital kept available and not drawn on for other purposes would make it possible to readjust this unbusinesslike and unscientific policy. And yet it is to be feared that some managements which are not under the financial harrow at any time, get into this habit of reducing or increasing maintenance expenses according to the financial weather cock.

Opinion on Railway Subjects.

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Stringent Regulation Makes Money for the Bankers.

"Obviously, the more stringent the rulings of the commission and the more exacting the laws as to regulation and taxation, the poorer the credit of the railroads affected. The poorer the credit of the railroads becomes, the higher the commission charged by underwriting syndicates and the greater the profits of the bankers. For some decisions of the commissions that have been most popular, the bankers might be most thankful.

* * * * *

"I hold no brief for the railroads, or the bankers, but as a citizen and a business man interested in a sane solution of this difficult problem I call attention to one phase of the subject which may not have been considered sufficiently by those in power—that is, the people and their legal agents.

"Do they fully understand that Wall street is now the reaper of a big harvest, and, while undoubtedly deploring the general tendencies, making hay while the sun shines?

"Do these commissions, state and national, realize that large profits are accruing to bankers as one result of their stringent decisions in favor of lower rates or against legitimate advances?"—John V. Farwell, Chicago Merchant.

Freight Rates and Cost of Living.

"The railroads are now the most poorly paid of all the agencies of distribution. To pay them a little more will make a very little difference in the cost of any article. The Lehigh Valley Railroad has gone extensively into this matter. We have examined the effect of freight rates on the cost of living and have found that it is too small to be considered. Under present rates the railroads get five cents

at the most from the dollar spent by the final consumer. Increase that by 5 per cent. and the difference is so small that it cannot be counted into the price. The cost of living cannot be affected in either direction by freight rates.—E. B. Thomas, president, Lehigh Valley R. R.

Rates Not Governed by Capitalization or Valuation.

"It would be impossible to fix actual value, for this depends upon earning capacity, and earning capacity depends upon the rates that can be charged. Rates upon competitive traffic must be the same upon all lines, irrespective of their original cost or value of reproduction. To adjust the rates of prosperous lines in such manner as to permit them to earn only a fair return upon their original cost, or their cost of reproduction, would ruin many of the less prosperous companies. On the other hand, it would not be fair to the public, or practicable, to adjust rates in such manner as to make all lines profitable to their owners.—Victor Morawetz, Norfolk & Western Ry.

Government Ownership Not Inevitable.

"Government ownership does not necessarily follow immediately the reluctance of the Government to permit increased rates. Other recourses might be the decrease in the class of service furnished decreases in wages and a retrograde movement in the development of the country. This is something which no one wants, and it is not believable that the American people will force the railroads to such an extremity to avoid bankruptcy. If the Government or any one can devise means by which the railroads can continue to render efficient service and borrow at reasonable rates

the money required for expansion, the railroads would gladly adopt the methods."—A. H. Smith, president, New York Central R. R.

Government Power to Ruin.

"The most conclusive argument in favor of the proposed increase is that two and two have, up to this writing, always failed to make five. The Government has it in its power to first ruin the railroads and then buy them. Whether it proposes to pursue this policy I cannot say, not being in its councils. It is certain that the present condition of things cannot continue."—E. P. Ripley, president, A. T. & S. F. Ry.

Rigid Condition Prevailing.

"To my mind, the favorable feature in the railway situation is that people are discussing it with greater understanding and with more apparent fairness. The specially unfavorable feature is the inelasticity in railroad operation enforced by the requirements of law and the demands of the public for service and of labor organizations for wages and working conditions, which make it almost impossible for railway managers to adjust their expenditures to declining earnings."—C. E. Schaff, president, Missouri, Kansas & Texas Ry.

Valuation and Rates.

"Probably, upon the whole, it is a good thing to have a Federal valuation of the American railroad system. Undoubtedly, it will show that the railroads are not only worth as much, but more, than their existing capitalization, when considered as a whole. I do not expect, however, that the railroads will be permitted to advance their charges, because of that fact; and, if I am right, nothing will be gained by a physical valuation to use as an argument for reduced rates."—Daniel Willard, president, Baltimore & Ohio R. R.

If Government Can't Regulate Successfully, Can It Operate?

"If the argument is made that Government ownership should come because public regulation is a failure, it is a curious reasoning to suggest that the same instrumentality that has made a failure of public regulation should be entrusted with ownership and operation."—F. A. Delano, president, Chicago, Indianapolis & Louisville Ry.

Increased Deficit

"The fundamental question confronting us now is, How are we going to continue our programme of development if we cannot earn a fair return upon the money invested in the property? The Long Island Railroad has not paid a dividend to its stockholders in twenty years, and the outlook is that our financial statement for the year just ending will show an increased deficit, rather than a decreased deficit or a surplus, which, of course, is very discouraging to the management."—Ralph Peters, president, Long Island Ry.

On the northern district of the Southern Pacific Co., of which D. W. Campbell is general superintendent, there is as unique a crew of track cleaners and police as could anywhere be found. The members are neither Americans nor foreigners. The crew is a crew of crows. The birds have builded their section nests near Hornbrook, Ore., and fat and sleek, live off the generosity of passengers and dining car employees of the Southern Pacific. When the trains arrive at Hornbrook the

crows leave their roosting places and circle above the depot. When the limited trains pull out the birds follow them for five or six miles. Scraps are thrown to them and they devour every bit, policing the tracks and acting as scavengers. The section men and other employees of the railroad realize the work the birds do and prevent them from being molested. Trains crossing the Great Salt Lake are followed by seagulls, the latter, like the crows, feasting on the scraps thrown them from the diners.

Secretary Lane on Alaskan Railroad Building.

Franklin K. Lane, secretary of the interior, in his annual report to the President, outlined several bold proposals regarding the development of the resources of the country. Two of his principal topics were Alaska, federal construction of railroads and development of coal fields there, and the government's public land policy.

"The largest body of unused and neglected land in the United States," said Secretary Lane, "is Alaska. In the 46 years intervening since its purchase we have given it little more than the most casual concern, yet its mines, fisheries and furs alone have added to our wealth the grand sum of \$500,000,000. Individual fortunes have been made in that country larger than the price paid to Russia for the whole territory. It has been estimated that there are 50,000,000 acres of this land that will make homes for a people as sturdy as those of New England.

"This vast and unsurpassed asset lies almost undeveloped." This "unfortunate condition," in Secretary Lane's judgment, is not due to "the inhospitality of the Alaska climate," because "some of southeastern Alaska has a climate more temperate and more equable than that of the city of Washington." "Why has not this land been developed? The frank answer is that we did not realize until within a few years that it was worth developing. We have withdrawn Alaska from the too aggressive and self-serving exploiter. What have we to substitute as a safer servant of public interest? To this question I have given much thought, and my conclusion is that if we are to bring Alaska into the early and full realization of her possibilities we must create a new piece of governmental machinery for the purpose.

"We should undertake the work in the spirit and after the method of a great corporation wishing to develop a large territory. In my judgment the way to deal with the problem of Alaskan resources is to establish a board of directors to have this work in charge. Congress should determine in broad outline the policies which this board in a liberal discretion should elaborate and administer, much as is done as to the Philippines."

In concluding his reasons for the creation of such conservation machinery for Alaska, Secretary Lane says:

"Alaska has the potentialities of a state and whatever policy may be adopted should look toward an Alaska of homes, of industries and of an extended commerce. Those things which appeal to me as of immediate necessity, upon which independent action may be taken, are, first, the construction of railroads in the territory, and, second, the opening of her coal lands."

"The rates and services of railroads proposed to be built by the government should be fixed with reference to Alaskan development—not with regard to immediate returns. If this is our task it should be done whole-heartedly and with a consciousness that the dollar spent today on an Alaskan railroad will yield no more immediate return on the investment than the dollar spent on the Panama canal."

Discussing the coal resources of Alaska, Secretary Lane declares the fields "should be opened not to speculators, but to operators. Those should have these lands who will use

them. None should be opened as a basis for a gamble in future values. It is certainly not for the public interest," the report says, "that our coal deposits shall be opened rapidly and ruthlessly." As to oil he says: "We should, I believe, stimulate the search for oil and in the event that oil is found in commercial quantities the government should be paid a royalty fixed in advance."

Secretary Lane expresses frankly his dissatisfaction with the operation of the homestead law as to the timber lands. He says the "homesteader," after getting patent to the land, promptly sells it for \$10,000 or \$20,000 to some lumber company without making an effort to comply with the spirit of the law. Thus the government "loses the timber and the

land and does not gain a real home maker. Such homesteaders should be punished, in fact, as frauds. There is a remedy for this condition of things, and it lies in the selling of the land and the timber separately."

Much attention is devoted in the report to consideration of the reclamation of arid lands. Discussion of the subject is replete with interest to the farmers who locate on the various projects. "The west can use profitably and wisely \$100,000,000 in the next ten years to the advantage of the whole country. If the government will place upon a leasing basis these western resources, with which we have been dealing, it can have an increased fund for the continuance of this work and an increased assurance of the return of its advances."

Centralized Control System, Panama Canal Locks.

The machinery which operates the Panama canal locks, and the electric system which controls it, constitute one of the most remarkable pieces of engineering ever executed. The job is the largest of its kind, the electrical apparatus was all built especially for this installation, and its design and manufacture has occupied engineering talent for several years. A description of the power equipment, the operation of the locks, the control boards and the mechanical interlocking.

Operation of the locks, terminals and auxiliary equipment of the Panama canal utilizes electrical energy throughout, with the present exception of the Panama Railroad, the electrification of which is under contemplation. The power system as a whole, includes the following elements:

A 7500-kva. 2200-volt hydroelectric power plant at the Gatun dam.

A 4500-kva. 2200-volt Curtis turbo-generator electric power plant at Miraflores for emergency, lately used to supply power for construction work.

A double 44,000-volt transmission line across the isthmus, connecting Cristobal and Balboa with the two power plants.

Four 44,000 2200-volt substations, stepping down at Cristobal and Balboa, and up or down at Gatun and Miraflores, depending on which of the two plants is supplying power.

Thirty-six 2200 240-volt transmission stations for power, traction and light at Gatun, Pedro Miguel and Miraflores locks.

Three 2200 220-volt transformer stations for the control boards at the locks.

Stations at Cristobal and Balboa for coal handling plants, machine shops and dry docks.

The most important concentration of apparatus, it will be noted above, is at the three locks. For the sake of operating expediency the machinery at these places was placed below the coping of the lock walls, thus affording a clear space for maneuvering ships and protecting the apparatus from the weather without erecting numerous houses.

The Locks.

The mitering gates consist of two massive leaves pivoted on the lock walls which operate independently of each other. A pair of gates is located where each change of level occurs and divides the locks into 1000-foot chambers. In addition to these gates, at lake and ocean ends are duplicate pairs of gates used as guard gates. To handle the vessels of various sizes with the minimum use of water mitering gates of the same description as those above are installed, dividing 1000-foot locks into two compartments. These gates are termed intermediate mitering gates. When the mitering gates are closed they are what might

be termed clamped in this position by a device called a miter forcing machine.

The chain fenders are stretched across the canal in front of all mitering gates which can be exposed to the upper lock level and also in front of the guard gates at the lower end. These chains are maintained in a taut position when the gates behind are closed, and are lowered when the gates are opened for the passage of a ship. The chains are raised and lowered by a method similar to that followed in hydraulic elevators, with the additional feature that if a ship approaches the gates at a dangerous speed and rams into the chain, the chain is paid out in such a way as to gradually stop the ship before it reaches the gates. Lowering the chain for the passage of a vessel and raising it again after the vessel has passed is accomplished by two motors; one driving the main pump supplying water under pressure, and the other operating a valve controls the direction of movement of the chain. These two operations are combined in one, each motor being stopped automatically by a limit switch when the motor has performed its function.

The filling and emptying of the locks is accomplished by three culverts, one in the middle wall and one in each side



Control House at Gatun, Panama, Where Lock Control Board Will Be Installed.

wall, the flow of water being controlled by rising stem valves. They are located in the culverts at points opposite each end of each lock so that the culvert can be shut off at any desired point for filling a lock with water from above, or upstream, or for emptying it by allowing it to flow out and down to the next lock. Lateral culverts conduct the water from the main culverts, under the lock chambers, and up through openings in the lock floors.

The rising stem valves are installed in pairs, and each pair is in duplicate; also each culvert is divided into two parallel halves at these valves by a vertical wall. This arrangement reduces the size of each valve and makes it more easily operated, each valve being 8 by 18 feet. One pair of duplicates is left open as a guard, or reserve pair; the other pair is used for operating, so that in case of an obstruction in the culvert or accident to the machinery, the duplicate pair can be used.

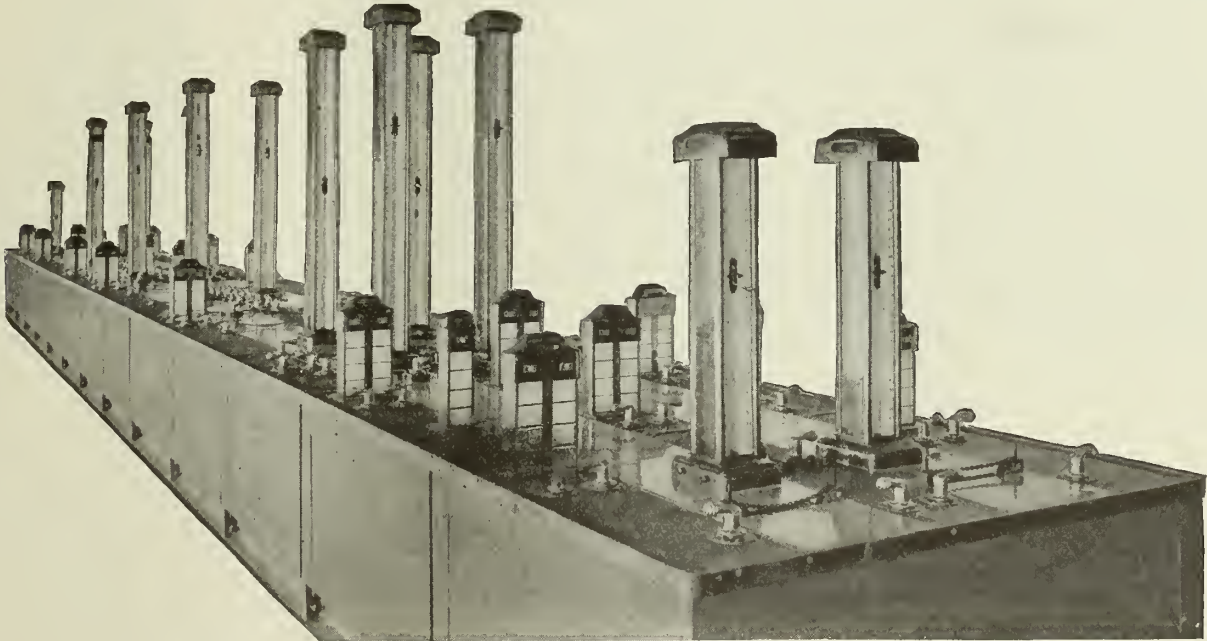
At the upper ends of the culverts at the side walls, the duplication is accomplished by three valves in parallel, called the guard valves. They perform service exactly similar to the rising stem valves, except that three valves in parallel in this case must conform to the same laws as the two in parallel in the other case.

The culverts in the middle wall must serve the locks on both sides, and to control this feature cylindrical valves are

2220-volt buses in the 44,000 2200-volt substations can also be operated from the power plants; the stations at Gatun locks, from the Gatun hydroelectric station; and the stations at Miraflores and Pedro Miguel from the Miraflores emergency steam plant. To give an idea of the number and sizes of motors to be controlled in operating the lock machinery, the following table is interesting. Many of the smaller auxiliary motors are not included:

Machines and operation.	Motors, each Machine h. p.	Number of Motors.				Total h. p.
		Gat.	Ped.	Mira.	Total.	
Miter gate, moving each leaf.....	1-25	40	24	28	92	2300
Miter gate, miter forcing.....	1- 7	20	12	14	46	322
Fender chain, main pump.....	1-70	16	16	16	43	3360
Fender chain, operating valve 1 ½		16	16	16	48	24
Rising stem gate valve.....	1-40	56	24	36	116	4640
Cylindrical valve	1- 7	60	20	40	120	840
Guard valve	1-25	6	6	6	18	450
Auxiliary culvert valve	1- 7	4	4	4	12	84
Totals.....		218	122	160	500	12020

As the flight of locks at Gatun, for example, extends over approximately 6200 feet, and the principal operating machines are distributed over a distance of about 4000 feet, it can readily be seen that central mechanical transmission of control of machines would be almost impossible; and to



Centralized Control Board for Miraflores Locks, Panama Canal.

placed in the lateral culverts that branch out on each side. There are ten of these on each side of the culvert at each lock.

At the upper end of each set of locks, there are two valves in the side wall for regulating the height of water between the upper gate and upper guard gate, as it is desired to maintain the level of the water between these gates at an elevation intermediate between that of the lake above and that of the upper lock when the upper lock is not at the same level as the lake. These valves are called the auxiliary culvert valves.

Electrical Lock Machinery.

Current for the lock machinery and towing locomotives is transformed from the 2200-volt system in the immediate vicinity of where it is used. There are as noted above a total of 36 transformer stations for all locks, each containing duplicate 200-kva. 3-phase 2200 240-volt transformers for power, and one single-phase 25-kva. 2200 220,110-volt transformer for lighting. The stations, normally fed from the

control the machines locally would mean a large operating force distributed practically along the full length of the locks, which has invariably been the practice heretofore. Such a force would be difficult to co-ordinate into an efficient operating system. The situation therefore resolved itself into centralized electrical control, which reduces the number of operators, operating expense, and liability to accident. To accomplish this system of control, a control board for each lock was constructed which permitted having all control switches located thereon mechanically interlocked so as to minimize, if not entirely prevent, the errors of human manipulations.

Centralized Control and Indicating System.

The control boards are installed in control houses located on the middle walls at points which afford the best view of the locks, although this view is not depended on to know the position of the gates or other apparatus, as all are provided with the indicators on the control board. The control boards are approximately operating miniatures of

the locks themselves, and are arranged with indicating devices which will always show the position of valves, lock gates, chains and water levels in the various lock chambers; and with the exception of such machinery as needs only an "open" or "closed" indication, the indications will be synchronous with the movement of the lock machinery.

The indicators were developed especially for this undertaking and show accurately and synchronously every movement of the machinery to which they are connected, whether in the extremes of travel or at any intermediate point. A complete synchronous indicator consists of a transmitter located at and operated by the machine in the



Mitering Gate Indicator, Panama Lock Control System.

lock wall, and a receiver operating an indicator at the switchboard in the control house. Both transmitter and receiver have a stationary and a rotating part. The receiver rotor follows closely and smoothly the movement of the transmitter rotor, and consequently imparts to the position indicator a movement identical with the movement of the lock machine, although on a scale reduced to the requirements of the control board.

The mitering gate indicator comprises a pair of aluminum leaves, shaped to correspond to the plan view of the top of the gate, which travel horizontally just above the top of the board, the hinge ends being connected to shafts extending down through the surface of the board where they are geared to the receivers by means of bevel gears. When the miniature gates are completely opened, they are covered by shields to give the effect of the gates folding back into recesses in the lock walls.

For the chain fender the indication on the board is given by a small aluminum chain, which, like the large chain, is raised and lowered, each end operating independently, the large chain being lowered to the bottom of the lock and the small chain into a slot on the control board. The ends of the miniature chain are fastened to semaphore arms which are connected to segmental gears meshing with the driving gears on the receiver machines. As the receiver rotors turn, the chain is either lifted or lowered, the position of the large chain from the bottom of the lock being indicated by the angle of the semaphore arms.

As the rising stem valves occur in pairs, their position indicator occurs in pairs also. Each indicator is similar to a small elevator, a car being used to indicate the position of the valve gate. To make the indications visible from points up and down the control board, the elevator shaft under each car is always illuminated and the portion above is dark.

The specifications covering the water level indication required an accuracy of 1-20 of a foot, or 1-10 of 1 per cent. in actual water level. The required accuracy was obtained by two sets of transmitters and receivers, one set connected to a fine index, and the other set connected to a coarse index. The fine index is a hollow cylinder carrying a pointer, the length of the cylinder being such that when

an aluminum ball representing the coarse index, which can be depended upon for coarse indication, is within the limits of the cylinder, the reading of the fine index is correct within the limits specified. The scales are illuminated by lamps in both base and top caps of the indicator.

The position of the miter forcing machine is not indicated by synchronous indicators, but its open and closed positions are shown by red and green lights and a mechanical indicator on the control board representing the machine.

Control Boards and Mechanical Interlocking.

The control boards are of the flat top benchboard type, 32 inches high by 54 inches wide, built in sections, with total lengths as follows:

Gatun	.....64 feet
Pedro Miguel	.....36 feet
Miraflores	.....52 feet

The side and center walls of the locks are represented by cast iron plates and the water in the locks by blue Vermont marble slabs. The outer edge of the board is surrounded by a brass trim rail, and the sides are enclosed with steel plates which can readily be removed for inspection of the board. The control board is supported by a wrought iron framework resting on base castings, which are in turn supported on the operating floor of the control house.

The control switch handles are mounted above the surface of the board and operate through an angle of 90 degrees. They are provided with name plates for the "open," "closed" and "off" positions. The space immediately below the flat top of the control board is occupied by the contact fingers of the control switches, mounted on the operating shaft, synchronous receivers and their cable connections. Connection boards are provided for the cables, which are led up from each side, as are buses for supplying current to the control switches, receivers and the lamps that illuminate the scales of indicators. The receivers, transmitters and lamps are operated at 11 volts, while the control circuits are 220 volts, both using 25-cycle alternating current.

In order to make it necessary for the operator to maneuver the control switch handles always in a certain order, corresponding to a predetermined sequence of operation of the lock machinery, and to prevent the operator in control of one channel from interfering with the machinery under the jurisdiction of the operator controlling the other channel, these control switches are provided with interlocks. The interlocks are in two vertical racks under each edge of the board and some distance below, so that they may be inspected and oiled from a floor which is about seven feet below the floor on which the switchboard operator stands. The latter floor does not extend across under the board, this space being open so that all parts on the underside of the board are accessible from the floor below.

Vertical shafts operated by connecting rods from the control switch shafts extend downward past the electrical parts for the operation of the interlocks. The interlock system is essentially a bell crank mechanism, connecting the shaft of the control switch through a movable horizontal bar to a vertical operating shaft which can or cannot move according to the relative positions of the interlocking bars and dogs.

Interlocks prevent the chain fender from being lowered until adjacent mitering gates have been opened, and also prevent the gates being opened until the chain is in the raised position. In this way it is assured that the chain fender will always be in the up position to protect the gate when the gate is closed. To avoid unnecessary complication, each end of the chain is interlocked with the leaf on its side of the lock only, because as a rule both leaves of a gate, as well as both ends of a fender chain, will be opened

simultaneously, and further interlocking is unnecessary. After the mitering gates are closed, a miter forcing machine is operated by a control handle and locks the ends of the gates closed. This machine cannot be operated until the gates are closed.

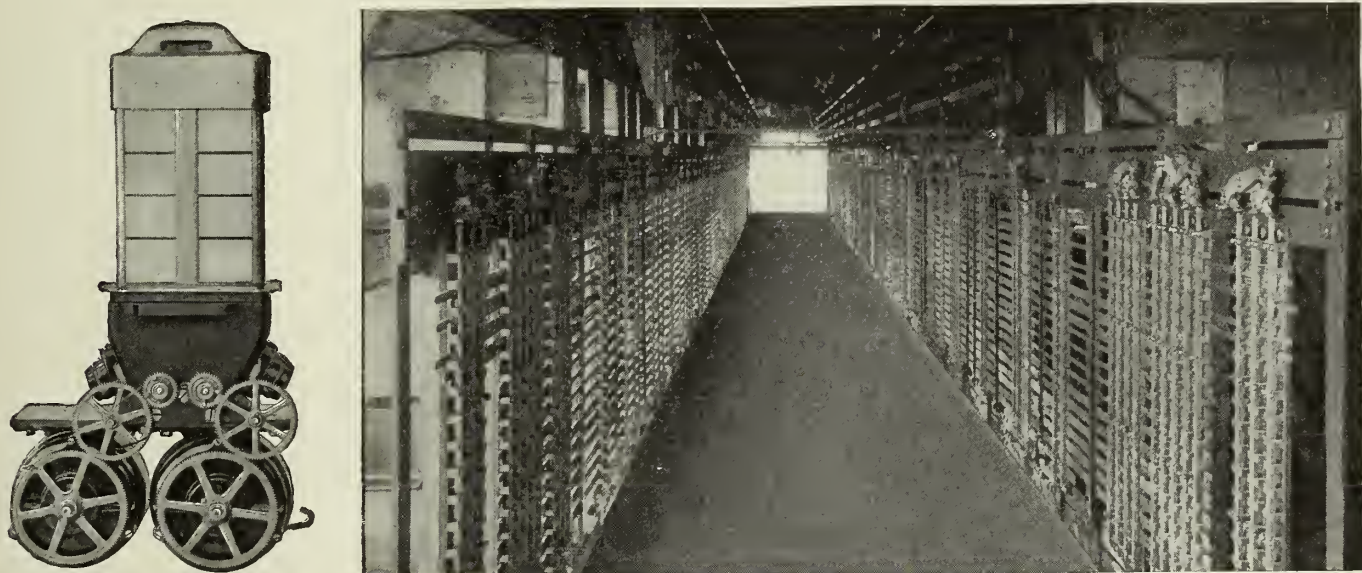
Also the rising stem valves of the side wall, next above or below a miter gate, must be closed while the miter forcing machine is open. As the miter forcing machine cannot be closed until the gates are closed, this means that the valves either above or below the gate must remain closed until the gate itself is closed, thus preventing the operator from creating a current of water around the gates while they are open, or being moved in opening or closing. This interlock is not included on the middle wall valves for the reason that they will be used with the locks on either side and must be free for that purpose.

Either pair of rising stem valves may be opened first, at

valves on one side or the other must be opened before the rising stem valves can be opened, and the rising stem valves must be closed first. This interlock is applied in order to require the operator to control the flow of water by means of the rising stem valves rather than by the cylindrical valves.

Design and Manufacture.

The specifications for the entire generating, lock controlling and distribution system for operating the Panama Canal were prepared under the supervision of Edward Schildhauer, electrical and mechanical engineer, Isthmian Canal Commission, assisted by a staff of able electrical engineers, including C. B. Larzelere, who was closely identified with the lock control problems, and W. R. McCann with the generation and distribution of power. These specifications exhibited great care and painstaking engineering. They contained every safeguard that expert en-



Rising Stem Valve Indicator. Interlocking System Below the Miraflores Board, Panama Lock Control System.

the choice of the operator, an interlock becoming effective when the first valve of the second pair of duplicates is opened. This is done by a novel arrangement of equalizing levers acting against the ends of the interlock bars, with certain definite amount of lost motion which is taken up on opening the first pair of valves, thus putting the interlocks in operation on the next pair. To illustrate this operation, consider, for example, a side wall culvert at Gatun with its principal rising stem valves at each change of level from one lock to the next. The control of these valves is interlocked so that if the valves are opened at one particular point, the valves a lock length upstream or downstream cannot be opened. Thus the operator is limited to equalizing the water between locks and cannot allow water to flow from the upper lock past the middle lock into the lower lock, which operations, if permitted, might flood the lower lock walls and the machinery chambers in them. The cylindrical valves are interlocked so that if those on one side are opened the ones on the other side are locked, closed and the opening of one switch on a side will lock the opposite ten. This prevents careless cross filling between locks, which operation might be combined with the regular method and produce flooding. However, there may be times when it is desirable to employ cross filling to economize in the use of water from Lake Gatun in the dry season. For this reason this interlock is made removable by the use of a Yale lock and key. The key will be placed in the hands of the chief operator.

In the use of the middle wall culvert, the cylindrical

gineers could suggest, were exact and explicit in regard to the results required, yet gave proper range in the details of accomplishment.

All of the lock machinery motors, control panels, centralized control boards, power station generating apparatus, switchboards, transmission line substation equipments, coaling stations, and practically the entire electrical equipment for the wharf terminal cranes and for the extensive permanent repair machine shops were manufactured by the General Electric Co., Schenectady, N. Y.

Nearly two thousand special drawings were required in the fabrication, and there were also involved the following unusual quantities of materials.

Special slate bases.....	1,300
Small castings	160,000
Screw machine parts	1,200,000
Copper rod and bar, ft.....	58,000
Asbestos lumber, sq. ft.....	9,000
New patterns	650
New jigs, templates, tools, etc.....	625
Porcelain parts	18,000
Special bus supports	6,800
Gal. pipe (framework) ft.....	21,000
Special gears	2,300
Special instruments	640
Miscellaneous sherardized pieces.....	300,000
Cases for boxing	4,150

The combined weight of the centralized control boards for Gatun, Pedro Miguel and Miraflores is about 39 tons.

Railway Organization and Operation in India.

By G. C. GODFREY, AGENT, BENGAL-NAGPUR RY.

From a lecture at the London School of Economics. Reasons for state ownership of some of the large railway systems of the country. The arrogance of employees of state-operated railways. Organization and management of Indian railways. First-class passenger equipment, with the Englishman's "bath."

I will try to picture to you what an Indian railway journey is like and how much it differs from one in Europe. You must imagine yourselves traveling through vast tracts of country, sun-baked and dusty for the most part of the year, mile after mile of rice or corn fields on either side, nothing to remind you of England or European civilization except the track of line on which you are traveling. Every now and then a great river is crossed; so different from a well-behaved, manageable river in England, those in the plains of India consist for eight months in the year of wide, sandy, river beds, with only a little trickle of a stream to be seen. Then when the rainy season begins, towards the end of June, and after only a few days' heavy rain, these same trickling streams become mighty foaming rivers, rushing down in flood, sweeping all before them, sometimes even the bridges themselves and undoing the work of months and years in a few hours. You can imagine the task of bridging the great rivers is not an easy one, especially as the course of a river may change for many miles from year to year. Just at this present time one of the most important bridges ever attempted in India is in course of construction. This is the Sara bridge, over the Ganges, on the route from Calcutta to Darjeeling. The Ganges has already been bridged higher up in two or three places, but hitherto it has not been considered feasible to bridge it so far down its course; not entirely on account of its breadth and the consequent expense, but because the bulk of water the river contains at this point is so tremendous, and the incessantly changing channel makes it so uncertain from year to year the water will be found flowing.

A railway journey in India is a matter of days, very often, not of hours, broken only by stops at little wayside stations where crowds of Indians, a growing mass of color, may be seen streaming up and down the platform, filling their water jars, buying sweets from the sweetmeat sellers, always to be seen and heard in an Indian station, all to the accompaniment of an incessant babble of talk and cries that only die away as the train gets under way once more. Until recently the arrangements for feeding the European traveler must often have caused the stranger to wonder. The halt of the train for 30 minutes or so, while he sits in the little hot refreshment room, the punkhas swinging overhead, and tries to eat the bad fare provided—curry generally and a tough chicken! But this is fast becoming ancient history, and on the main lines refreshment cars of the latest design and equipment are now being run on which one can get a comfortable, though not always good, meal without the long delay entailed formerly.

I will next deal shortly with the constitutions of state and company railways. I use the expression "company" railways, as in India there are very few lines qualifying for the description "privately" owned.

There are three great state railway systems—the North-Western Ry., the Oudh & Rohilkand Ry. and the Eastern Bengal Ry. These lines are both owned and worked by the state, and in the case of the first-named, *i. e.*, the North-Western Ry., there seems to be some outstanding advantages in state ownership and working.

This system consists of 4903 miles of open line, nearly 2000 miles more than the Great Western, the longest English railway. For purposes of accounts it is divided into a commercial and a military section. The commercial section is a lucrative one to the state, being worked for about 48 per cent of its gross re-

ceipts, while the military section consists of lines for strategical purposes along and in the neighborhood of the North-West frontier, and is worked for about 100 to 117 per cent of its receipts.

Now, you will readily understand that these 1255 miles of line, comprising the military section, could never have been constructed by anything but state or state-guaranteed capital, nor could they be operated as a commercial concern; and yet the safety of the country required that these lines should exist, so that troops could be concentrated at certain points without delay and for the maintenance of communication with outlying military stations along the extensive frontier, that frontier which is so constantly active and which has played such an important part in the military history of India. These military lines are equipped with blockhouses and forts at bridges, tunnels and other important points, rendering them picturesque and attractive in appearance, but showing, of course, that the expenditure on the lines must have been much higher than would have been required on a commercial railway.

The other two state railways serve agricultural and commercial districts, and there are no special reasons that I know for considering them as better suited to state ownership and working. But I do not propose to discuss the merits of "state *versus* private railways," beyond a few remarks I will make presently in connection with company-worked lines.

The other important railway systems are what are known as company-worked lines; that is, they are practically owned by the state but leased to companies for working. To enable you to understand this I will briefly explain the constitution of the Bengal-Nagpur Ry. The capital of this line amounts to about £23,800,000. Of this the company has provided £3,000,000 in ordinary shareholder's stock, or say one-eighth, about £5,000,000 in debentures, and the balance of capital, nearly £16,000,000, has been provided by the secretary of state; that is to say, by the Indian government, either out of the revenues of the country, year by year, as required, or out of loans raised by the secretary of state in England or India. Therefore, you see, the state owns two-thirds of the capital of the line.

For the building and working of the line the secretary of state entered into an agreement or contract with the company under which the interest on the ordinary stock was guaranteed at a fixed rate of 4 per cent, and any excess of receipts after paying all interest charges for any year was divisible between the government and the shareholders in the proportion of $\frac{3}{4}$ and $\frac{1}{4}$ per cent. The first contract had a duration of 25 years, and shortly before its termination another contract, on somewhat modified terms, was made for a period of nearly 40 years.

From this you will see that the shares of such a company provide a useful investment to persons requiring, without risk, a moderate return on their money, with a fair chance of a liberal return. For about 17 years the shareholders had to be content with their certain 4 per cent interest, but after their share of the surplus profits—that is, the excess of net receipts over interest charges—was sufficient to convert the return into 5 per cent and in one case to 6 per cent.

The terms arranged between other companies' lines and the government are very similar, and I think this is sufficient to show you what is meant by company-worked lines in India and why they do not qualify for the expression "privately owned." The ownership is "state" while the working is "private," subject to certain control by government. For this reason the reported mileage and private railways, on the basis usually considered in various countries, is misleading in respect to India.

"STATE VS. COMPANIES' RAILWAYS."

Before leaving this subject I will make a few remarks promised you, on the subject of "State *versus* Private Ownership,"

qualified for India by the description "State *versus* Companies' Railways." Where capital for construction is not under consideration, owing to its being guaranteed by the state, or to its being entirely provided by the state, the limits for discussion are restricted to the working or operation of open lines; and where, as in India, the state reserves the right to enforce maxima and minima class rates for good traffic, applicable alike to state and companies' lines, the limits are still further restricted.

Thus any discussion touches chiefly the staff employed and the public facilities provided. I do not wish to decry the staff of the state railways, but from experience of traveling in Europe as well as in India, and with the initial bias of being a company's employee, I can only tell you that I prefer the officials of private or companies' railways. They are, I believe, more attentive to the traveling public, more willing to assist traders, and more anxious for the good name and success of their particular line than are state railway officials.

If a man is a state servant it is difficult for him to forget it or to sink it. In India, certainly, he thinks he is of special importance quite beyond his actual duties because he is employed directly by the government, and with the most honest intentions in the world he cannot help showing this feeling. Moreover, he knows that his promotion, except for serious misdemeanor, is practically dependent on seniority rather than on merit. Therefore it is only human nature for him to argue: "Why bestir myself unnecessarily? As long as I keep things going quietly I shall crawl up the ladder of promotion safely and surely."

If by any chance a state railway servant does happen to be passed over for promotion, what is easier than a carefully worded petition, presented, through the proper formal channels, right up to the head of the government; *i. e.*, in India to the viceroy. While, as for dismissal, I believe it is a most difficult feat to dismiss a state employee except for very serious misconduct. The Indian employed in the lower grades is particularly prone to ideas and influences of this kind, but I think that the same tendencies are apparent among the employees of state railways in Europe.

I do not pretend that all the officials of companies' lines in India are free from these failings; that would be far from the truth; but I do think the effort made on companies' lines by all officials, from the highest to the lowest, to work for and with their clients, the traveling and trading public, are more successful than on state railways.

I might tell you an anecdote of what actually happened on a certain railways in India, which shall be nameless. A European entered the booking office of a small station, where European passengers were not very common, and asked for a ticket. The Indian stationmaster replied, with very scant civility, that he was busy and the passenger must wait a bit. In a few minutes the stationmaster was told by one of his staff that the government inspector of railways was on the platform. He looked around the corner and realized it was the passenger. Rushing up to him obsequiously he poured forth his apologies and concluded with, "Oh, sir, please excuse. I thought your honor only an ordinary passenger."

Now whether that happened on a state or company's railway doesn't matter, it was the wrong spirit for any railroad servant. Obsequiousness to officials, with incivility to "ordinary passengers," is the last thing we want; and, as some of you, no doubt, will or already may be employed on railways, you will not mind my suggesting that you might remember this little failing of a native stationmaster of India whenever you feel inclined to be a bit off-hand with the clients of your particular railway. The feeling I like to instil into the men on my railway is that they are in the same position as shopkeepers and their assistants. They have to sell the transport offered by their railway company, and to render the purchaser every assistance that

they can. In concluding this reference I may tell you that I think the subordinate officials of English railways display this feeling to an infinitely greater extent than the officials of the state railways on the continent over which I have traveled.

ORGANIZATION OF INDIAN RAILWAYS.

The state railways are controlled by the Railway Board, a department of the government of India, consisting of a president and two members, with a highly-paid and very competent secretary. The companies' railways are controlled by their boards of directors in London, but owing to the large share of the capital held by the government and to the guaranteed interest, their expenditure is very much subject to approval by government, that is the Railway Board, and their powers to quote passenger fares and goods rates are restricted to certain maxima and minima laid down by government.

The chief administrative officer of a railway is called "the agent," a term not usually understood outside India. Until last year the head of a state railway was called "the manager" but the designation was changed to assimilate with the company's lines. The word "agent" was introduced, I believe, because the head of a company's line in India is the agent, duly constituted by power of attorney for the board of directors, with power to enter into agreements and contracts. If similarity in the designation of both state and companies' lines was considered desirable, it seems to me it would have been more satisfactory to have arranged to substitute in both cases the English title "general manager" because that, in effect, is what the agent is.

Below the agent or general manager there are the heads of the various departments—the general traffic manager, the chief engineer, the chief mechanical engineer, the chief auditor, the chief storekeeper, and in some cases the heads of other minor departments. The traffic department is usually divided into two branches, transport and commerce, in much the same way as English railways, the official designation of the heads of these branches varying somewhat on different lines. For instance, on my railway these officers are called the superintendent of transportation and the superintendent of goods. On another they are deputy traffic manager (transport) and deputy traffic manager (commerce). The former deals with such matters as timetables, movement of stock, establishment, accidents, company's letter and telegraph service, and other matters; the latter with rates and fares, good classification, claims, statistics and other commercial affairs.

The district traffic officers, their assistants, inspectors and stationmaster are jointly under and correspond direct with these two superintendents, according to the nature of the particular work. An experiment is, I think, likely to be made shortly on the North-Western Railway to divide completely these two branches of the traffic department by providing separate staff throughout the line, with a traffic manager in charge of each branch, or department, as it will then be. But it remains to be seen whether the extra expense of such a thorough division will not seriously discount the advantages sought in extra efficiency.

The average earnings per mile per week of Indian railways are, of course, considerably lower than of English railways. For instance the figure for all Indian railways taken together for 1912 was Rs. 354, or say £24, and that is the highest it has reached during the last eight years. The figures for the railways of the United Kingdom for 1912 was £97, of four times as much. On this account we have to endeavor to work as economical as possible, and that we succeed is shown to some extent by the percentage that working expenses bear to the gross receipts. I will not tire you with figures of individual railways, but for all India the figure for 1912 was 49 per cent, and it is seldom over 52 or 53 per cent, while for, all the railways of the United Kingdom for 1912 it was 63 per cent and for the last 13 years has not been below 62 per cent.

Our receipts per mile of line are low because we must carry

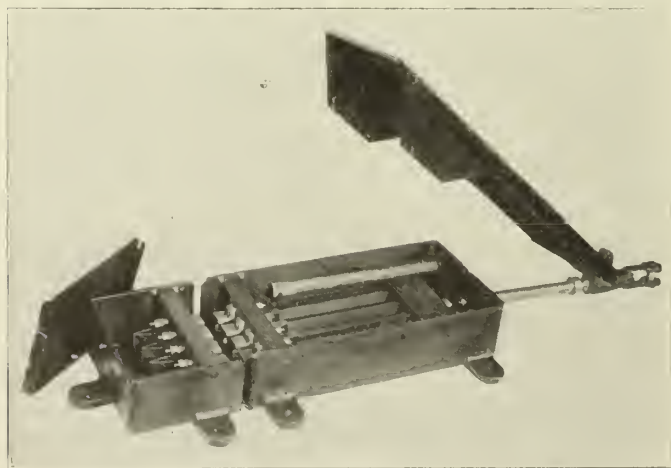
a passenger or a ton of goods at exceedingly low mileage rates or we should never get the traffic. The distances are so great that the third-class passengers, who, of course, are the backbone of the traffic, could not afford the parliamentary fare of England, nor could goods traffic to the ports bear the rates charged here per ton per mile. The average rate paid by a passenger on Indian railways for traveling 1 mile during 1912 was just under $\frac{1}{4}$ d. and that is an average including first-



Union Model 13 Bridge Circuit Controller, Fig. 1—Contact Made.

class passengers who paid the economical rate of just under $\frac{1}{4}$ d. per mile. Many of us would like to travel first-class in England for that mileage rate, and yet we do not give the first-class passenger less comfortable or luxurious accommodations, but I admit we do not give him anything like the same number of fast trains.

The first-class compartment is not the tiny little box of a corridor train as in England. It is a long wide compartment, with a kind of sofa seat along each side—longitudinally, not laterally. Above each of these is a lifting berth which provides the beds for the third and fourth occupants, if there are more than two. There are electric ceiling lights and reading lamps, also small electric fans on swivel joints. Each compartment has its own complete bathroom, also fitted with an electric light and fan; and the newest carriages on my line have a needle and shower bathing place instead of the ordinary sit-down bath. You can imagine the joy in the evening, after a long, hot, sultry day, with the Indian sun beating on the carriage, rendering it like a furnace, and you and everything in the carriage covered with a thick layer of dust, of having a shower bath, with warm water, it is true, and then lying at ease to cool down under the electric fan. Corridor trains are, in my opinion, most unsuitable for the conditions of travel in India, because, to put it shortly, one cannot in them have both air and privacy—and both are essential. One wants privacy, especially in the case of ladies, because in hot weather one does not want to be burdened with more clothes than possible. You see, journeys are, as a rule, long, not seven or eight hours, such as you consider a long journey in England, but two, three or even four days. To go



Union Model 13 Bridge Circuit Controller, Fig. 2—Contact Broken.

from Calcutta to Delhi, or Bombay, or Madras, takes the best part of two days and two nights.

Union Model "13" Bridge Circuit Controller.

A new bridge circuit controller has been developed by The Union Switch & Signal Company. This instrument, known as Model "13," is of rugged construction, being designed to withstand the rough usage to which it is exposed in service; yet in detail, as well as in principle, it is an extremely simple mechanism.

The contact springs in both sections of the instrument are stationary, which does away with all movable wire connections and flexible wires. These springs are identical in both portions of the instrument and are mounted on insulating blocks. The contact fingers which slide between the springs are so clamped between insulating blocks at one end that no insulating bushings are needed. The contact between each finger and its springs is in a vertical plane, which permits of vertical movement of the parts. Lateral movement is provided for in the flexibility of the fingers and springs themselves. All clearances between parts carrying current and between these and other metal parts are according to R. S. A. requirements.

The contact fingers and springs are well protected from the weather and dust by sheet iron covers, one over each



Union Model 13 Bridge Circuit Controller, Fig. 3—Cover Raised to Show Contact Fingers and Springs.

end of the instrument. The cover on one end is arranged to slide as shown (Figs. 1 and 2), so that when contact is made the opening between the two parts of the instrument is covered. In this end also there is a fiber tube to carry the wires past all moving parts and protect them from injury. A 4-way instrument is shown, but they are made in 8 and 12-way styles as well.

Railway and Engineering Literature.

GOVERNMENT OWNERSHIP OF RAILWAYS by Sam'l O. Dunn, editor, *Railway Age Gazette*, New York, D. Appleton & Co.

Mr. Dunn has done a real service, at this time, in the preparation and publication of this work. He has treated the subject historically and from all points of view. He is eminently fair, giving credit where credit is due; and the data which he has compiled and classified will be useful to those who do not agree with his conclusions as well as to those who do. Naturally he favors evolution in a policy of railway regulation rather than the revolution implied in government ownership. Those who want to learn the economic, social and political aspects of this subject will be greatly aided by the results of the authors arduous work.

* * *

The American Mason Safety Tread Co., Lowell, Mass., has issued a new pamphlet catalogue of the Mason safety tread. This device is perfectly well-known, for it may be seen underfoot on steps and thresholds in public buildings everywhere. It is composed of rolled, unperforated steel or hard brass (delta metal), with alternate U-shaped and dovetailed grooves, the dovetailed grooves being filled with the non-slippery, soft metal lead or with carborundum grains. Carborundum is an extremely hard and abrasive material, and the grains are securely bound together and to the steel base with a chemical cement.

* * *

The Chicago Pneumatic Tool Co., Fisher building, Chi-

cago, has issued bulletin No. 149, on the Chicago portable mine hoist. This machine, is clamped to drill a column, and used to raise and lower timber, rock and other material in raises, winzes and stopes. It will handle a considerable tonnage, and is easily set up or torn down and transported from point to point.

* * *

"Brass Tacks in Advertising" is the latest brochure of Bruce V. Crandall. It is full of points; and points that can be seen and felt. He believes in tacks which bring income instead of being a tax on income.

* * *

"Connecticut and the New Haven Road" is one of Howard Elliott's keen and informing business utterances. It is an address before the Chamber of Commerce of New Haven. "Address to The Town Criers of Rhode Island," by Howard Elliott, is devoted to a discussion of the present and possible future development of Rhode Island.

* * *

The Railway Business Association has published in pamphlet form the address made by Howard Elliott and Gov. Cox of Ohio, at the recent annual dinner; also the paper entitled "Railway Purchases, Measure General Business Prosperity," an address by E. B. Leigh at the annual business meeting, which was recently published in full in these columns. Copies can be obtained by addressing Frank W. Noxon, Sec'y Railway Business Association, 30 Church St., New York.

* * *

A pamphlet by the Morrison Boiler Co., Sharon, Pa., shows a series of views giving the type of construction of this novel form of boiler and representing the various stages of advancement in connection with a typical installation.

* * *

For engineers desiring to keep a file of books for reference the Joseph Dixon Crucible Co., Jersey City, N. J., have a limited number of booklets dealing with such subjects as "Steam Traps," "Unions for steam Pipes," "Feeding Graphite for Lubricating Purposes," etc., which will be sent free as long as the supply lasts, to those who care for them. These treatises were prepared by the well-known engineer, Mr. W. H. Wakeman, who has written many articles on practical engineering problems. Numerous illustrations are used to make each subject easily understood.

* * *

A leaflet by the Armstrong Machine Works, Three Rivers, Mich., describes the "Superior" steam trap, manufactured and sold by that firm. These traps are simple and compact and are well adapted to a wide range of service.

* * *

The general Electric Co., Schenectady, N. Y., has issued bulletin A4171, devoted to a description of that company's ventilated railway motors. The bulletin supersedes the previous bulletin on the subject. Bulletin A4173, describes the GE-201 ventilated commutating pole, railway motor, and supersedes the previous bulletin on the same subject. Bulletin A4167 is devoted to the subject of "Electricity in Iron Foundries." The bulletin is profusely illustrated with some typical applications of G-E motors in iron foundries, and contains a chapter on foundry lighting. Motor-driven exhaust fan outfits for ventilating purposes, is the subject of bulletin No. A4174. Bulletin A4176 describes the General Electric high voltage oil break switch, known as Type F, Form K15, and bulletin No. A4178 is devoted to three-phase induction motor panels for controlling induction motors of voltages of from 110 to 2200, and for operation on 25 to 60 cycle circuits. In bulletin A4151 are described engine driven continuous current generators of the commutating pole type. Those generators are manufactured in both two-wire and three-wire styles, and either shunt or compound wound, 115 to 125, or 230 to 250 volts. They range in capacity from 25 to 400 kw., inclusive.

The "Over-Rail" Detector Bar.

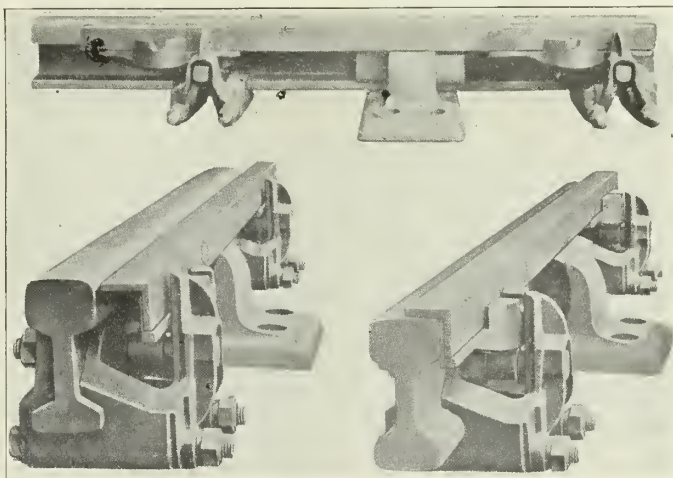
We take from the Railway Engineer, an English publication, some illustrations of a new style of detector bar that is designed to be used on the outside of the rail and still be secure against the possibility of being lifted without engaging the wheel. Failure in this manner has sometimes occurred with outside bars of the usual design, by reason of wear, misadjustment or curvature in the track.

The accompanying illustrations show an outside bar which cannot get away from the rail and cannot be operated if a

vehicle be on the rail, whether on a curve, a broad-headed rail, or under any adverse circumstances. This is because the motion of the bar is first upwards and then lateral over the rail.

The top figure shows a front view of part of the bar in position; the lower left-hand figure is an end-on view of the bar when normal, while the right-hand illustration is an end-on view when the bar is in mid-stroke; i. e., with the top of the bar over the head of the rail.

The bar is worked by a rod—not seen—from the signal



The "Over-Rail" Detector Bar.

tower in the usual way, and it is carried by special clips. Under the bar is a semi-circular cam resting on a roller which, when the bar is actuated from the tower, raises the bar to above rail level. When one quarter of the movement is made the bevel attached to the outside of the bar comes against the raised outside of the clip, and this causes a lateral movement of the bar. When in the mid-stroke the bar is over the rail, as seen, and as the stroke is continued the bar is withdrawn off the rail and falls in the opposite direction. The cam is so shaped that the bar slides away from the rail to its normal position. Only one bolt per clip is required through the web of bull-head rails and none for flat-bottom rails.

This detector bar, or "locking bar" as it is called on English railways, is made by Messrs. McKenzie & Holland, Ltd., 58, Victoria Street, Westminster, London, S. W.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The regular meeting of the New York Railroad Club for January was held at the building of the United Engineering Societies, No. 29 West Thirty-ninth street, New York, on Friday evening, January 16. The technical paper presented at this meeting was by Mr. J. W. Harkom, C. E., of Richmond, Que., who discussed the subject: "Rigidity or Flexibility, Which is best in Locomotive Boilers?"

The regular monthly meeting of the Western Railway Club for January will be held in the assembly room on the twelfth floor of the Karpen building, Chicago, on Tuesday evening, January 20, 1914. Mr. F. B. Farmer, of the Westinghouse Air Brake Co., Pittsburg, Pa., will address the club on the subject: "Train Handling."

The twenty-first annual convention of the Air Brake Association will be held at Hotel Pontchartrain, Detroit,

Mich., from Tuesday May 5, to Friday May 8, 1914, inclusive. Members desiring accommodations at the above hotel are urged to apply for reservation as early as possible. Arrangements have been made with the Pullman Company for 50 per cent refunds on Pullman fares as heretofore, when receipts for same on special forms to be secured from the secretary of the association, are presented to H. P. Clements, general ticket agent of the company at Chicago. Live programs from both the technical and the entertainment phases of the convention are announced. A new feature in connection with the exhibits will be the "manufacturers' exploitation" meeting, in which each exhibitor will be given an opportunity on a day set aside for the purpose, to present the merits of his devices before the assembled convention. F. M. Nellis, 53 State street, Boston, Mass., is secretary of the association.

The fifth annual meeting of the American Society of Engineering Contractors was to be held Friday, January 16, in the United Engineering building, 29 West 39th street, New York city. The afternoon session, beginning at 2 p. m., was to be devoted principally to business. The evening session was to be opened with an address by the incoming president. Following the presidential address, George C. Warren, president of Warren Brothers Co., Boston, Mass., was to show moving pictures of road construction throughout the country, and give a short and interesting explanatory talk.

The Kansas City Traffic Club was organized recently at a meeting at the Hotel Baltimore, Kansas City, Mo. The membership is composed of traffic officials of railroads and mercantile companies. The club has made no arrangements for a home. Its purposes are to be social and educational. The following officers were elected: President, Joseph A. Tapee, Morris & Cox; first vice-president, F. C. Cole, New York Central lines in Kansas City; second vice-president, H. E. Heller, Burlington; secretary-treasurer, A. A. Wild, Merchants' traffic manager. Directors, J. C. Swift, live stock commission dealer; H. G. Wilson, transportation commissioner for the Commercial club;

C. W. Lonsdale, J. F. Holden, vice-president and traffic manager of the Kansas City Southern Ry.; J. S. Adsit, D. W. Rider, E. V. Hoffman and J. L. Sweeney.

The educational department of the Chicago Transportation Association has announced an important program for the next six months and in this work it will have the active support of the local officials of the railway express and commercial traffic departments. Following is the program:

Jan. 6—"Railway Freight Organization and Service; Handling a Shipment from Consignor to Consignee, Solicitation, Accounting, Loss, and Liability." Jan. 13—Address, M. G. Hopkins, traffic manager, Chicago board of trade. Subject, "Transportation and Its Relation to Public Interests." Jan. 20—"Commercial Traffic Departments, Shipping, Equipment, Records and Methods of Operating." Jan. 27—Open discussion on transportation subjects presented by the members. Feb. 3—"Express Service Classifications, Equipment, Methods of Operating and Accounting." Feb. 10—Speaker and subject to be announced. Feb. 17—"Passenger Service, Local and Through Service, Operating and Accounting." Feb. 24—Open discussion.

Under the following headings it is intended to cover the different territories, quoting the tariffs covering, rate construction, principal commodities, and l. c. l. shipments, routing service and terminals, important I. C. C. decisions, opportunities and probable development. March 3—"Chicago to Central Freight Association Territory." March 10—Speakers and subject to be announced. March 17—"Chicago to Trunk Line and New England Territory." March 24—Open discussion. March 31—"Chicago to Missouri River." April 7—"Chicago to Minnesota, the Dakotas, and Canada." April 14—Speaker and subject to be announced. April 21—"Chicago to North Pacific Coast Points." April 28—Open discussion. May 5—"Chicago to South Pacific Coast Terminals." May 12—Speaker and subject to be announced. May 19—"Chicago to Southwestern Committee Territory." May 26—Open discussion. June 2—"Chicago to Southeastern Territory." June 9—Speaker and subject to be announced. June 16—"Chicago to Export Points." June 23—Open discussion.

The Railway Supply Man's Point of View.

Proper Attention to Appliances in Service.

Railway appliances are frequently put into use, and not followed up by proper attention by the railway people. They seem to be forgotten or overlooked; and so either go wrong or no use is made of them. If the appliance is worth trying at all it is worth proper attention; and this should not be left to the carelessness of employees but should be covered by strict orders. Where possible, frequent reports should be required. Appliances frequently get an entirely undeserved "black eye." Instances of this often come to our attention. If it is understood, however, that a special appliance is "the old man's pet," it is pretty sure to succeed. Manufacturers are frequently at fault in not following up their own appliances in service. This is bad policy and is unjust to the railways as well as to themselves.

"A little of that roundhouse physic of neglect" was the way in which a railroad man put it to us in our office the other day. It was well put—a mighty suggestive phrase of what is going on so far as railway appliances are concerned on many roads. We are bound to have a whole lot of it, and railway supply manufacturers should expect it, and, expecting it, should design and construct whatever equipment they sell, keeping this always in mind.

Proper attention to appliances in service we never get in railroading or anything else. Some men take good care of

their automobiles if they have them; other men do not. They don't even hire any one to take proper care of them. The same is true regarding a horse. The man who now owns an automobile is the man who used to own a horse. From some owners, the horse, harness, and rig received the proper attention; from others they didn't.

All through railroad service, attention of one kind or another is given to the appliances in service. It depends to a certain extent upon the management of the road, but to a much larger extent, upon the individual employee. The ideal condition for railway equipment is that it should be self-maintaining, self-operating, fool-proof, and a good many other things; but with the increasing demands for better railway service on the part of the public and shippers, and together with it, an increasing demand for a smaller charge for the better service, it becomes increasingly imperative on the part of railroads that proper attention be given to appliances in service.

But after all, is it up to the railroads entirely—this question of giving the proper attention to appliances in service? Isn't this something that even from our own biased viewpoint, we must admit, is also up to the railway supply fraternity as well? Naturally, a man who buys something is supposed to take care of it. But there are certain things that are sold, which, if not sold under a guarantee, are sold in a way where there is implied a guarantee that they will perform the proper amount of service for a certain number of years.

Railroading is so diversified; its problems are so many and so complex; the railway manager is dependent so much upon the expert knowledge and service of the manufacturer of railway supplies, that it would seem as if a man who manufactures and sells any equipment to railroads should be responsible for its problems in service, that is to a certain extent. The railroad's responsibility should be in that it will see that the thing which is used is given fair usage—that is in so far as possible in an industry where unfair usage is bound to occur, due to the very nature of the business. Locomotive appliances especially need careful watching, in addition to proper care.

Is it not fair to expect from the manufacturer some attention to the appliance which he has sold after it has gone into service? He has sold it for the specific purpose of giving certain results if correctly used and handled. There are many appliances used in railway operation where it is imperatively necessary for some one with an expert knowledge to give such appliances a little attention at regular intervals, beyond the care that is ordinarily given them by employees of the railroad who are properly attending to their work.

Not only is there an advantage to the railroad in the supply manufacturer giving proper attention to the appliance which he has sold after it goes into service, but there is also a very plain and very big advantage to the manufacturer himself. Not all appliances are perfect—not all have been fully developed. There is room for progress, and out of proper attention to his appliance in service there may and will come to the manufacturer much added knowledge, which he can turn into added profits by making his appliance more perfect.

We cannot get very far with anything in the railway world without stumbling upon the value of co-operation. This spirit of co-operation which has pervaded railroading since the first rails were laid has had very much to do with its growth and success. There are two ways of looking at the question of proper attention to appliances in service—that is two viewpoints from which we may look at the question. The one viewpoint is that of the railway officer or employee, and his duty toward the appliance which he is using, and the other viewpoint is that of the manufacturer of that same appliance, and his duty toward the railroad, in watching it not only that it may operate at all times as it should, but that in the watching of that operation there may come a possibility of further perfecting the original design of the appliance.

Working for One's Competitors.

Editor, Railway Review:

I have read with interest the article in your last issue on the subject of "Reciprocity in Favors." I suppose most railway supply manufacturers have to take risks in making expenditures for educational purposes and to help railways to decide important matters. They are experts whose services are generally at the service of railway companies without charge.

Sometimes, however, this service involves large expenditure of high-priced time, and of money. No bargain can be made in advance, and the manufacturer, engineer or contractor takes his chances on getting anything back. Sales expenses are undoubtedly largely increased by this kind of work; and in most cases the selling company has no just cause of complaint if it does not get the order. "It's all in the day's work."

Nevertheless, where work is honestly done and expenditures made either on the direct request of the prospective buyer or with his co-operation, fairness demands that their expenditure of time and money be remembered and taken into account in letting the order or contract. It is hardly fair that the concern which puts out its resources liberally, should find that the result inures to the benefit of a competitor who steps in at the last moment and having in-

curred no expense in the preparatory work of investigation, makes a lower price to take away the business.

We were engaged in certain specialized construction work which required that plans and drawings be made for each special job, depending on local conditions. At the request of the chief engineer of a large system we made such plans for a considerable number of locations. The work ran through the best part of a year and involved a cost to us for traveling expenses, drafting, etc., of about \$2,400, not including any charge for the time of our engineers and estimators. No fault was found with our plans—in fact they were approved and substantially used, although not by us. Competitors who had made no such plans or practically any expenditure, stepped in and took the work. We had proved to the railway that the work was necessary and economical; the other fellow reaped where we had sown, and we received no thanks or recognition.

I do not think that the chief engineer was wholly to blame. When the time came for placing the order, higher authority told him to figure with so-and-so on the job. We had the cold comfort of bidding on some portions which we did not get, because the other fellow made his bid on the whole proposition and without figuring any preliminary engineering expense. It has always seemed to me that the engineer ought to have stood up for fairness to us and explained all the circumstances to the man higher up. Our work ought not to have given us any "cinch" on the job; but it certainly ought to have been placed in some way, to our credit. We have always found a reputation for fair dealing to be a valuable asset, and a railway company in the long run would also find it to be so. In this particular case it cut it itself off from whatever advantage there might be in having us bid on future work.

Railway Service as a Training School for Railway Supply Business—II.

In the introductory article on this subject, sketches were given of three railway men who became successful railway supply men. Others are to follow, but there will be few in this Who's Who Among Supply Men, who present the remarkable combination shown by John C. Barber, master car-builder, inventor and business manager. It is unusual for the inventor to have the organizing and business ability needed in building up a big business. Mr. Barber's story is an interesting one.

To arrive at a record of having your inventions applied on over 550,000 freight cars and still going on is not very usual. Last year the Standard Car Truck Co. put its appliances on 68,553 freight cars and 328 locomotives. The fact that the inventor was a railway man who endeavored to meet a real want as he saw it in service, demonstrated and developed it, and then put it upon the market himself and retained control of the business, is still more unusual.

John C. Barber was a young railway man in an operating position down in Texas, when he noted a certain thing which some years afterward came back to him when he began to think of the problem of lateral motion in car trucks. He was having a safe moved one day, when it was stalled by the casters sinking into some depression in the floor. As they pushed and pulled, the safe would start but immediately roll back into the depressions in which the wheels had lodged. Years afterward, "way up north" this incident occurred to him when he was working on a device to allow limited lateral play in trucks. He made some cup-like castings and put them on a car and found out that the thing worked. It was crude but the idea was there which now in highly developed form is on about twenty per cent of the freight cars of the country.

Most railway people remember the mechanical problem

which divided them for some years "Swing-motion trucks vs. rigid trucks." The advocates of each principle were firm in their convictions. The writer remembers two roads which ran through a rugged mountainous district in the same general territory. They had heavy grades and sharp curves and were built on mountain sides looking down on steep and deep precipices. The management of one of them claimed vehemently that it could not operate cars with swing-motion trucks because they would permit the body of the car to move laterally and when it once started it would go off the track and down the hill. The other management claimed that rigid trucks would leave the track and they must have swing-motion to ease them around the curves. And a good many cars went down the bank on both roads. Railway men generally adhered strongly to one view or the other. Then the man from the Northern Pacific stepped into the arena with a device for limited lateral play, with results as above noted.

John Child Barber was born in St. Lawrence county, New York, Dec. 12th, 1844. He was educated only in the public schools, and in September, 1861, enlisted as a Union soldier in a Wisconsin regiment. After honorable discharge in 1865, he secured employment with the Chicago & Northwestern in its locomotive and car building department at Fond du Lac, Wisconsin, filling various positions therein for six years. In 1871 he joined the mechanical department of the Northern Pacific shops at St. Paul, where he served for two years. In 1873 he became superintendent of the car department of the Missouri, Kansas & Texas, at Sedalia, Mo. In 1883-5 he was superintendent of the Rio Grande division of the Texas & Pacific at Fort Worth, Texas. He returned to the Northern Pacific at St. Paul in charge of the car department where he continued twelve years, or until 1897. While here he studied the truck situation, and brought out his lateral roller motion truck, which provided the same functions as the common swing hanger trucks with a large reduction of parts, as well as first cost and cost of maintenance. The demand for these trucks decided him to resign from railway service in 1896; and since that time he has given his entire time to his various inventions of railway truck appliances, seventy-four of which he has patented. The most important of the list has proved to be the all-steel truck for locomotive, passenger and freight equipment and street cars. In 1898 he organized the Standard Car Truck Co., and of this organization he remains president.

Mr. Barber's interests are not confined entirely now to the railway supply field. Like many other successful railway and supply men he has a fondness for farming; and he indulges it on an extensive stock farm with fish and game preserves in Crow Wing county, Minnesota. He spends much time there in the summer and especially during hunting season. He is also interested in a land company, having extensive vineyards and groves in Southern California.

In the fall of 1897, when Mr. Barber left the services of the Northern Pacific Ry., the employees (several hundred of them), tendered him a banquet and in his address to them there was a prophetic paragraph which is worth recalling. He said:

"At this time I again desire to express myself, as I have already done, in the hope of enjoining all of you to shun strikes and keep entirely out of unions or sects whose aim or desire is to promote their personal interests and welfare at the expense and downfall of your fellowmen; but instead protect your interests at the ballot box. It may be slow but it is sure, and this action from year to year will make you a power sufficient to form a band of security and protection to you that will lead to prosperity and wealth and at the same time will command the respect of all classes, peoples, and trades; and thereby security for investors and capital in railroads which are now the great arteries of the business of this country.

"I want also to awaken you to the fact, particularly you young men and apprentice boys, that it is highly important that you prepare yourselves to meet the coming changes necessary to reduce the cost of conducting transportation; and also installing locomotives double the present power and cars almost double in capacity as compared with the present style of equipment. Electricity is sure to become an important factor as a motive power, as well as electric appliances for railroads; wood and cast iron in cars will be replaced in part by steel, as well as corresponding improvements in roadbeds, bridges and heavy rails. I, therefore, again repeat the importance of



John C. Barber, President Standard Car Truck Co.

your giving this thought and study and be prepared to enter the new field which will give employment for thousands of you."

Mr. Barber's remarks regarding the future did not meet the approval of some higher officers, who thought them extravagant and wild. They were glad to reverse that opinion in a few years.

Exhibitors National Railway Appliances Association.

The list of exhibitors of the National Railway Appliances Association for the exhibition which opens in Chicago, March 16, 1914, is as follows:

Adams & Westlake Co., The, Chicago, Ill.
 Ajax Forge Co., Chicago, Ill.
 Ajax Rail Anchor Co., Chicago, Ill.
 American Guard Rail Fastener Co., Philadelphia, Pa.
 American Hoist & Derrick Co., St. Paul, Minn.
 American Rolling Mill Co., The, Middletown, Ohio.
 American Steel & Wire Co., Chicago, Ill.
 American Valve & Meter Co., The, Cincinnati, Ohio.
 American Vulcanized Fibre Co., Pittsburg, Pa.
 Asphalt Ready Roofing Co., New York, N. Y.
 Atlas Preservative Co. of America, New York, N. Y.
 Barrett Mfg. Co., New York, N. Y.
 Bausch & Lomb Optical Co., Rochester, N. Y.
 Louis Blessing, Jackson, Mich.
 S. F. Bowser & Co., Ft. Wayne, Ind.
 L. S. Brach Supply Co., New York, N. Y.
 Brown Rail Loader, James C. Barr, Mgr., Boston, Mass.
 Bryant Zinc Co., Chicago, Ill.
 Buda Co., The, Chicago, Ill.
 Buyers Index Co., Chicago, Ill.
 Philip Carey Co., The, Lockland, Cincinnati, Ohio.
 Carnegie Steel Co., Pittsburg, Pa.
 Geo. B. Carpenter & Co., Chicago, Ill.
 Chicago Bridge & Iron Works, Chicago, Ill.
 Chicago Pneumatic Tool Co., Chicago, Ill.
 Cleveland Frog & Crossing Co., Cleveland, Ohio.
 Clyde Iron Works, Duluth, Minn.
 Commercial Acetylene Ry. Light & Signal Co., Chicago, Ill.
 Concrete Steel Co., Chicago, Ill.
 Conley Frog & Switch Co., Memphis, Tenn.
 Crerar, Adams & Co., Chicago, Ill.

Curtain Supply Co., Chicago, Ill.

D. & A. Post Mold Co., Three Rivers, Mich.
Des Moines Bridge & Iron Co., Des Moines, Iowa.
Detroit Graphite Co., Detroit, Mich.
Paul Dickinson, Inc., Chicago, Ill.
Dilworth, Porter & Co., Pittsburg, Pa.
Joseph Dixon Crucible Co., Jersey City, N. J.
G. Drouve Co., The, Bridgeport, Conn.
Duff Mfg. Co., The, Pittsburg, Pa.
Duplex Metals Co., New York, N. Y.

Eastern Granite Roofing Co., The, New York, N. Y.
E. D. E. Co., Chicago, Ill.
Thomas A. Edison, Inc., Orange, N. J.
Edison Storage Battery Co., Orange, N. J.
Electric Storage Battery Co., The, Philadelphia, Pa.
Elyria Iron & Steel Co., The, Elyria, Ohio.

Fairbanks, Morse & Co., Chicago, Ill.
Fairmont Machine Co., Fairmont, Minn.
Federal Signal Co., Albany, N. Y.
Frictionless Rail, The, Boston, Mass.

Gallon Iron Works Co., Gallon, Ohio.
General Electric Co., Schenectady, N. Y.
General Ry. Signal Co. of Canada, Ltd.
General Railway Signal Co., Rochester, N. Y.
Gordon Primary Battery Co., New York, N. Y.
Grip Nut Co., Chicago, Ill.
Gurley, W. & L. E., Troy, N. Y.

Haggard & Marcusson Co., Chicago, Ill.
Hall Switch & Signal Co., New York, N. Y.
R. R. Hammond & Co., Philadelphia, Pa.
Hayes Track Appliance Co., Richmond, Ind.
Hobart-Allfree Co., The, Chicago, Ill.
Hoeschen Mfg. Co., Omaha, Nebr.
Hubbard & Co., Pittsburg, Pa.

Illinois Steel Co., Chicago, Ill.
Indianapolis Switch & Frog Co., The, Springfield, Ohio.
International Harvester Co. of America, Chicago, Ill.

H. W. Johns-Manville Co., Chicago, Ill.
O. F. Jordan Co., The, Chicago, Ill.
Joyce-Cridland Co., The, Dayton, Ohio.

Kalamazoo Railway Supply Co., Kalamazoo, Mich.
Kelly-Derby Co., Chicago, Ill.
Kennicott Co., The, Chicago, Ill.
Kerite Insulated Wire & Cable Co., New York, N. Y.
Keuffel & Esser Co., Chicago, Ill.

Lackawanna Steel Co., Lackawanna, N. Y.
Lehon Co., The, Chicago, Ill.
Lidgerwood Mfg. Co., New York, N. Y.
Louisiana Red Cypress Co., New Orleans, La.
Lufkin Rule Co., The, Saginaw, Mich.
David Lupton's Sons Co., Philadelphia, Pa.

Maryland Steel Co., Philadelphia, Pa.

C. F. Massey Co., Chicago, Ill.
McGraw Publishing Co., New York, N. Y.
Modern Frog & Crossing Works, Chicago, Ill.
Mudge & Co., Chicago, Ill.
M. W. Supply Co., Philadelphia, Pa.

National Carbon Co., Cleveland, Ohio.
National Electric Specialty Co., The, Toledo, Ohio.
National Indicator Co., Long Island City, N. Y.
National Lock Washer Co., The, Newark, N. J.
National Malleable Castings Co., The, Cleveland, Ohio.
National-Standard Co., Niles, Mich.
Geo. P. Nichols & Bro., Chicago, Ill.
Northey-Simmen Signal Co., The, Ltd., Indianapolis, Ind.
Ogle Construction Co., Chicago, Ill.
Okonite Co., The, New York, N. Y.
Spencer Otis Co., Chicago, Ill.

P. & M. Co., The, Chicago, Ill.
W. W. Patterson Co., Pittsburg, Pa.
Pennsylvania Steel Co., The, Philadelphia, Pa.
Pittsburgh Steel Co., Pittsburg, Pa.
Pocket List of Railroad Officials, New York, N. Y.
Positive Rail Anchor Co., Louisville, Ky.
Potter-Winslow Co., Chicago, Ill.

Q and C Co., The, New York, N. Y.

Rail Joint Co., The, New York, N. Y.
Railroad Supply Co., The, Chicago, Ill.
Railway List Co., Chicago, Ill.
Railway Review, The, Chicago, Ill.
Ramapo Iron Works, Hillburn, N. Y.
Reading-Bayonne Steel Casting Co., Reading, Pa.
Revolute Machine Co., New York, N. Y.
Rhineland Machine Works Co., New York, N. Y.
Richards-Wilcox Mfg. Co., Aurora, Ill.
Roberts & Schaefer Co., Chicago, Ill.

Sellers Mfg. Co., Chicago, Ill.
Signal Accessories Co., The, New York, N. Y.
Simmons-Boardman Publishing Co., New York, N. Y.
T. W. Snow Construction Co., Chicago, Ill.
Standard Asphalt & Rubber Co., Chicago, Ill.
Standard Underground Cable Co., Pittsburg, Pa.
Stark Rolling Mill Co., The, Canton, Ohio.
Steel Railway Tie & Appliance Co., Denver, Colo.

Templeton, Kenly & Co., Ltd., Chicago, Ill.

Union Draft Gear Co., Chicago, Ill.
Union Iron Works, Hoboken, N. J.
Union Switch & Signal Co., The, Swissvale, Pa.
United Electric Apparatus Co., Boston, Mass.
U. S. Wind Engine & Pump Co., Batavia, Ill.

Verona Tool Works, Pittsburg, Pa.

Waterbury Battery Co., The, Waterbury, Conn.
West Coast Lumber Mfrs.' Assn., Tacoma, Wash.



THE TANGO AT WASHINGTON
as a Supply Man Sees It.

Wm. Wharton, Jr., & Co., Inc., Philadelphia, Pa.
Winans Improved Patent Rail Joist Co., Portland, Ore.
Horace L. Winslow, Chicago, Ill.
Wolfe Brush Co., Pittsburg, Pa.
Wyoming Shovel Works, Wyoming, Pa.

Yale & Towne Mfg. Co., New York, N. Y.

RAILWAY NEWS.

Chicago & Northwestern.—A report that the Chicago & Northwestern Ry. had secured right of way from Lander, Wyo., to Idaho Falls, Idaho, and would soon undertake construction, is denied.

Chicago, Rock Island & Pacific.—It is stated that the Chicago, Rock Island & Pacific Ry. has postponed indefinitely the date for beginning double tracking of its line between Iowa City and Council Bluffs, Iowa.

The stockholders of the Chicago, Rock Island & Pacific Ry. will vote January 31 upon the acceptance by the company of a lease of the line of railway of the Rock Island, Stuttgart & Southern Railway company, extending from Mesa to Stuttgart, Ark., a distance of approximately 22 miles; said lease to extend for a term of 999 years from February 1, 1914, upon such terms and conditions as may be agreed upon.

Dayton, Lebanon & Cincinnati R. R. & Terminal.—The Ohio public utilities commission has authorized the Dayton, Lebanon & Cincinnati R. R. & Terminal Co. to issue \$500,000 in bonds. Of this amount \$300,000 are to be sold at once to pay off debts of \$240,000 and \$60,000 is to be used to enlarge terminals in Dayton, Ohio, and to lay new rail.

Grand Trunk Pacific.—An announcement is said to have been made that actual work on the Grand Trunk Pacific Ry. bridge over South Saskatchewan river will be commenced within a few weeks. The government of Saskatchewan intends giving the company a further guarantee of \$2000 per mile for railroad construction, and in addition \$1,300,000 to cover the cost of two railway bridges, one of which is on the line from Young to Prince Albert.

Intercolonial Railway.—The Intercolonial Railway of Canada has under way the following new construction: Nelson, N. B., to Derby Junction, diversion of line, 2.67 miles; St. Romauld, Que., to Chaudiere Junction, double tracking 3.75 miles; Pt. Tupper to Sydney, N. S., grade revision, 91 miles; Oxford Junction, N. S., to Painsec, N. B., double track, 73.7 miles; Halifax Ocean terminals; passenger station at Sussex, N. B.; block signals from Halifax, N. S., to Windsor Junction, 13.9 miles; from Moncton, N. B., to Painsec Junction, 7.2 miles; from St. John to Hampton, N. B., 22 miles. Contract has been awarded to the Union Construction Co., Ltd., North Sydney, N. S., at \$67,571, for the construction of a new line to run from a point on the Intercolonial at North Sydney station to a junction with the main line near Leitchs Creek, N. S.

Kane & Elk.—The Hamlin Bank & Trust Co. of Smethport, Pa., has been appointed receiver of the Kane & Elk R. R. which runs from Kane to Lamont, Pa., 7 miles, and Hillview to Martindale, 4 miles.

Kansas City, Ozark & Southern.—The Kansas City, Ozark & Southern Ry., it is said, will repair bridges, improve road-bed and purchase additional rolling stock. John W. Byng is now general manager of the road which extends from Mansfield to Ava, Mo., a distance of 15 miles.

Kansas City Union Depot & Terminal.—The Kansas City Union Depot & Terminal Railway Co. applied to the Missouri public service commission January 14 for permission to issue \$8,000,000 refunding and improvement bonds.

Louisville & Nashville.—The Louisville & Nashville R. R., according to report, is making preliminary surveys for revision of line and double track on its Cumberland Valley division between Middlesboro and Corbin, Ky.

The South & North Alabama R. R. (Louisville & Nashville R. R.) has filed its mortgage to the United States Trust Co. of New York, as trustee, to secure an authorized issue of \$25,000,000 5 per cent bonds. Of the bonds \$10,000,000 will be used to retire bonds issued under consolidated mortgage of 1886 on maturity, \$2,500,000 is reserved for equipment, already purchased and to be purchased, \$6,257,000 to pay floating debt and \$4,243,000 for cost of extensions, additions, betterments under construction or contemplated.

Missouri, Oklahoma & Gulf.—Louis S. Posner, of New York city, and Alexander New, Kansas City, Mo., have been appointed receivers for the Missouri, Oklahoma & Gulf Ry.

Nashville, Chattanooga & St. Louis.—The Nashville, Chattanooga & St. Louis Ry., it is stated, will apply for permission to build a double-track line from Glencliff, Tenn., through the southern part of Davidson county to the Nolens-

ville Turnpike, where the Radnor yards of the Lewisburg & Northern Ry., are being constructed.

New York, Chicago & St. Louis.—At a meeting in New York of the directors of the New York, Chicago & St. Louis R. R., January 14, no action was taken on the dividend on the common stock because of the fact that the earnings did not justify doing so. The regular semi-annual dividend of $2\frac{1}{2}$ per cent on the first preferred and second preferred stocks were declared.

Ocean Shore.—Stockholders of the Ocean Shore R. R. voted on January 10 to issue 5 per cent bonds in the sum of \$500,000. The first \$200,000 will be used for making the contemplated change to electric power and for sidings and other improvements.

Philadelphia & Reading.—The Philadelphia & Reading Ry. has awarded a contract for the grading and masonry preliminary to laying fourth track between Skillman and Belle Mead, N. J., on the New York division.

PERSONALS.

John K. Fahey, assistant superintendent of Morgan's Louisiana & Texas R. R. & Steamship Co., has been appointed superintendent of terminals at New Orleans, La.

Frank Fitzpatrick has been appointed assistant trainmaster of the International & Great Northern Ry., with headquarters at Valley Junction, Tex.

L. M. Dooley, terminal trainmaster of the Missouri Pacific Ry. at Omaha, Neb., has been appointed transportation inspector of the Texas & Pacific Ry. at New Orleans, La.

L. G. Scott has been appointed auditor of the Texas & Pacific Ry., with office at Dallas, Tex., succeeding R. E. Williams, resigned.

C. E. Carson has been appointed superintendent of the Ft. Dodge, Des Moines & Southern R. R., with headquarters at Boone, Iowa, succeed F. K. Shuff, assigned to other duties.

John F. Alsip, effective January 1, was appointed trainmaster of the Northern Pacific Ry. with headquarters at Tacoma, Wash., vice J. S. Dean, promoted.

A. P. Ottarson, assistant auditor of receipts of the Nashville, Chattanooga & St. Louis Ry. at Nashville, Tenn., has been elected controller, succeeding E. F. P'Pool, resigned.

Charles E. Burr, superintendent of the Pennsylvania division of the Delaware & Hudson Co. at Carbondale, Pa., has been appointed acting general superintendent of transportation, with headquarters at Albany, N. Y., succeeding Charles E. McKim, temporarily incapacitated on account of ill health.

J. W. Butts, trainmaster of the Missouri, Kansas & Texas Ry. at Greenville, Tex., has been appointed superintendent, with headquarters at Greenville.

C. A. Morgan, trainmaster of the Delaware & Hudson Co. at Carbondale, Pa., has been appointed acting superintendent of the Pennsylvania division, succeeding Charles E. Burr.

Howard L. Ingersoll, effective January 1, was appointed assistant to president of the New York Central Lines, with office at New York.

John W. Byng, auditor of the Kansas City, Ozark & Southern Ry., at Ava, Mo., has been made general manager.

A. H. Payson, assistant to president of the Atchison, Topeka & Santa Fe Ry. and president of the Northwestern Pacific R. R., has resigned the latter office and becomes vice-president.

W. S. Palmer, general manager of Northwestern Pacific R. R. succeeds A. H. Payson as president.

T. B. Burgess has been appointed trainmaster of the Chicago division of the Baltimore & Ohio R. R., with headquarters at Garrett, Ind.

William Walliser, division superintendent of the Chicago & North Western Ry. at Belle Plaine, Iowa, has been appointed assistant to the general managers and will be assigned to special duties, with office at Chicago.

B. E. Terpning has been appointed superintendent of the East Iowa division of the Chicago & North Western Ry., with headquarters at Belle Plaine, Iowa, vice William Walliser, promoted.

W. D. Beck has been appointed superintendent of passenger terminals of the Chicago & North Western Ry. at Chicago, succeeding B. E. Terpning, promoted.

C. H. Shircliffe has been appointed superintendent of dining and parlor cars of the Chicago & North Western Ry., with office at Chicago, vice W. D. Beck, promoted.

E. W. Sandwich has been appointed superintendent of car

service of the Atlanta & West Point R. R. and Western Ry. of Alabama, with office at Atlanta, Ga.

TRAFFIC.

W. Van Valkenburgh has been appointed general baggage and mail agent of the Long Island R. R., succeeding G. F. Chichester, retired under the pension rules after a service of 51 years.

C. M. Andrews, traveling freight and passenger agent of the Southern Pacific Co. at Tacoma, Wash., has been transferred to Seattle, Wash.

C. D. Whitney has been appointed traffic manager of the Chicago, Peoria & St. Louis R. R., with headquarters at St. Louis, Mo. He will have charge of all matters pertaining to freight and passenger traffic.

W. H. Askew has resigned as general agent of the New Orleans, Mobile & Chicago R. R. at New Orleans, La.

R. W. Rigdon has been appointed commercial agent of the Kansas City, Mexico & Orient Ry., with office at Ft. Worth, Tex., succeeding F. E. Mitchell, resigned to engage in other business.

P. H. Scanlan has been appointed division freight and passenger agent of the Chicago, Milwaukee & St. Paul Ry., with headquarters at Great Falls, Mont.

Edward R. Ferry has been appointed general agent of the Illinois Central R. R. and the Yazoo & Mississippi Valley R. R., at New Orleans, La., succeeding Hunter C. Leake.

A. C. Green has been appointed contracting freight agent of the Illinois Central R. R., with office at Cleveland, Ohio.

J. H. Boodro has been appointed traveling freight agent of the Illinois Central R. R., with office at Carbondale, Ill.

G. V. Holton has been appointed traveling freight agent of the Illinois Central R. R., at Indianapolis, Ind., vice J. H. Boodro, transferred.

C. A. Francois has been appointed contracting freight agent of the Illinois Central R. R., with office at Minneapolis, Minn., vice G. V. Holton, promoted.

ENGINEERING.

E. Sullivan has been appointed roadmaster of the Chicago, Rock Island & Pacific Ry. at Washington, Iowa, vice C. Flynn.

MECHANICAL.

William Lanon has been appointed supervisor of locomotive operation of the Arkansas, Indian Territory and Louisiana divisions of the Rock Island Lines, vice S. T. Patterson, transferred.

S. T. Patterson has been appointed supervisor of locomotive operation of the Chicago Terminal and Illinois divisions of the Rock Island Lines, vice R. E. Wallace assigned to other duties.

B. F. Crowley has been appointed supervisor of locomotive operation of the Baltimore & Ohio R. R., with headquarters at Wheeling, W. Va., succeeding T. B. Burgess, transferred.

E. B. Hall, division master mechanic of the Chicago & North Western Ry. at Chicago, has been appointed assistant to the general superintendent of motive power and car departments, with headquarters at Chicago.

J. G. Dole has been appointed master mechanic of the Alliance division of the Chicago, Burlington & Quincy R. R., lines west of the Mississippi river, with headquarters at Alliance, Neb., succeeding T. J. Raycroft, resigned.

C. D. Ashmore, general foreman of the Chicago & North Western Ry. at Clinton, Iowa, has been appointed master mechanic at Pekin, Ill.

T. Nicholson has been appointed master mechanic of the Louisiana Railway & Navigation Co., with headquarters at Shreveport, La., succeeding M. F. McCarra, resigned.

OBITUARY.

Henry Walton Griffith, assistant secretary of the Norfolk & Western Ry., died suddenly in New York city, January 15.

William Franklin Berry, former second vice-president of the Boston & Maine R. R., died January 9, at his home in Winchester, Mass. Mr. Berry was born February 2, 1844, at Biddeford, Me., and entered railway service in May, 1864, as a clerk on the Eastern Railroad. This road later became a part of the Boston & Maine. Mr. Berry, therefore, had virtually been in the service of the same company for nearly fifty years. He was general freight and passenger agent of the Boston & Maine R. R. system from March 1, 1889, to May 17, 1892, and from May 17, 1892, to December 1, 1895, general traffic manager. Mr. Berry was elected second vice-president of the Boston & Maine, with authority

over the traffic departments December 1, 1895. He retired on June 1, 1913.

W. B. Linsley, formerly superintendent of the Peninsular division of the Chicago & North Western Ry., died at his home in Escanaba, Mich., January 10. Mr. Linsley first went to Escanaba when the Chicago & North Western was extended to that point in 1868. He later became general manager of the road west of the Missouri river and then general superintendent of the entire system, but because of ill health about fifteen years ago returned to Escanaba to resume his earlier position.

Richard Dixie Lankford, vice-president and secretary of the Southern Railway, was found dead from gas asphyxiation in his apartments in Brooklyn, N. Y., January 15.

NEW ROADS AND PROJECTS.

Alabama.—It is reported that the Nashville, Chattanooga & St. Louis Ry. will extend its line from Lax, Ala., to Decatur, Ala., where connection will be made with the Southern Railway and Louisville & Nashville R. R. The Southern Railway owns the bridge now operated over the Tennessee river north of Decatur. Unless arrangements could be made for its use by the proposed new line the building of a new structure would be necessary.

Arizona.—The Department of Agriculture, according to press reports, has approved the sale of a billion feet of lumber from the Kaibab National forest in southern Utah and northern Arizona, with authority for the construction of 200 miles of railroad. Bids will be received up to the middle of June this year, then three years will be allowed for building the railway.

Idaho.—A report says that the St. Maries branch of the Chicago, Milwaukee & St. Paul Ry. is to be extended this spring to the Clearwater river at Ahsahka, Idaho.

Indiana.—The Indianapolis & Frankfort R. R. is reported incorporated with a capital of \$60,000, to construct a line as a connection between the Pittsburg, Cincinnati, Chicago & St. Louis Ry., at or near the eastern corporation line of Indianapolis, Ind., and the Vandalia Railroad, near Frankfort, Ind. It is to be operated through Marion, Boone, Hendricks and Clinton counties, length approximately 55 miles. The incorporators and directors are Jos. Wood, J. J. Turner and E. B. Taylor, of Pittsburg, Pa., and A. M. Schover, St. Louis, Mo.

Kentucky.—Articles of incorporation of the Tug River & Kentucky Railroad Co. have been filed with the Kentucky railroad commission and with the secretary of state. The capital stock is \$50,000 and the home office is at Ashland, Ky. The railroad will follow Blackberry, Peter and Poplar creeks and intersect with the Norfolk & Western Ry. at Ashland. The incorporators are N. D. Maker and L. E. Johnson, of Roanoke, Va.; W. G. Macdowell and J. T. Dorian, Philadelphia; W. J. Jennings, Bluefield, W. Va.; W. A. Ginn, of Ashland, and Henry Barnes, of Portsmouth, Ohio.

Maine.—It is reported that plans are being made for the building of a railroad from Jonesport, on the Maine seacoast to Oakfield, on the Bangor & Aroostook R. R., a distance of 115 miles. The state legislature granted, last year, a renewal of a charter for the Jonesport Central & Northern R. R., which will cover 21 miles of the projected system and which provides for a connection with the Maine Central R. R. at Columbia Falls. Jonesport has a fine deep-sea harbor, the bay being three miles wide.

Maryland.—The Pittsburg & Buffalo Coal & Lumber Co. has commenced construction of the proposed line from Cook's Mills to Kennels Mills, Md., a distance of about nine miles. N. C. Hunter & Co., Pittsburg, Pa., have the contract.

North Carolina.—The Dan River Ry., recently incorporated, will build a line 30 miles long from King, N. C., to Asbury, N. C. Gasoline electric motor cars will be used for passenger service, while steam locomotives will be employed for freight. Harlee Miller of Clemmons, N. C., and others are the incorporators.

The Gulf & Bay Ry., capital stock \$10,000 to \$50,000, has been chartered to build a line from Belva to Carmen, N. C., a distance of 10 miles. The incorporators are A. G. Betts, D. M. Harshburger and B. Starbuck of Stackhouse, N. C.; W. N. Garrett of Hot Springs; Robert C. Lieb of Walnut, and W. B. Barnhisel of Dufor, Ore.

Oklahoma.—W. D. Gibson of Grove, Okla., and associates, it is said, are having survey made for a railroad 6 miles long from Grove to Copeland to connect the St. Louis & San Francisco R. R. with the Missouri, Oklahoma & Gulf Ry.

It would require a 400-ft. bridge over the Neosho river. Chas. D. Bennett is chief engineer.

Pennsylvania.—The Beaver Valley & Ohio R. R. has been incorporated in Pennsylvania with \$120,000 capital, to construct a line from a point in White township, Beaver county, Pa., to the Ohio state line, 12 miles. The incorporators include W. A. Goehring, president, R. R. Goehring, F. B. Hall, Zeleinople, and M. G. Hibbs, of Pittsburg, Pa.

South Carolina.—President W. R. Bonsal of the Charleston Northern Ry. has been quoted as saying that track material for the proposed new line into Charleston, S. C., has been shipped and within 30 days a large force of men would be at work between Charleston and Andrews.

Texas.—The Gulf & Pacific Ry., with principal office at Sweetwater, Nolan county, Tex., has filed articles of incorporation; capital stock, \$125,000. The company proposes to construct a line of railroad from Sweetwater to Comanche, Tex., a distance of 125 miles, passing through the counties of Nolan, Taylor, Runnels, Callahan, Coleman, Brown, Eastland and Comanche. The incorporators are J. V. Holmes, Ben Anthony, E. O. Wedge, J. S. Focht, William Wright, H. C. Hord, John J. Johnson and M. J. Hoaly.

A contract has been received by the chamber of commerce, Plainview, Tex., reciting that the Quanah, Acme & Pacific Ry., will extend into Plainview, erect and maintain a concrete or brick roundhouse containing seven stalls for locomotives and carsheds, a brick depot and terminals in Plainview, for which the people of Plainview are asked to pay a bonus of \$100,000 in cash, procure the right of way from the Floyd county line across Hale county and give terminal grounds in Plainview, which means a total outlay of about \$150,000. The bonus is not to be paid until trains are running into Plainview, and the road guarantees to have trains running not later than September 1, 1915. The railroad reserves the right to use the track of the Atchison, Topeka & Santa Fe Ry. from Floydada to Plainview, but will maintain a separate depot.

The Nueces Valley, Rio Grande & Gulf Ry., it is said, will probably award contracts in February for the construction of its proposed railroad from Kitty, Tex., via Simpson, Tex., to the central portion of McMullen county, 25 miles. J. W. Brooks, Belleville, Tex., is chief engineer.

Utah.—See New Roads and Projects under Arizona.

Washington.—The new branch line of the Northern Pacific Ry. to Fort Simcoe, Wash., will be extended to White Swan early this spring, it is said. The line now runs 12 miles out of Toppenish and the distance to White Swan is 11 miles.

The Tacoma Eastern R. R. (Chicago, Milwaukee & St. Paul Ry.) has awarded contract to Hans Pederson, Seattle, Wash., at about \$250,000, for the construction of 13 miles of roadbed.

West Virginia.—A report says that the Petersburg & Columbia Springs Ry. has been organized to build a line in the mountains of West Virginia through to Monterey, Va. John Y. Hite, A. R. Watson, Lloyd Bailey and R. L. Long of Fairmount, W. Va., are said to be interested.

Wyoming.—See Railway News under Chicago & Northwestern Ry.

Electric Railways.

The McKinley interests, controlling the Illinois Traction Co., will, it is reported, construct the projected electric railway to connect Jefferson City, Columbia, Fulton and Mexico, Mo., and possibly a longer line from St. Louis to Kansas City.

The Northwestern Electric Ry. Co., capital authorized from \$100,000 to \$2,000,000, has been granted a commission. The proposed line will be about 150 miles in length, from Easley via Anderson, Abbeville, McCormick and Edgefield, S. C., to Augusta, Ga. The petitioners were James E. Leach and W. C. Smith of Easley, A. S. Farmer and J. H. Anderson of Anderson, S. J. Wakefield and A. M. Erwin of Antreville, W. P. Calhoun and O. P. Bright of Edgefield, J. J. Andrews and T. J. Price of McCormick, and C. C. Gambrell and W. N. Graydon of Abbeville, S. C.

Contract for construction of the proposed interurban railway from Galesburg to Peoria, Ill., has been awarded to W. H. Schott, 1913 Harris Trust building, Chicago.

The Fort Scott & Pittsburg Ry., has been incorporated to construct and operate an electric railway from Fort Scott, Kan., to Pittsburg, via Frontenac, Garland, Arcadia and Mulberry. The incorporators are A. P. Dickman, W. J. Calhoun, A. R. Kearns, Walter Glunz, C. D. Samble, A. N. Keene and Robert B. Barr.

The Fort Worth-Denton interurban Ry., Fort Worth, Tex., has organized by electing E. E. Baldrige, president;

Sam Davidson, vice-president; Marion Sansom, vice-president; Alex. Spears, secretary and treasurer; executive committee, Sam Davidson, Marion Sansom, W. E. Connell, John P. King, B. J. Tillar and E. E. Baldrige. John Mead, constructing engineer representing the St. Louis Union Trust Co. in the construction of the interurban from Dallas to Waco and Corsicana, has been selected as engineer for the proposed line.

Construction of the Maryville & Knoxville Interurban Ry. has been begun near Maryville, Tenn. R. B. Oliver, Knoxville, Tenn., is the contractor. Morton Butler, Chicago, Ill., is president of the road, and Knox Burger, Maryville, Tenn., secretary.

The Wisconsin, Illinois & Indiana Electric Ry. has applied for a charter to build an electric railway from the northern line of McHenry county south through the counties of Cook, DuPage, Kankakee, Will, Livingston and McLean. Capital stock, \$500,000. The incorporators are J. C. Williams and H. M. Walker, Evanston; J. B. Hubling, Downers Grove, and James L. Clark and C. H. Seeberger, Chicago.

The Shelbyville, Petersburg & Decatur R. R. has been incorporated to build a steam or electric railway from Shelbyville, Tenn., to Decatur, Ala. The capital stock is \$10,000. S. P. Kirkpatrick, Shelbyville, is reported interested.

The Detroit, Lansing & Grand Rapids Ry., it is said, plans to begin work in the spring on its 135-mile line between Detroit, Mich., and Grand Rapids, via Lansing. Capital, \$2,500,000. The company will furnish power for lighting purposes. Henry M. Wallace, 704 Union Trust building, Detroit, is vice-president; and H. M. Wallace, of Detroit, is general manager.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Curary of Ecuador has ordered 2 mogul (2-6-0) locomotives from the Baldwin Locomotive Works.

—The Delaware, Lackawanna & Western R. R., it is said, has prepared specifications for new locomotives.

—The Northwestern Pacific R. R., is reported to be in the market for 4 American type (4-4-0) and 2 ten-wheel (4-6-0) locomotives.

—The report that the Georgia Railroad is in the market for additional locomotives has been officially denied.

Freight Cars.

—The Union Tank Line Co. is in the market for 500 steel tank cars of 8000 gallons capacity.

—The Virginian Railway is reported in the market for 1000 gondolas.

—Morris & Co., it is said, have ordered 200 refrigerator cars from the Haskell & Barker Car Co.

—The Illinois Central R. R. has ordered 150 refrigerator cars from the American Car & Foundry Co.

—The Atchison, Topeka & Santa Fe Ry. has ordered 500 box and 300 furniture cars from the American Car & Foundry Co. and 200 tank cars from the Pressed Steel Car Co.

—The Kanawha & Michigan Ry. has ordered 1150 50-ton general service cars from the Ralston Steel Car Co.

—The Buffalo Creek & Gauley R. R. has ordered 200 hopper cars from the Pressed Steel Car Co.

—The Hocking Valley Ry., according to report, has ordered 1000 coal cars from the Cambria Steel Co.

Passenger Cars.

—The Delaware & Hudson Co. is said to be in the market for passenger cars.

—The Rutland Railroad is in the market for 8' coaches, 3 smoking, 3 mail and smoking, 1 mail, 3 baggage and 8 milk cars.

—The Northern Pacific Ry., we are advised, is now in the market for 40 express refrigerator cars but for no other passenger equipment.

—The Kanawha & Michigan Ry. has ordered 5 70-ft. steel passenger coaches from the American Car & Foundry Co.

Machinery.

—The Pennsylvania Railroad, it is said, is asking bids on a number of tools to be supplied shops on its various divisions. The list includes lathes, shapers, drill presses, pipe machines and special presses.

Iron and Steel.

—The Seaboard Air Line Ry. is said to be in the market for 20,000 tons of rails.

—The Southern Railway is reported as inquiring for 25,000 tons of rails.

Buildings, Terminals, Etc.

—The Michigan Central R. R., according to report, has purchased a 10-acre site adjoining its yards in North Toledo, Ohio, on which shops for heavy repair work may be built.

—The Norfolk Southern R. R. is contemplating the erection of an engine house at Raleigh, N. C.

—The Rock Island Lines have awarded contract to the Fox Construction Co., El Reno, Okla., for constructing the subway on Georgia avenue, Memphis, Tenn., which will be used as an approach to the new freight terminal.

—The new station and office building of the Missouri, Kansas & Texas Ry., at Parsons, Kan., was formally opened on January 8.

—The Western Pacific Ry., it is said, has agreed to spend \$1,000,000 in the next three years for the improvement of its portion of the water front at Oakland, Cal.

—The Seaboard Air Line Ry. is soon to begin work on important terminal improvements at Savannah, Ga., which, it is said, will involve an expenditure of \$500,000.

—Railroads entering Spartanburg, S. C., are preparing to erect a union station at that place.

—Plans are being prepared by the Central of Georgia Ry. for the proposed new union passenger station to be erected at Cherry and Fifth streets, Macon, Ga. The building will be three stories high, with space for offices, ample facilities for baggage and express, besides offering the best accommodation to the public. Umbrella sheds and 16 tracks will be built.

—The Michigan Central R. R. will construct a new freight terminal at the foot of Third street, Detroit, Mich., on the site of the old passenger station, recently destroyed by fire. An expenditure of about \$500,000 is contemplated.

Bridges.

—The Duluth & Iron Range R. R., it is said, has ordered 365 tons of structural steel from the American Bridge Co.

—The Pennsylvania Railroad has contracted with the Lackawanna Bridge Co. for 300 tons of steel for two bridges.

—The Oregon-Washington R. R. & Navigation Co. is expected to ask for bids this month for a \$575,000 steel swing bridge across the city water-way at Tacoma, Wash.

—Contract for the construction of four reinforced concrete bridges over the University of Washington campus at Seattle, Wash., has been awarded by the Northern Pacific Ry. to the Sound Construction & Engineering Co., at about \$80,000.

—Plans have been prepared for the proposed plaza over the Western & Atlantic R. R. yards and adjoining streets, union depot, and viaducts at West Alabama and Spring streets, Atlanta, Ga. The estimated cost is \$1,700,000.

—Officials of the Pennsylvania Lines west of Pittsburg have been in conference with city and county authorities at Lima, Ohio, considering plans for grade crossing elimination in that city.

—See Railway News under Grand Trunk Pacific Ry. and reference to three bridges to be built in Saskatchewan.

—The Pennsylvania Railroad has awarded contract to the McClintic-Marshall Co. for 400 tons of steel for a bridge at Metuchen, N. J.

—The Delaware Lackawanna & Western R. R. is expected to prepare plans soon for the elimination of grade crossings in Orange, N. J.

—Brazoria county, Texas, has accepted the proposition of the Houston & Brazos Valley R. R. to build a railroad and vehicular bridge across the Brazos river, connecting Freeport and Velasco, Tex. The county's share in the expense will be \$60,000.

SUPPLY TRADE NOTES.

—The Link Side-Bearing Co., Hammond, Ind., has been incorporated to manufacture railroad trucks. The capital stock is \$100,000. The incorporators are Joseph T. Hutton, Geo. C. Lacklin, Camille Gauthier, Henry W. Marden, William S. Hutton and William J. Whinery.

—The Stow Manufacturing Co., Binghamton, N. Y., announces that D. Walker Wear, formerly purchaser of the Chicago Tunnel Co., has been elected vice-president and a director of the company with offices at 443 State street, Binghamton.

—The Des Moines Bridge & Iron Co. of Pittsburg, Pa., and Des Moines, Iowa, opened a contracting office at 50

Church street, New York city, January 1, 1914. J. E. O'Leary, one of the company's contracting engineers, is in charge of the office. This office will handle the business in the coast states north of Virginia and in Eastern Canada. The Des Moines Bridge & Iron Co. makes a specialty of the design and construction of hemispherical bottom steel tanks on steel towers for municipal, railway and industrial work.

—The Chicago Pneumatic Tool Co. held its tenth annual convention of the sales and factory organizations this week at the Great Northern hotel, Chicago. About one hundred of the company's representatives have been in attendance from all parts of the world including W. G. Corner and Ernest Martin from London, Ernest Eklund from St. Petersburg, Gustavo Cucculo from Milan and Geo. Shepard from Montreal. There were morning, afternoon and evening sessions and demonstrations and tests of new tools were made. President W. O. Duntley will be host at a banquet given at the close of the convention Saturday evening. The business of the company is in exceptionally flourishing condition, the sales for 1913 having exceeded those of any previous year since the organization of the company.

—The Railroad Water & Coal Handling Co. has been formed, with offices at 537 S. Dearborn street, Chicago. President W. D. Miller has had long experience in connection with railway water supply. He had charge of this work on the Atchison, Topeka & Santa Fe Ry., the Illinois Central R. R. and the Missouri Pacific Ry., with remarkably good results. He left the latter road to connect himself with the T. W. Snow Construction Co. The vice-president of the new company, T. S. Leake, is also an old railway man, having been for some years superintendent of buildings for the Illinois Central and the Missouri Pacific railways. For some years he has been engaged in railway contracting. The new company is therefore equipped by long practical experience. It is prepared to contract for the building of water stations, water treating plants, pipe lines and sewers, filtering plants, coaling stations, etc., and to furnish water reagents, gasoline and oil engines, and to make water investigations.

—Joseph M. Flannery of Pittsburg who has been so closely identified with the introduction of vanadium in this country, has been for some time devoting his attention to the production of radium through the Standard Chemical Co. He denies the necessity for the government taking a hand in the production of radium as proposed by Secretary of the Interior Lane. He says: "During the year of 1914, our company will be able to place at the disposal of physicians and hospitals from ten to twelve grams of radium. This is a production about 200 per cent greater than the rest of the entire world, or about 400 per cent in excess of the radium production of the Austrian government. Austria is famous for its radium, but that which we get from our mines in the State of Colorado alone is greater in bulk than the supply of the entire world. The annual radium output of Europe is at present only four grams, about one-seventh of an ounce." He therefore resents the statement that this country now has to rely on a foreign supply of radium.

—In the biographical sketch of the late E. L. Adreon, the error was made of saying that he was succeeded as general manager of the American Brake Co. by his son, who recently died. The general manager of the brake company is the surviving son, Robert E. Adreon; E. L. Adreon, Jr., having been with the Adreon Mfg. Co.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, JANUARY 6, 1914.

Rail supporting and fastening device, 1,083,270—Daniel L. Braine, New York, assignor to Composite Tie Plate Corporation, New York, N. Y.

Switch opener, 1,083,286—Harry J. Lantz, Augusta, N. J.

Machine for raising and lowering railway tracks and applying ballast thereto, 1,083,302—Walter F. Sparks, Sinton, Texas.

Electric Signaling system, 1,083,306—John D. Taylor, Edgewood Park, Pa., assignor to the Union Switch & Signal Co., Swissvale, Pa.

Steel tie, 1,083,322—Martin T. Hansen, Trenton, N. J.

Yoke for draft gears, 1,083,335—Charles J. Nash, Chicago, Ill., assignor to Universal Draft Gear Attachment Co.

Angle cock holder, 1,083,337—Edward Posson, Chicago, Ill.

Pipe coupling gasket, 1,083,350—Edward W. Davis, Hollis, N. Y., assignor to Westinghouse Automatic Air and Steam Coupler Co., St. Louis, Mo.

Safety device for brakes, 1,083,351—Sidney G. Down, Chicago, Ill.

Railroad cattle gate, 1,083,367—William G. King, Austin, Ark.
 Rail loader, 1,083,390—Martin Fenney, St. Paul, Minn.
 Draft gear, 1,083,391—William D. Forsyth, Youngstown, Ohio, assignor to Railway Products Corporation, Buffalo, N. Y.
 Forging for car truck side frames, 1,083,392—William D. Forsyth, Youngstown, Ohio, assignor to Railway Products Corporation, Buffalo, N. Y.
 Forged car truck side frame, 1,083,393—William D. Forsyth, Youngstown, Ohio, assignor to Railway Products Corporation, Buffalo, N. Y.
 Locomotive stoker, 1,083,432—David F. Crawford, Pittsburgh, Pa.
 Rail securing device, 1,083,436—William L. De Remer, Chicago, Ill.
 Grinder and polisher for car journals, 1,083,452—Nelson C. Markham, Denver, Colo.
 Rail tie and joint, 1,083,474—Carl V. Wilford, Barberton, Ohio.
 Metallic railway tie, 1,083,487—Lawrence Guenenfelder, Pierron, Ill.
 Railroad cross tie, 1,083,488—Charles M. Gunter and Columbus F. Nelson, Moultrie, Ga.
 Ratchet brake lever, 1,083,519—Robert H. Blackall, Pittsburgh, Pa., assignor to Ratchet Brake Co., New York, N. Y.
 Pneumatic brake, 1,083,521—Francois Jules Chapsal and Alfred Louis Emile Saillot, Paris, France.
 Dust deflecting device for car windows, 1,083,536—Robert A. Hammond, Sandwich, Mass.
 Railroad spike, 1,083,559—Clarence E. Prowell, Chester, Ill.
 Dumping car, 1,083,563—Ralph V. Sage, Westmont, Pa.
 Process of making rail joint bars, 1,083,578 and 1,083,579—Benjamin Wolhaupter, New Rochelle, N. Y., assignor to The Rail Joint Co., New York, N. Y.
 Train controlling device, 1,083,588—James J. Brennan, Fort Wayne, Ind.
 Railway tie plate, 1,083,599—Samuel Downs, Pitman, N. J.
 Anti-rail creeper, 1,083,603—Henry G. Elfborg, Chicago, Ill., assignor to Ajax Rail Anchor Co., Chicago, Ill.
 Railway tie and fastener, 1,083,626—Cruge L. McCray, Portsmouth, Ohio.
 Mail bag receiving device, 1,083,629—Daniel W. Millsaps, Marion, S. C., assignor to Millsaps Mail Exchange Co., Marion, S. C.
 Head rest for car seats, 1,083,633—Charles R. Saunders, Richmond, Va.
 Sleeping car, 1,083,640—Edwin E. Tait, Bradford, Pa.
 Means for supporting railroad rails, 1,083,647—Benjamin F. Wise, San Francisco, Cal.
 Electric head light, 1,083,658—Herman H. Boney, Chicago, Ill.
 Railway tie, 1,083,667—Jay G. Dinger, Charles C. Dinger and Gustov C. Schaffer, Chicago, Ill.
 Electric traffic controlling system, 1,083,669—Frank L. Dodgson, Rochester, N. Y., assignor to General Railway Signal Co., Gates, N. Y.
 Manufacture of superheater units, 1,083,688—Columbus K. Lassiter, Richmond, Va.
 Door operating mechanism for railway cars, 1,083,705—Frederick Seaberg, Chicago, Ill., assignor to National Dump Car Co., Chicago, Ill.
 Circuit breaker connection for electric railway system, 1,083,726—Frank E. Case, Schenectady, N. Y., assignor to General Electric Co., Schenectady, N. Y.
 Switch shield, 1,083,745—Henry H. Jones, Pottsville, Ark.
 Switch, 1,083,751—James S. Lockard, Spartanburg, S. C.
 Extensible trap for railway cars, 1,083,762—Ellwood H. Sickles, West Philadelphia, Pa.
 Railway rail, 1,083,791—James B. Baum, Grand Junction, Colo.
 Guard for rail frogs, 1,083,799—Clarence A. Caldwell, Jacobsburg, Ohio.
 Car door opener, 1,083,800—John W. Carver, Hay Springs, Nebr.
 Rail joint, 1,083,811—John W. Enright, New Orleans, La.
 Combination tie jack, 1,083,816—Harry H. Ferris, Huntington Beach, Cal.
 Mail receiving and delivering device, 1,083,825—Robert Glenn, Madison, Wis.
 Box car, 1,083,831—William S. Holdaway and William M. Ryan, Provo, Utah.
 Means for the interchange of messages between a station and a moving car, 1,083,866—Oliver H. Smith, Slatford, Pa., and Josiah L. Smith, Southern Pines, N. C.
 Accelerator for air brakes, 1,083,891—Joseph de Lipkowski, Paris, France.

Station indicator, 1,083,898—Bert Rivkin, New York, N. Y.
 Wheel flange lubricator, 1,083,901—James H. Miner, Lumberton, Miss.
 Journal box, 1,083,905—William E. Crist, Baltimore, Md.
 Lubricator, 1,083,906—Leopold Kassander, New York, N. Y.
 Car vestibule diaphragm, reissued, 13,669—William H. Forsyth, Chicago, Ill.
 Brake arrangement for six-wheel trucks, reissued, 13,670—William H. Lewis and John A. Pilcher, Roanoke, Va.



CLASSIFIED ADVERTISING

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POSITIONS VACANT.

WANTED—A pen and ink artist who has seen railroad service and who has a technical knowledge of cars, locomotives, signals, and railway appliances. Should be a man who is a good draftsman with some artistic ability. Address "Art," care of Railway Review, Ellsworth Bldg., Chicago.

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OPPORTUNITIES.

WANTED—Party with some capital and experience in the railroad field to take an interest and position in the sale of a high-grade railroad track device now in practical use. Repeat orders now on hand. Address Box 147, Railway Review, Ellsworth Building, Chicago.

WANTED—To manufacture and market good railway specialty. Give full and complete particulars and royalty expected in your first letter. "Manufacturer," Box 17, care Railway Review, Ellsworth Building, Chicago.

EDUCATIONAL.

OFFICIALS of the Union Pacific and Illinois Central railroads have recently arranged to extend the privileges of the Railway Educational Bureau, conducted on their lines for several years, so that officials and employees of other roads can participate in its benefits.

Twenty-five courses of instruction are available.

Officials have found in these a means of broadening their general railroad knowledge; employes have qualified for and obtained promotion; college men have combined these practical studies with their theoretical ones beneficially.

Twelve dollars in advance (or two payments of \$6.75 each) entitles any subscriber to all the privileges of the Bureau for one year.

Send check, and state what you want; or write for further information.

The Railway Educational Bureau, Room 303 Union Pacific Headquarters, Omaha, Nebraska.

RAILWAY REVIEW

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Increasing Maintenance Costs.

The Interstate Commerce Commission bulletin of revenues and expenses of steam railways for the month of October, 1913, shows that for the first four months of the current fiscal year maintenance of way and structures took 13.99 per cent of the total operating revenues, against 13.19 per cent during the same months of the previous year. Maintenance of equipment took 16.57 per cent against 15.28 per cent in 1912. Transportation expense took 33.32 per cent against 32.12 per cent. The proportion required for track and structure thus increased 6.06 per cent; that for transportation 3.73 per cent; while that for maintenance of equipment increased 8.44 per cent.

Pennsylvania R. R. Quick Lunch Car.

The lunch counter car, which was built at the Altoona shops of the Pennsylvania R. R., some months ago and which has been since running experimentally between Philadelphia and New York, has now been permanently placed in service on the main line to run between Philadelphia and Pittsburgh. It is probable that many more of these cars will be built within the next few years.

South African Strike Ended.

The general strike of mine and railway workers in South Africa, which began Tuesday, January 13, was ended during the closing days of the same week. The government promptly issued a proclamation of martial law throughout the region affected. General Louis Botha, prime minister, veteran of the Boer war, took personal charge of the situation and a most energetic policy was pursued. All persons obstructing the operation of the industries concerned, or engaging in meetings or conferences on the strike question, were promptly arrested. The disaffected men began to return to work, and on Sunday, January 18, the railway strike was officially called off.

Resolutions Oppose Central Pacific-Southern Pacific Divorce.

The Chamber of Commerce, of San Francisco, Cal., passed a resolution, January 20, condemning the proposed suit of the United States government to require the Southern Pacific Co. to sell the capital stock of the Central Pacific. The proposed action, according to the resolution is not in the public interest, and will work a "commercial injury to the people of this state." It is declared that ownership of the Central Pacific by the Southern Pacific is not a combination in restraint of trade, and that the two roads were built at the same time by the same management, practically as one system. The separation, it is claimed, would leave the Southern Pacific "without a through line and connections necessary to unite different branch lines for operation, and also deprive it of terminal and main lines which are essential to the service of the community reached by its lines."

Resumption of the Anthracite Inquiry.

The Interstate Commerce Commission resumed, on January 14, its inquiry into the anthracite coal industry with

reference to rates and practices existing between the railroads and coal companies. The hearings were begun last November, and were suspended until this time because of the death of Commissioner John H. Marble. Commissioner C. C. McChord presided. Attorneys for the commission endeavored to show that there is a combination among certain corporations identified with the coal trade to fix a basis for rates. Storage facilities of the coal-carrying railroads were under investigation on Friday, January 16. W. D. Grier, general coal and freight agent of the Lehigh Valley, and A. S. Lcaroyd, general freight agent of the Delaware, Lackawanna & Western, told of the storage of hard coal at certain points along their respective lines, and in answer to questions by counsel for the commission testified that the storage privileges were open to all shippers provided they leased the storage space. The Lehigh Valley Coal Sales Co. and the Delaware, Lackawanna & Western Coal Co. said they were given no advantage over independent shippers. Both witnesses were of the opinion that most of the independent shippers along their lines were not in need of storage facilities, because they did not mine large quantities of coal. The commission closed its side of the case, on Saturday, with the introduction of exhibits compiled by E. F. Morgan, accountant for the commission, comprising masses of figures contained in a half hundred tabulations showing the cost of hauling. The defense, which includes all the anthracite-carrying railroads and involves the so-called railroad coal companies, will present its side of the case in the course of a continuation of the hearing, in New York city.

New Express Rates for Illinois.

The Public Utilities Commission of Illinois has issued an order requiring express companies within the state to adopt, effective February 1, the rates and system of computing rates now effective in interstate express business, as recently ordered by the Interstate Commerce Commission. The order involves also the interstate regulations as to joint rates. The effect will be a reduction in rates, especially in those for the longer distances within the state.

Safety First on the Grand Trunk Ry.

The executive committee in charge of the safety first movement on the Grand Trunk Ry. held its first meeting at Montreal, on January 12. This being the first meeting of the committee since the organization of the movement on this road in August, 1913. Since that time twenty-four division, shop and terminal safety committees have been organized on the system, with a membership of about six hundred. During the month of December alone the members of these committees actually corrected five hundred unsafe physical conditions which might perhaps have caused injury, and cautioned employees against unsafe methods, and practices in about four hundred and eighty cases. The report of the secretary showed that since the inauguration of the safety movement injuries to employees on the Grand Trunk have been reduced to the extent of 11.5 per cent and that during the same period fatal injuries to employees on duty have been decreased 50 per cent, as compared with same period of 1912; this notwithstanding the fact that traffic was heavier in the latter period than in the former.

Stockholders of the Pennsylvania Railroad.

On January 1, there were 88,586 shareholders in the Pennsylvania Railroad Co., the largest number in the history of the company, and showing an increase of 13,431 for the calendar year, 1913. Of this total, 42,514 shareholders were women, there having been an increase during the year of 6266 women stockholders. Women constitute almost 48 per cent of the total number of Pennsylvania stockholders.

During the year there has been an increase of 6010 shareholders in the state of Pennsylvania, the stockholders in this state now numbering 29,792. Stockholders abroad now number 11,676, a total of 1047 having been added during the past year.

As to Standing of Ohio Roads.

Governor Cox, of the state of Ohio, has directed his attorney general, T. S. Hogan, to start an immediate investigation of the present relations of the Chesapeake & Ohio, the Hocking Valley, the Kanawha & Michigan and the Toledo & Ohio Central railroads, and to give an opinion whether the divorcing of the K. & M. from the Chesapeake & Ohio comprises a conformity to the Ohio laws. A statement issued concerning the matter, following a conference of state officials with President George W. Stevens, of the Chesapeake & Ohio, says: "The conference was called at the request of Mr. Stevens, who wanted to know what was to be the attitude of the state relative to the ouster suits pending against the four railroads now that the Kanawha & Michigan has been entirely divorced from the Chesapeake & Ohio agreeably to the order of the United States court in Cincinnati. Mr. Stevens insisted that after the decree of the United States court is complied with the railroad companies' relations with each other will not be in violation to the Ohio law. He stated further that his company stood ready to conform to the laws in Ohio in case any violations were pointed out. It was agreed at the end of the conference that the attorney-general personally would investigate the whole situation without delay and report his findings to the governor and the Public Utilities Commission. The officers on behalf of the state left the question entirely an open one, but with the information to Mr. Stevens that the state would insist on a substantial compliance with Ohio laws."

The Rate Hearings.

A telegram from Washington, D. C., January 20, says that hearings for the shippers in the eastern freight rate advance cases will begin before the Interstate Commerce Commission next Monday morning, January 26, and will continue until March 5. In most cases one day has been assigned for hearing on each commodity, although for bituminous coal and lake and rail rates, three days. Other important schedules include petroleum, which is first to be heard, flour, cement, iron and steel articles, fruit, pulp and paper, and boots and shoes.

Records Broken in Silk Shipment.

The largest single shipment of raw silk ever received at a California port arrived in San Francisco on January 6, on the Pacific Mail liner Korea, and was turned over to the Southern Pacific and delivered to its New York owners four days later. Several records were broken with the shipment. The cargo consisted of 2421 bales, weighing 220 pounds each, a total of over half a million pounds with a value of \$2,500,000. The Korea crossed from Yokahama to San Francisco in thirteen days. The Southern Pacific got the cargo to New York from San Francisco in four days, fourteen hours and forty minutes, breaking its own record by one hour and one minute. Altogether, only eighteen days were consumed from the time the silk-laden Korea left Yokahama until the silk got into New York. There were eleven baggage cars and a force of stevedores waiting at the Pacific Mail pier at 6:45 o'clock, when the Korea docked. By 7:30, the 2421 bales had been loaded into the cars and the clearance papers issued by the customs authorities. By 9 o'clock the cars had been transferred to the ferry float, carried across the bay to Oakland, and were on their way eastward. Because of the high value of the cargo, involving the insurance and interest on

the money invested, silk shipments are always expedited by the railroad and steamship companies.

Medals for Station Agents and Roadmasters, Southern Pacific Co.

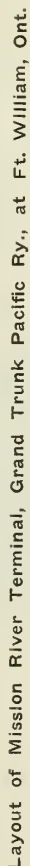
Agents at 36 stations on the Pacific system of the Southern Pacific Co. have been awarded silver medals for having premium stations, according to the decision of officials of railroad on the results of the recent annual inspection trip for the year 1913. The honor for the best division was won by the Coast division, of which T. Ahern is superintendent. M. Lahey, roadmaster of the Salinas district of the Coast division, won the gold medal for the best roadmaster's district and H. Sheridan, foreman of Section 16 of the Salinas district, won the gold medal for the best section. The agents who won the medals for best-kept stations are those at Berkeley, University avenue; Camarillo, Cobre, Covina, Dun-dee, Durham, Guadalupe, Iron Point, Kennet, Kenwood, Klamath Falls, Los Altos, Lowell, Medford, Midlake, Millbrae, Monrovia, Oakland, Sixteenth street, and Oakland, First and Broadway; Oceano, Paso Robles, Promontory Point, Roseburg, Santa Barbara, Santa Cruz, Santa Margarita, San Luis Obispo, Shasta Springs, South San Francisco, Tulare, Volta, Watsonville Junction, West Weber, Wheatland, Woodland and Yuba City. The inspection was begun in October and was concluded in December, the officials having gone over and noted conditions on more than 6000 miles of track, 792 sections and 670 stations. The medals are awarded annually and the men take a keen interest in the competition for official recognition of their work by the Southern Pacific in this form of prize.

Course in Railway Mechanical Engineering, University of Pittsburg.

Beginning with the fall term of 1914, the school of engineering of the University of Pittsburg, will offer a comprehensive course in railway mechanical engineering and administration. In this course instruction is given in such subjects as: Materials of railway engineering, operating units, railway design, utilization of locomotives and cars, maintenance of locomotives and cars, railway shop methods, fundamentals of railway practice, and thesis; the two latter features coming under the direction of Mr. D. F. Crawford, general superintendent of motive power of the Pennsylvania Lines West of Pittsburg. The work in the school of engineering is carried on under the co-operative plan; the student, during his course, working in some one of the engineering industries of the Pittsburg district. It is intended that the course in railway engineering and administration shall be closely affiliated with the railroads whereby the student will be given an opportunity to study modern methods of railway operation through the courtesy of the management of the railroads in this locality. It is planned that the students shall be given an opportunity to make inspection trips, assist in various tests and otherwise become acquainted with their several subjects.

Shrinkage of Corn Shipments in Transit.

The results of experiments to determine the shrinkage of shelled corn while in cars in transit, which should be of interest to corn shippers and transportation companies, are reported in Bulletin No. 48 of the Department of Agriculture, distributed by the Office of Grain Standardization. The question of natural shrinkage in corn during transit has been a source of much controversy in the handling and shipping of corn, and these experiments have shown that there is a natural shrinkage in commercial corn which varies with the water content of the corn and is greater in warm weather than in cold. The experiments outlined in this bulletin cover four special shipments from Baltimore to Chicago and return, the first shipment being over the Baltimore & Ohio



The layout drawing shows the connections from the classification tracks to various industrial establishments on the two rivers. It will be noticed that north of the classification tracks a large space has been set aside for industrial sites, with plans for serving this district with switching tracks. For the present a 12-stall engine house answers the requirements, although this is but a single unit in the final layout, which is expected to be four times this capacity. A rail dock, 60x500 ft. in size, has been constructed on the Kanimistiquia river.

Mikado Type Locomotives for the Duluth & Iron Range R. R.

The Lima Locomotive Corporation has lately built for the Duluth & Iron Range R. R. two Mikado type engines as illustrated herewith. The engines are modern in every respect and were designed generally in accordance with the specifications prepared by R. B. Moore, superintendent of motive power of the above named road. The details of design are by the Lima Locomotive Corporation and embody the best known practices in modern heavy engine construction. The boilers are equipped with Schmidt superheaters and sectional brick arches. A deep throated firebox of ample dimensions assures low combustion rates and high direct heating surface. The auxiliary dome is arranged ahead of the firebox so that it can be used as a man-hole thereby avoiding the inconvenience of removing the throttle from the main dome at times of inspection.

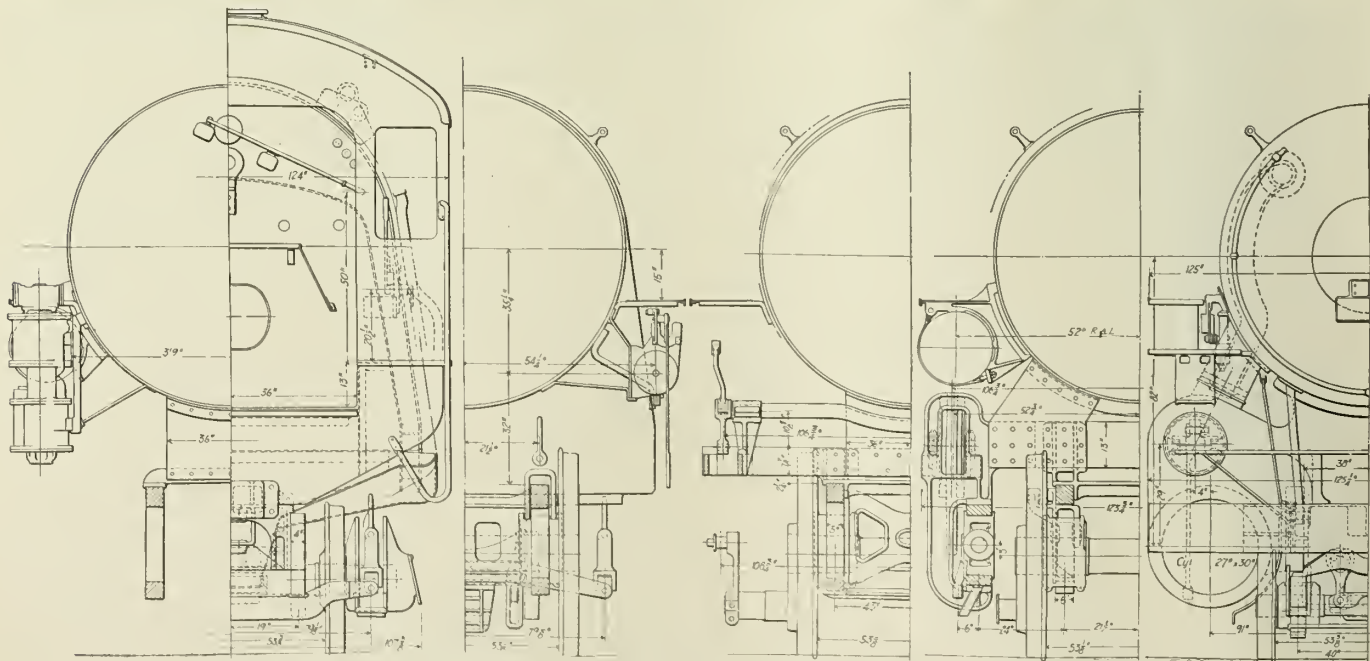
Steam distribution for these locomotives is by means of Walschaert valve gear, actuating 16-inch piston valves, and giving ample supply for all conditions of cut off. These engines will be used in the heavy ore traffic handled by this road, the service giving opportunity for the special qualifications of the Mikado type in heavy fast freight transportation. The leading features of the design are indicated in the following table:

Type	2-8-2
Service	Freight
Cylinders	27 by 30 ins.
Valves	16-in. piston
Valve gear	Walschaert

Traction power	56,200 lbs.
Boiler, type	Wagon top
Minimum diameter	84 ins.
Working pressure	175 lbs.
Firebox, size	96 by 112 ins.
Grate area	74.66 sq. ft.
Kind of fuel	Soft coal
Tubes, number	36 and 289
Diameter	53/8 and 2 ins.
Length	19 ft. 5 in.
Heating surface, tubes	3984 sq. ft.
Firebox	258 sq. ft.
Total evaporative	4242 sq. ft.
Superheater surface	870 sq. ft.
Driving wheels, diameter	63 ins.
Journals, all	10 1/2 by 12 ins.
Truck wheels, front	30 ins.
Journals	6 by 12 ins.
Back	42 ins.
Journals	8 by 14 ins.
Weight on driving wheels	214,000 lbs.
Total Engine	283,000 lbs.
Total engine and tender	457,000 lbs.
Wheelbase, driving	15 ft. 9 ins.
Total engine and tender	68 ft. 9 3/4 ins.
Tender wheels, diameter	33 ins.



Mikado Type Locomotive, Duluth & Iron Range R. R.



Cross Sections, Mikado Type Locomotive, Duluth & Iron Range R. R.

Journals	6 by 11 ins.
Capacity, water.....	9000 gals.
Capacity, coal.....	14 tons

Strike on the Delaware & Hudson and Its Settlement.

Service on the Delaware & Hudson Ry. was badly disarranged for one day, January 19, by a strike. Five thousand employees, enginemen, trainmen, telegraph operators and towermen, were said to have left their work. As soon as the strike was ordered the railroad appealed to the federal board of mediation and conciliation, and Assistant Commissioner G. W. W. Hanger proceeded at once to Albany. Mr. Hanger urged the railroad to accede to the demands of the men. This the railroad finally consented to do, and the strike was called off, the evening of January 19. The Delaware & Hudson Co. issued two statements referring to the matter. The first, given out while the strike was in progress relates the origin of the trouble and the railroad's position in regard to mediation:

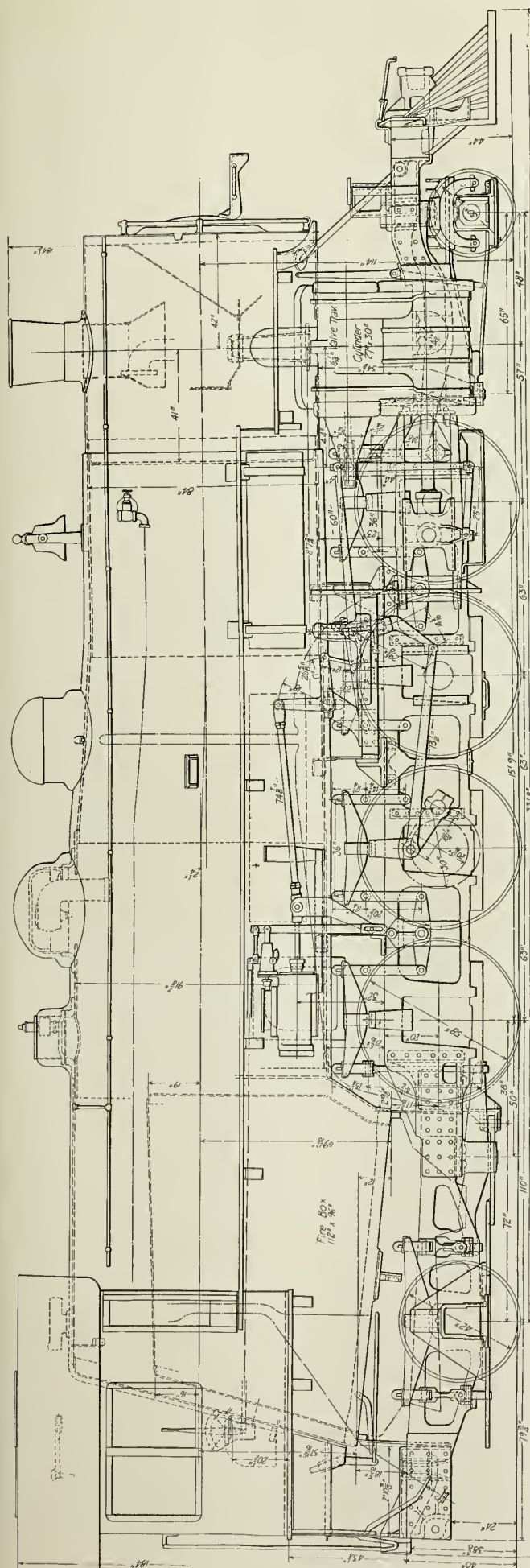
"The question between the Delaware & Hudson Co. and its employes is this: In June, 1913, F. A. Slade, conductor, and J. A. Lynch, engineer, were running a freight train on the company's lines and hauled a derailed car three and a half miles, causing damage to the railroad property and endangering trains on the other track. After full investigation by the officers of this company, it was found that these men had failed in their duty to observe the situation. It also appeared that their previous records had not been good. Slade at one time had been suspended for running by a meeting point, and at another time for a side swiping collision. Lynch had been suspended four times and for these reasons the men were discharged from the service.

"The matters of reinstatement of Slade and Lynch came up with several other matters in conference between officers of the orders embracing this company's employees in the train service and officials of this company, and all the matters except this one were satisfactorily adjusted. With respect to this matter, this company's officers felt that the negligence of the men was clearly established, that their records were not good and that they could not be reinstated without injury to the service and without exposing the public to possible danger. They also felt and still feel that the responsibility for the continuation in the service of negligent employees rests directly upon them, and that their conclusions in matters of discipline should be accepted as final.

"But in view of the provisions of the Newlands relating to mediation and arbitration, and of the fact that both the railroads and the brotherhoods, by their representatives, assured the president and the senate committee that they felt under obligations to use the machinery of such an act, this company has reached the conclusion that to avoid serious consequences of a strike to the public, it ought to go so far as offer to submit even this matter to the discipline of arbitration. Consequently it has called upon the federal board of mediation and conciliation."

The second statement of the company, issued the following day, after the strike had been terminated, reiterated the foregoing statement of the railroad's position in regard to mediation, and quoted the representations made to Mr. Hanger, which amounted to most unusual pressure that the railroad surrender its point entirely. The company's statement was as follows:

"The course of the Delaware & Hudson Co. in the dispute with its employees regarding the discipline of two men in the train service was controlled by what is conceived to be its obligations under the Newlands law, relating to mediation and conciliation. Mr. Rea, president, Pennsylvania Railroad Co., and Mr. Brown, president, New York Central Lines, having pledged the railroads to its observance when they appeared before the president and the senate committee. The company, therefore, followed the provision of the act, and called upon the board



Elevation, Mikado Type Locomotive, Duluth & Iron Range R. R.

of mediation and conciliation. The board responded, and sent its representative to Albany. Having thus invoked the intervention of the board, the company felt under an obligation to accept its recommendation. Mr. Hanger, assistant commissioner, after a full investigation, recommended arbitration, to which this company agreed, but to which the employees refused to agree. Thereupon Mr. Hanger sent to this company the following recommendation:

"January 19, 1914.

"To the Delaware & Hudson Co.:

"A controversy concerning conditions of employment and other matters having arisen between the Delaware & Hudson Co. and its employees, and said company having applied to the board of mediation and conciliation created by the Newlands act, and having invoked its services for the purpose of bringing about as amicable adjustment of the controversy, and said board, through the undersigned, its representative, having with all practical expedition put itself in communication with the parties

to said controversy, and having used its best offices by mediation and conciliation to bring them to an amicable settlement, and such efforts having been unsuccessful, and the undersigned having further endeavored to induce the parties to submit their controversy to arbitration, in accordance with the provisions of said act,

"Therefore, as a public official, and because I believe that the controversy, if continued, will be of serious detriment to the public interest, and solely for the protection of the public interest, I most earnestly urge the Delaware & Hudson Co., without further action, to recede from the position which it has taken with respect to the reinstatement of the men in question."

"The foregoing recommendation of Mr. Hanger, for the reasons stated, the company accepted. It is obvious that this action neither enforced any principle nor does it establish a *modus vivendi*. If discipline is to be maintained, means must be found to insure the action of the Newlands law, or the railroads should be relieved of their obligations under it."

Convention of the Wood Preservers' Association

Proceedings of the Tenth Annual Meeting, New Orleans, La.

The tenth annual convention of the American Wood Preservers' Association was called to order at 10:30 a. m., Tuesday, January 20, in St. Charles hotel, New Orleans, La., by President A. E. Larkin, general superintendent, Republic Creosoting Co. A felicitous address of welcome was made by Mayor Martin Behrman, of New Orleans, who presented to the president a gavel made of creosoted southern pine, and with it a hearty welcome to members and visitors. Response was made by J. H. Waterman. Mr. Waterman explained the work of the association and what it was doing to help in the conservation of natural resources. A. M. Shaw, a member of the Louisiana Engineering Society, made a brief address, in which he stated that in the reclamation of low-lands in Louisiana a large number of creosoted piles were used in the construction of bridges, and that he considered it criminal to use anything but treated timber in all exposed places where it is subject to decay; that timber treating was universal and that no corporation had a corner on the process of treatment nor upon the materials employed.

This was followed by the president's address. Mr. Larkin referred to the complete lack of a recognized or official medium of publicity between members of the association during the interval of a year from the date of one convention to the date of the next. Some arrangement must be made, he said, that not only will afford the members an opportunity to keep in close touch with the progress and development of the industry through the association, but also to distribute reliable information and data throughout the country and enable outsiders to profit by and become interested in the work of the association. He recommended specific action to this effect by the convention, and offered the suggestion that a monthly pamphlet be issued by the association, as a beginning.

Upon one phase of association work, the president said:

"The association's progress in the past has been retarded by the fact that very little original constructive work has been done, that the association could stand back of. Ten years have passed since its organization, and little really substantial improvement has been made in this respect. A large forward stride was made when Mr. Sterling last year inaugurated the custom of sub-committee investigations of specific problems, relating to the development and advancement of wood preservation. It is to be sincerely hoped that this phase of the association work will be emphasized and continued in 1914. Sub-committee reports, when they are approved, go into the proceedings as the only authoritative data, which can be re-

ferred to by our Secretary in answer to inquiries, as the official record of the association's investigations. This material will be given to him during the year, and the scope of these investigations will be so broad that he will in the near future be able to supply information on practically every phase of the industry."

Mr. R. S. Manley, chairman of the entertainment committee, read the program of entertainment for members, visitors and ladies during Convention week.

Secretary-Treasurer Angiers' report was read. The membership in good standing December 31, 1913 was 183, a gain of 26 members during the year. The association was organized in 1904 with 20 members, and the average growth each year during the past four years has been 34 members. The membership is composed of men connected with railroads, commercial treating plants, chemical and manufacturing concerns, tie and lumber companies, professional men with the forestry bureaus and testing laboratories of the United States, paving block associations, educational institutions, etc. These are distributed over all the United States and some in foreign countries. The association has enjoyed a prosperous year, and much development of improved methods for treating ties and timber has taken place during this period. In 1885 there were only three timber treating plants worthy of mention in the United States. The industry has had a steady and wonderful growth. In 1890 there were eight plants; 1895 twelve plants; 1900 fifteen plants; 1905 thirty-four plants; 1910 seventy-five plants, and at the end of the year 1913 ninety plants in operation and five under construction in the United States. It will be observed that since the year 1900 seventy-five plants have been built and put in operation, which is at the rate of nearly six plants a year.

The next in order was the reading of a paper prepared by Thomas White on "Some Methods for Separating Water from Creosote Oil." Mr. White described two methods which are most commonly used.

Mr. E. F. Bateman, chairman of the committee on preservatives, presented a report of the committee. The discussion of this report was spirited and interesting and continued the remainder of the forenoon and all of the afternoon of the first day of the meeting.

Mr. Fulweiler recommended that the specifications for creosote oil be modified so as to include oil distilled from petroleum tar. At the present time the specifications only

admit oil distilled from coal tar. Mr. W. F. Goltra called attention to the increasing consumption of creosote oil and recommended specifications that would admit oil distilled from wood tar and petroleum tar, as well as coal tar. Since timber treating began on a commercial scale in the United States the domestic supply of creosote has never been equal to the needs of the industry. With the rapid development of wood preservation in recent years, the insufficiency of the home production has become more acute. At the present time about two-thirds of the oil is imported from England and Germany. The annual consumption of creosote oil is about as follows:

1903	7,700,000 gallons
1904	8,650,000 gallons
1905	13,550,000 gallons
1906	26,000,000 gallons
1907	42,000,000 gallons
1908	50,000,000 gallons
1909	51,431,000 gallons
1910	63,266,000 gallons
1911	73,027,000 gallons
1912	83,663,000 gallons

The year 1913 will be close to 100,000,000 gallons.

In order to overcome some of the difficulties of getting a supply of oil agreeable to standard specifications used in the past, it has been the practice for many years to add refined tar to the oil.

P. C. Reilly, president of the Republic Creosoting Co., made a clear and forcible address opposing the adulteration of creosote oil with refined coal tar. He was followed by Dr. Von Schrenk, who was diametrically opposed to those views and stated that about 40 per cent of the creosote oil now used in this country is adulterated with refined coal tar. Dr. Von Schrenk claims that there is no material difference in the penetrative qualities of the oils, either with or without coal tar, and that there is no separation or filtrating of the tar oil when penetrating the timber. The recommendations of the committee were to be voted on before the end of the meeting.

Wm. Townsley called attention of the committee to the fact that there was no mention of chloride of zinc in the report; that perhaps because it is so well and favorably known as a preservative it was unnecessary to refer to it. The committee was instructed to bring in a report on that preservative.

On Wednesday morning the report of the standing committee on preservatives was read and note taken of the three recommendations by the committee and accepted. The second recommendation was "That the association adopt the classification for tars and creosote oil proposed by last year's committee and as modified by this committee." By its provisions creosote oil derived from petroleum tar and wood tar is excluded, and the association approves the use of creosote oil derived from coal tar only. This is a matter of vital importance to the wood preserving fraternity, as the great increase in the consumption of oil makes it necessary to find new sources. Creosote oil derived from petroleum tar has been used in large quantities and in most instances sold as straight coal tar creosote. Its effectiveness as a preservative is generally conceded to be equal to that of coal tar. Creosote used with the substitution of petroleum tar creosote oil for coal tar creosote oil does not in any way lessen the character of the treatment. Wood tar creosote is produced from a distillation of tar obtained in the coking of wood. At the present time it is produced only in small quantities—perhaps about 500,000 gallons a year, but the quantity could be increased to about 5,000,000 gallons annually, if there was a demand for it. This demand will undoubtedly come soon, as the production of creosote oil in this country is not adequate to the

increasing demand. The manufacture of coal tar creosote oil in this country is practically controlled by only one concern, whereas a large number of gas companies and chemical companies could furnish creosote oil, provided it was admitted under the specifications.

F. B. Ridgway read a paper on "Treating Piles With Creosote Oil." He submitted samples of treated piling that was driven in 1875 and was in nearly as perfect condition at this time as when it was driven. The piling was treated to protect it against the action of the sea worm.

Mr. H. F. Weiss' paper on the "Protection of Ties from Mechanical Destruction" was read, Wednesday afternoon, and considerable discussion followed. It was apparently the consensus of opinion of all those present that ties should be adzed and bored before treatment. In order to get the best results from treated ties, it is absolutely necessary to adze and bore the ties and affix tieplates. Several speakers, among which were Mr. Lownsbury, Mr. Rex and Mr. Howson, strongly recommended the machining of ties before treatment. The cost of adzing and boring on the A., T. & S. F. Ry. is reported to be 1.6 cents per tie. This does not include any charge for superintendence, or overhead charges, but simply covers cost of labor, boring and repairs of the adzing and boring machine. It appears that on most railroads treated ties are tie-plated.

Mr. H. H. Gibson read an interesting paper entitled: "Future Tie Material in the United States." This paper is replete with interesting information and worthy of careful study.

Mr. A. G. McIntyre, superintendent Forest Products Laboratory, Montreal, Canada, stated that the dominion government contemplated building a testing laboratory near Montreal, similar to that at Madison, Wis. Mr. McIntyre credited this government with being in the advance in timber preservation and that his country was copying our methods.

E. L. Powell read his paper on "Treatment of Piling and Timber According to Condition of Use and Exposure"; and Mr. Waterman read his paper on "Some Facts Which I Have Gathered from Observations and Inspection of Experimental Ties."

The report of the standing committee on plant operation was called for, but no report was made. The committee was continued with instructions to report later.

The report of the standing committee on miscellaneous subjects was next called for. Mr. J. H. Waterman, chairman of the committee, read the conclusions and recommendations which were accepted by the association. The subject considered this year was steaming of ties and timbers. The principal recommendation in the report is a request that the United States forestry service and members of the association make experiments with ties and timbers to determine what influence preliminary steaming has upon the rate of seasoning, when subsequently piled in open air.

The election of officers was held on Thursday, with the following results: President, Geo. E. Rex; first vice-president, Carl G. Crawford; second vice-president, R. S. Manley; third vice-president; F. B. Ridgway; secretary-treasurer, F. J. Angier. The next meeting of the association will be held in Chicago.

Suits Against Frisco Officials.

Attorneys representing the receivers of the St. Louis & San Francisco system filed suit in the United States District court, at St. Louis, Mo., January 22, against ten men who were directors of the company in 1910, seeking to recover more than \$14,000,000. The action was brought in accordance with recent instructions of Walter H. Sanborn, Circuit judge, before whom the receivership proceedings were brought last May. It is based upon the deal by which the St. Louis, Brownsville & Mexico

was promoted by parties connected with the Frisco lines, and when completed was sold to that system. Details of this and similar transactions were disclosed during the recent Interstate Commerce Commission investigation of the Frisco receivership. The sale of the Brownsville by the syndicate that promoted it to the Frisco is declared in the suit to have been void, as the purchase was beyond the corporate power of the Frisco. The petition charges that the Frisco directors were guilty of malfeasance in negotiating the purchase and in authorizing the payment of large sums of the Frisco's money for the Brownsville stocks and bonds. The directors who participated or ac-

quiesced in the arrangement are declared to be jointly and severally liable for all losses that have resulted to the Frisco from the deal or that may result. The ten men named in the suit are: B. F. Yoakum, chairman of the Frisco directorate at the time of the receivership; James Campbell, president of the North American Co., which brought the receivership suit; William K. Bixby, now a receiver of the Wabash; C. W. Hilliard, former vice-president of the Frisco; B. L. Winchell, former president of the Frisco; E. V. R. Thayer; A. S. Greig; Frank Trumbull; Thomas H. West, chairman of the board of directors of the St. Louis Union Trust Co.; Hans Winterfeldt.

Air Pumps for Injecting Timber Preservatives

By F. J. ANGIER, SUPT. OF TIMBER PRESERVATION, B. & O. R. R.

Paper read at the annual meeting of the American Wood Preservers' Association, New Orleans, Jan. 20-22, 1914. Air pumps vs. hydraulic pumps for injecting preservatives into wood. The hydraulic system requires more machinery than the air-pressure system and more attention in operation; and the maintenance expense is larger.

It is the practice at most timber-treating plants to use hydraulic pumps to force the preservatives into the wood. This is a practical and an efficient way of performing that service, and while the hydraulic pumps may have some advantages over the use of compressed air, they also have some disadvantages. When designing the B. & O. R. R. plant at Green Spring, W. Va., this feature was given careful consideration, and it was finally decided to use the air pump.

The idea of employing compressed air for forcing the preservative solution into the wood to be treated was, so far as is known to the writer, first adopted by the Chicago & Northwestern Ry. at its plant at Escanaba, Mich. Here the apparatus is different from that used by the B. & O. R. R., but the principle is practically the same.

The accompanying photographic reproductions will convey some idea of the application of the air-pressure system at the Green Spring plant. Looking at the illustration, Fig. 1, the two small upright tanks at the right are what we call "pressure-measuring-drain" tanks, or, for short, "P-M-D" tanks. They derive their descriptive title from their three distinct operations—for pressure, measuring, and drain. In the case of the ordinary pump method at least two tanks would be required, one for pressure and measuring, and one for drain. The air pump at the B. & O. R. R. plant is located in front of the P-M-D tanks, shown in Fig. 1 in the foreground, to the left. In this view also a section of one retort can be seen through

the archway to the adjoining room. Connections to the P-M-D tanks from the retorts are made at the top and bottom, the former for air and vacuum, and the latter for the preservative solution.

The accompanying diagram shows the relative positions of the retorts, tanks and pumps, and it may convey a general idea of how these are operated. Some details are also shown in Figs. 3 and 4. There are no secrets, or patents. You are welcome to any ideas in use at the B. & O. plant which may have originated with us, and which may benefit you. The plant has been constructed and designed principally for the Card process, though it can also be used equally as well for the Bethell and Burnettizing processes, and, with slight modification, can be adapted to any other process.

The procedure of treating a charge of timber is as follows:

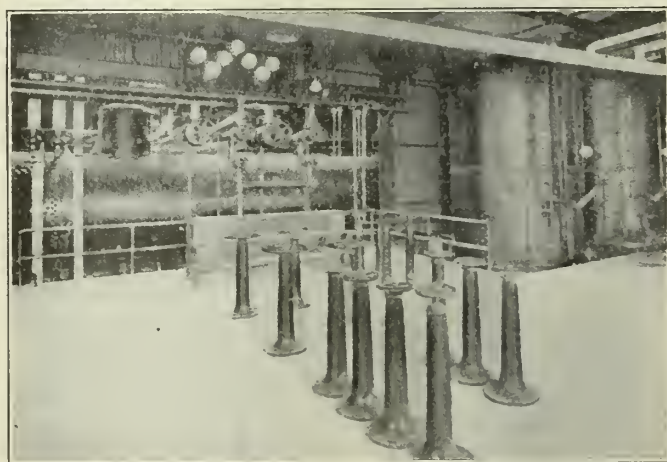


Fig. 2.—View in Engine and Tank Room, Green Spring Preserving Plant, B. & O. R. R.

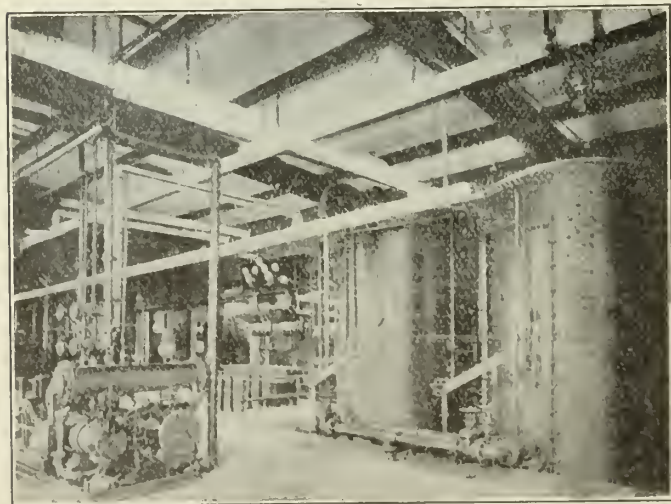


Fig. 1.—View in Engine and Tank Room, Green Spring Preserving Plant, B. & O. R. R.

The charge is placed in the retort and the door closed. If the material to be treated is green, it is seasoned artificially by steaming; if dry, this steaming is omitted. In either case an initial vacuum is created, which usually lasts an hour, but the duration of this vacuum depends largely on the amount of steaming or non-steaming. During the vacuum the P-M-D tank is charged with the preservative solution. It requires about seven minutes to do this, but it can be done while the vacuum is on the retort, so that no time is wasted. At the end of the vacuum, and just before destroying it, the preservative solution is introduced into the retort from the working tank. This flows by gravity through a 10-inch pipe, and requires about 13 minutes to completely fill the retort. Up to this stage of the operation the retort is completely filled with the preservative solution, and the P-M-D tank contains the requisite amount of solution for treating the charge. This solution has a temperature of 190° F. before it is introduced, and it is maintained at

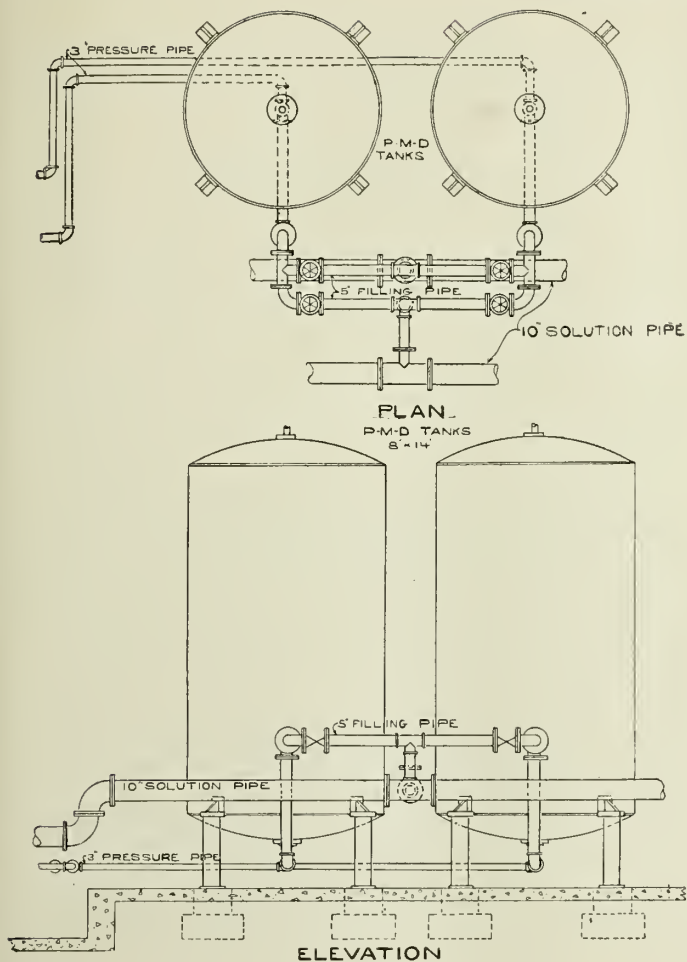


Fig. 3.—"P.-M.-D." Tanks and Piping.

this temperature, or as near this temperature as possible, during the time of impregnation.

Everything is now in readiness for the pressure to be applied. This is accomplished easily and quickly by opening the 3-inch valve in the pipe connecting the bottom of the P-M-D tank with the retort, and by starting the air pump. The air enters the top of this tank, forcing the preservatives into the retort and into the wood. When the desired absorption is obtained, as indicated by the gages on the tank, the air pump is stopped, and the valve in the connecting pipe closed.

The next operation is to return the preservative solution in the retort to the working tank. This is done by simply opening the 4-inch blow-back to release the pressure in the retort, then opening the 10-inch valve which leads from the retort to the working tank, and by opening very slightly the 2-inch valve in the pipe leading from the top of the P-M-D tank to the top of the retort. Bear in mind, the P-M-D tank is still charged with air varying in pressure from 125 to 175 pounds, and that this air forces all of the solution remaining in the retort (approximately 21,000 gallons) back into the working tank. To do this requires about 20 minutes, and there is still sufficient air pressure in the tank to force into the working tank what solution might remain in the P-M-D tank. (At this point the operators of hydraulic pump plants will recognize the advantage of having this air storage, which they are required to pump directly into the retorts with a low-pressure air pump, with more time and expense.)

Now, a final vacuum is usually required to surface-dry the timber. During this vacuum, which lasts about one hour, about 400 gallons of solution is recovered, or about 10 per cent of the total amount absorbed in the charge. Of course, this regain is due to drip and to the expansion of the atmospheric pres-

sure in the wood during the vacuum. This final vacuum is applied to both the retort and P-M-D tank. The surplus solution collects in the bottom of the retort and in the pipes leading to the tank, and also seeks its level as it flows by gravity into the tank. At the end of the vacuum period the valve is closed in the pipe leading from the retort to the vacuum pump, and the atmospheric valve opened to the retort, while vacuum is still maintained in the P-M-D tank. This operation quickly destroys the vacuum in the retort and forces the surplus solution into the P-M-D tank. The valve in the pipe leading from the retort to the P-M-D tank is then closed, drainings measured (if desired) and forced back into the working tank by air pressure.

The advantages of the air pump are: Only one tank is required for each retort, that tank serving in the triple capacity of pressure tank, measuring tank, and drain tank.

One air pump is ample for three retorts, while one hydraulic pump is required for each retort.

The maintenance of one air pump is much less than three hydraulic pumps, and is decidedly cleaner. The air pump requires less attention, and lessens the cost of packing, lubricants, valves, valve seats, plungers, etc.

An air pump is a necessity in plants using hydraulic pumps for blowing back solution, unless those plants are equipped with expensive underground receiving tanks. In the latter case an air pump can be dispensed with in lieu of a large oil pump for pumping the solution back into the working tank. The underground receiving tank is more expensive in operation than the air pump, and no doubt this is the reason why so few plants are thus equipped.

One air pump can be operated on two or more retorts at the same time without deranging the gage readings. This is not practicable with hydraulic pumps.

Experience has taught us that it is practically impossible to maintain a steady and constant pressure on a charge of timber with a hydraulic pump, even though it is equipped with relief valves, while with the air pump this is easily accomplished.

The amount of steam required to operate one air pump is not more than would be required to operate three hydraulic

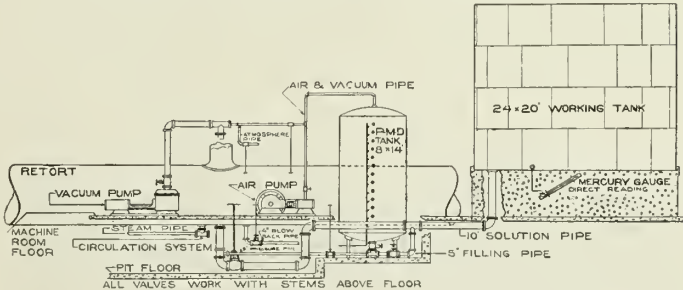


Fig. 4.—"P.-M.-D." Tank, Retort, Piping, Air Pump, Etc.

pumps, but as the exhaust steam is used for heating purposes, this feature is not so important.

The initial cost of installing the air pump system is a trifle more than for the hydraulic pump system, but the maintenance is less, and in the long run air is more economical. The following statement will give some idea of the relative first cost, which may vary one way or the other, depending upon local conditions:

Cost of Air Pump System.

One air pump (capacity 8 cu. ft. of compressed air per minute at 175 lbs. gage pressure).....	\$1200
Three pressure-measuring-drain tanks	2000
Piping, valves, etc. (estimated).....	400
<hr/>	
Total cost of air pump system.....	\$3600

Cost of Hydraulic Pump System.

Three hydraulic pumps.....	\$1000
Three measuring tanks.....	900
Two drain tanks.....	400
One low-pressure air pump.....	500
Piping, valves, etc. (estimated).....	600

Total cost of hydraulic system.....\$3400

With hydraulic pumps there is more machinery to care for, more tanks to look after, and more piping and valves to maintain. There is also more work for the engineer; and unless everything is compactly arranged the engineer will require an assistant. With the air pump one man can easily look after the entire operation, with greater satisfaction and with better results.

Manufacture of Brake Beam Hangers, Chesapeake & Ohio Ry., Clifton Forge, Va.

The mechanism shown by means of the illustrations herewith was devised by Mr. R. L. Woodrum, smith shop foreman of the Chesapeake & Ohio Ry., at Clifton Forge, Va., for the purpose of facilitating the manufacture of brake beam hangers. It consists of a cast iron off-set slab, to which two air cylinders are securely fastened. One cylinder only is used in the manufacture of brake beam hangers, the other being underneath the slab plate and used for other purposes. In using the machine the services of two men, a machine operator and a heater, are employed. The stock is cut to suit the length of hanger desired. It is then heated and bent in a "U" shape by means of the apparatus shown in operation 1. It is again heated to a sufficient length at points marked A A, and the eyes are bent in opposite directions in two operations by means of the device shown in operation 2. The hanger is thus completed with two heats and in three operations.

To change the dies or formers it is only necessary to detach them from the plunger and to lift them with their supporting plates, off the pins shown at B B, whereupon other formers can be substituted. Air hose attachments are provided for the purpose of keeping the formers free from accumulations of scale. With these devices it is possible to manufacture these hangers at a labor cost of 1½ cents each, which however, does not include shearing the stock to length and handling the finished product to material bins.

The explanation should be made that the half-tone illustrations show the manufacturing operations in the reverse

order, i. e., the "U" is bent first, from straight stock, and the eyes are formed afterward. We are indebted to Mr. E. A. Murray, master mechanic of the Chesapeake & Ohio Ry., at Clifton Forge, Va., for the foregoing information and the illustrations accompanying same.

The President's Message.

President Wilson laid his message to the present Congress before that body personally on the 20th inst. The recommendations made cover the following:

Effective prohibition of interlocking directorates.

Powers to be conferred on the Interstate Commerce Commission to superintend and regulate railroad financial operations.

Supplementary legislation to make more explicit the Sherman law.

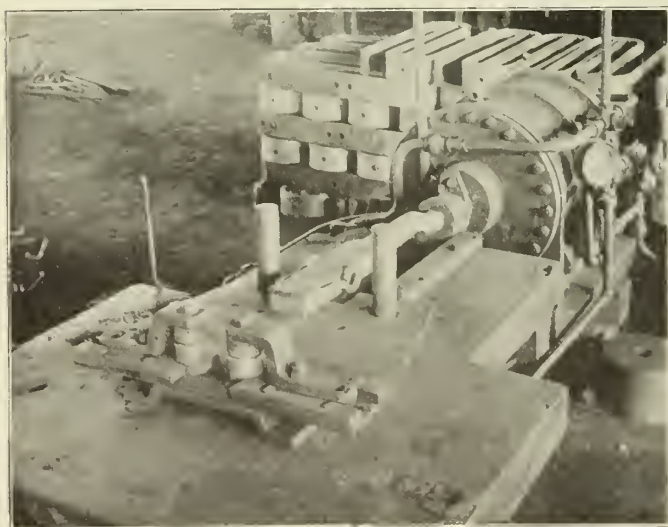
Creation of trade commission, a clearing house of information to help business to conform to the law.

A law prescribing penalties for individuals who are responsible for unlawful business practices.

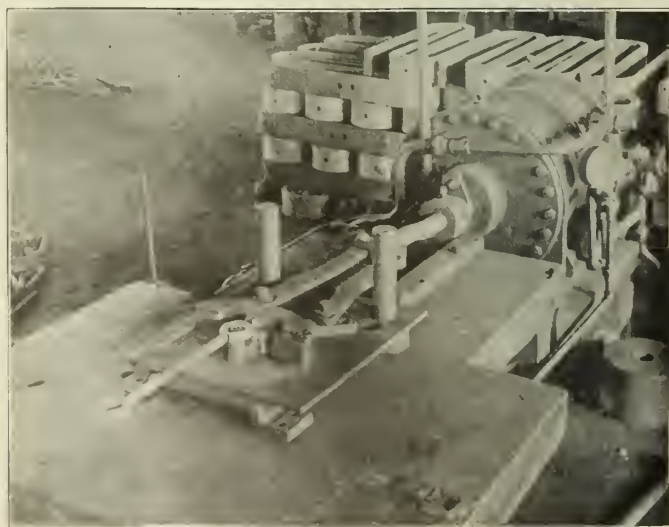
Allowing private claimants to found suits for redress against unlawful combinations under the Sherman law.

Under the second head he spoke as follows:

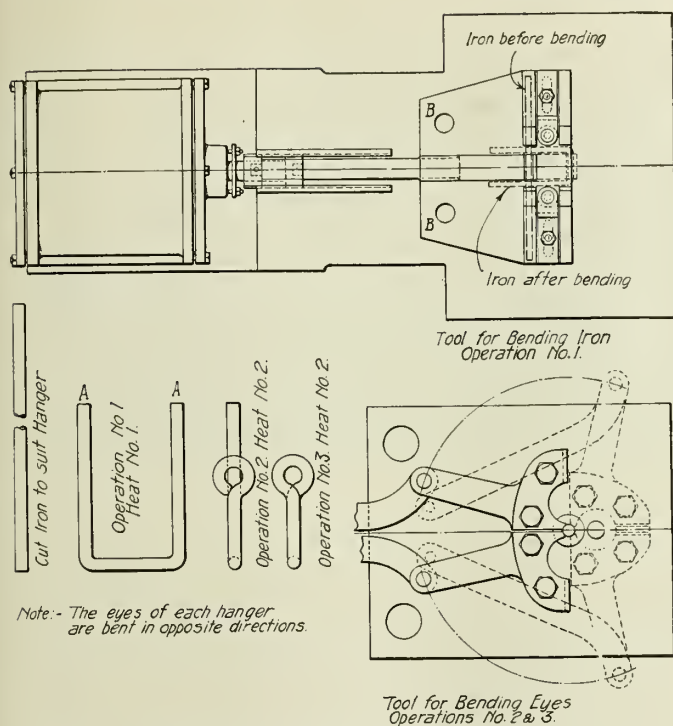
"Business men as well as those who direct public affairs now recognize, and recognize with painful clearness, the great harm and injustice which has been done to many, if not all, of the great railroad systems of the country by the way in which they have been financed, and their own distinctive interests subordinated to the interests of the men who financed them and of other business enterprises which those men wished to promote. The country is ready, therefore, to accept, and accept with relief as well as approval, a law which will confer upon the Interstate Commerce Commission the power to superintend and regulate the financial operations by which the railroads are henceforth to be supplied with the money they need for their proper development to meet the rapidly growing requirements of the country for increased and improved facilities of transportation. We cannot postpone action in this matter without leaving the railroads exposed to many serious handicaps and hazards, and the prosperity of the railroads and the prosperity of the country are inseparably connected. Upon this question those who are chiefly responsible for the actual management and operation of the railroads have spoken very plainly and very earnestly, with a purpose we ought to be quick to accept. It will be one step, and a very important one, toward the



Operation No. 1 Manufacture of Brake Beam Hangers, Chesapeake & Ohio Ry., Clifton Forge, Va.



Operation No. 2, Manufacture of Brake Beam Hangers, Chesapeake & Ohio Ry., Clifton Forge, Va.



Details of Apparatus for Manufacturing Brake Beam Hangers, Chesapeake & Ohio Ry., Clifton Forge, Va.

necessary separation of the business of production from the business of transportation."

New Construction for 1914

(Continued from pages 39 and 106.)

The Atchison, Topeka & Santa Fe Ry. has under survey, for construction during the year, second track from Bagdad to Ludlow, Cal., 22.42 miles; and from Los Angeles to Fullerton, Cal., 23.8 miles. New block signals will be installed between the following points: Rio Puerco and Suawanee, N. M.; Horace and McCartys, N. M.; Winslow and Flagstaff, Ariz.; Ash Fork and Seligman, Ariz.; Summit and Cajon, Cal.; Fresno and Calwa, Cal.

The Atchison, Topeka & Santa Fe Ry., Coast Lines, expect to build during the course of the present year, a 2-mile extension which has been surveyed, from Maricopa to Winoil.

The Central New England Ry. will eliminate five grade crossings in the state of Connecticut.

The Central R. R. of New Jersey will undertake the following work: Reconstruction of train shed at Jersey City; build a team delivery track and relocate freight house at West Side Ave., Jersey City; reconstruct a terminal building at Jersey City; build an engine terminal at Communipaw; extend track No. 6 over Division St., in Elizabeth; build a spur to H. W. Johns-Manville Co., at Manville; change the grade of a new bridge, etc., at Manville; build a freight yard at Bound Brook; extend a crib bulkhead and do additional dredging and filling at Jersey City; renew Bridge No. 2 at Easton; build a new pier (No. 14) at Jersey City; renewing Bridge No. 34 at Catasaqua; build a passenger station, extend retaining wall and make track changes at Scranton, Pa.; build additional tracks in the freight yard at Jersey City, N. J.; widen Bridge No. 171 at Ocran Ave., Jersey City.

The Central Vermont Ry. will build: New stations at Burlington, Vt., Brattleboro, Vt., and Eagleville, Conn.; new steel bridges at Barre and Middlesex, Vt. (bridges are bought); new freight house at Cushman, Mass., and Burlington, Vt.; extend the "Italy" freight yard at St. Albans, Vt.; and separate grades at Braintree, Brattleboro, and Eagleville, Conn.

The Cincinnati, New Orleans & Texas Pacific Ry. (Queen & Crescent Route), will build: Second main track from Crittenden to Williamstown (under construction); new 150-ton track scales at Lexington and Oakdale; new "Y" track at Williamstown; new interlocking plants, Cincinnati (two); extensions to shop buildings at Ferguson Shops (Somerset, Ky.); new coach and paint shop at Chattanooga, Tenn.; extension to passing track, New River, Tenn.; and various bridges will be renewed with heavier structures.

The Alabama Great Southern R. R. (Q. & C. System), will extend automatic block signals to cover its entire line.

The Dominion Atlantic Ry. (G. G. Hare, engineer, Kentville, N. S.), will lay 15 miles of track with 85-lb. rails; ballast 30 miles of track; and build, with concrete substructure and steel superstructure, bridges at the following points: Bear River, 1643 ft. long; Sissiboo River, 1190 ft. long; Windsor, 1480 ft. long.

The El Paso & Southwestern Ry. will install block signals on 33 miles of road, from Tecolote to Carrizozo, N. Mex.; and from Lewis Springs to Vail, Ariz., 56½ miles.

The Georgia Coast & Piedmont R. R. may relay its old line with new 60-lb. rail.

The Grand Trunk Pacific Ry. contemplates the following new railroad construction: 116 miles of main line; 26 miles on the Brandon branch; 15 miles on the Weyburn branch; 24 miles on the Price Albert branch; 18 miles from Moosjaw northwest; and 16½ miles on the Battleford-Wainwright branch. Two "half interlockers" will be built at Edmonton, a 26-lever interlocking plant at Weyburn and a 26-lever electric interlocking plant at Calgary. The following bridges are on the 1914 schedule of new construction: 12 steel bridges for creek crossings on main line in British Willow River Crossing, at Mile 1262; Nechaco River, at Mile 1373; Endako River Crossing, at Mile 1386; Mud River Crossing, at Mile 1492; South Saskatchewan River Crossing, Prince Albert Branch, at Mile 87.5; Overhead Crossing, C. P. R. Harte-Brandon Branch, at Mile 14.

The Tony Island R. R. will erect a 24-lever Saxby & Farmer interlocking plant to replace the present equipment at Whiteslone Junction.

The Lorain, Ashland & Southern R. R. will lay rail on 24 miles of newly constructed roadbed between Ashland and Willington, Ohio.

The Louisiana Ry. & Navigation Co. will do some ballasting of track.

The Missouri & North Arkansas R. R. will make the following expenditures; On bridge filling, \$15,000; on additional track facilities, \$12,000; on structures and depots, \$20,000; electrical interlocking plant at Kinsett, Okla., \$16,000; purchase of Bay City Pile Driver, \$10,000. It is intended to do extensive bridge filling during the year.

The New Orleans Great Northern R. R. will renew 10,880 ft. of pile trestle with creosoted ballast deck bridges and 5500 ft. of pile trestle will be filled in.

The New York, New Haven & Hartford R. R. contemplates the installation of new block signals as follows: Burr Road to New Haven, 18.7 miles, 4-track road; signals at Pawtucket, R. I., New Milford, Conn., Botsford, Conn., and Brookfield Junction, Conn.; and interlocking plants at Boston Switch, Mass.; Stonington, Conn.; Woodmont, Conn.; Dedham, Mass.; Myricks, Mass.; Middleboro, Mass.; and Middleboro Junction, Mass.

The New York, Ontario & Western R. R. will install automatic signals on 30.69 miles of double track and 8½ miles of single track.

The New York, Philadelphia & Norfolk R. R. will build new second track from King's Creek to Pocomoke, 6.56 miles; relay passing siding for use as second track, 2.35 miles; relay 85 lb. with 100 lb. rails on main line, 5.00 miles; build an interlocking plant at B. C. & A. Junction, Salis-

bury; new Union passenger station at Salisbury, Md.; new passenger station at Oak Hall, Va.; new passenger station at Wierwood, Va.; new concrete coaling and sanding station for engines at Cape Charles; additional transfer and perishable freight facilities at Port Norfolk, Va.; and a car-load delivery yard at St. Julian avenue, Norfolk, Va.

The Panama R. R. will build new interlocking plants at West Leg of Balboa, 24 levers; at Panama, 24 levers; at Summit, 12 levers; and at Pontoon Bridge, 8 levers.

The Portland Eugene & Eastern Ry. will build new railroad as follows: 15.5 miles between Molalla, Ore., and Silverton, Ore.; 4.3 miles between Independence, Ore., and McNary; 6.52 miles between Albany, Ore., and Weelsdale, Ore.; 3.5 miles from Eugene, Ore., known as the Santa Clara line; 6.0 miles between Salem, Ore., and Rosedale, Ore.; 21.00 miles between Oswego, Ore., and Hubbard, Ore., double track; 19.7 miles between Hubbard, Ore., and Salem, Ore., single track; 1.20 miles Canby, Ore., to Molalla, Ore.; and 2.93 miles between Willamette Pacific Ry. Junction and Eugene, Ore. It will construct sub-stations at Salem, McCoy, Corvallis, Monroe, Eugene, and Hubbard, Ore.; linemen's headquarters (buildings) at Salem, Eugene, and Oswego, Ore.; and car shops at Bolton, Ore. (near West Oregon City).

The Quebec Central Ry. will build 5 miles of the Chaudiere Valley branch, from St. Camphille, Bellechasse county, in the direction of English Lake; and make extensive improvements to the workshops at Sherbrooke, such as the building of new paint shop, new car shop and new stores department and offices.

The San Antonio Uvalde & Gulf R. R. will build 20 miles of new track, ballast the old line and do some grade revision.

The San Diego & Arizona Ry. will build 30 miles of new main line.

The Sandsprings Ry. will build 5 miles of second track and 5 miles of additional side-tracks.

The St. Louis & San Francisco R. R. contemplates the following construction work for 1914: Tower Grove subway, approximate cost, \$30,000; Cape Girardeau, river front improvements, \$200,000; Van Buren bridge, Arkansas river, \$250,000; Red River bridge at Arthur City, \$100,000.

The Toledo, St. Louis & Western R. R. will build a semi-electric interlocking plant at Marion and four or five industrial tracks.

The Utah Ry. will build from Black Hawk to Castle Gate, Utah, 21.24 miles of single track, with 9500 ft. of sidings, etc.; and yards at Castle Gate, 10,000 feet; also from Thistle to Provo, Utah, 20.8 miles of single track, with 16,000 ft. of sidings.

The Zitacuaro & Joconuscor R. R. is planning to build an extension of its road about 70 miles in length.

Block Signal and Interlocking Extensions in 1913.

In our issue of January 3 the Railway Review published a compilation of mileage of railroads in the United States newly equipped with block signals during the year 1913. The total mileage reported to us up to that time was 3851.49 for automatic block and 2061.17 for non-automatic block. Official reports since received, or from roads not heard from at the previous date, give 308.21 miles of road additional for automatic block and 712.73 miles of road additional for non-automatic, making the total revised figures to date as follows:

Railroads in the United States newly equipped with automatic block signals during 1913, 4159.70 miles.

Railroads in the United States newly equipped with non-automatic block during 1913, 2773.9 miles.

The railroads represented in the additional mileage here reported are:

AUTOMATIC BLOCK SIGNALS.

	Miles of Road.
Alabama Great Southern R. R.....	26.00
Central R. R. of New Jersey.....	30.80
Cincinnati New Orleans & Texas Pacific Ry.....	24.50
Lake Erie & Western R. R.	37.51
Missouri, Kansas & Texas Ry. (In addition to mileage previously reported)	7.6
New York, New Haven & Hartford R. R. (218.40 miles of track)	86.10
Panama R. R.....	25.70
Pere Marquette R. R.....	53.00
Pittsburg, Cincinnati, Chicago & St. Louis Ry. (34.1 miles of track)	15.70
Pittsburg & Lake Erie R. R.....	1.30
Total	308.21

NON-AUTOMATIC BLOCK SIGNALS.

	Miles of Road.
Cincinnati, New Orleans & Texas Pacific Ry.....	151.90
El Paso & Southwestern Ry.	66.00
Grand Rapids & Indiana Ry.	85.77
Missouri, Kansas & Texas Ry.....	9.5
New York, New Haven & Hartford	124.40
New York, Philadelphia & Norfolk R. R.....	17.86
Pittsburg, Cincinnati, Chicago & St. Louis	257.30
Total	712.73

Car Line Inquiry Opens in Chicago.

The Interstate Commerce Commission opened its inquiry into the subject of private car lines, in Chicago, January 21, with Commissioner Charles C. McChord presiding. The inquiry is intended to be one of the most comprehensive ever undertaken by the commission. Its scope was outlined to an extent by George P. Boyle, an examiner for the commission, who made the opening statement. He said: "We propose, through the testimony of witnesses to be examined here, to go into the operation of private equipment, car construction and repairs, questions of loading as regards minimum weight, and the return of equipment empty. The data furnished by the railways differ considerably, and an important point to be investigated is the compensation to carriers. Briefly, all questions of cost and details of operation, and of the relations between the private car lines and the shippers, each for the other, will be considered." Data produced by the companies and quoted in opening the hearing, show 641 private freight lines in the United States, 43,028 cars owned by independent companies, 16,644 cars owned by railroads for special purposes, 34,487 cars owned by shippers, and 43,020 cars by commercial houses—a total of 137,170, as against 2,301,711 the property of the railroads.

It was expected at the outset that the hearings in Chicago would continue about ten days. They were brought to a halt, however, during the evening session, January 22, by the refusal of the Armour Car Lines to give testimony. Vice President, F. W. Ellis, of the Armour Car Lines, was on the stand, but at every question of importance which was put to him, his attorneys rejoined with the statement: "This question is objected to upon the ground that it relates to the private business of the Armour Car Lines and that neither under the act of Congress, nor under the orders that have been entered in this proceeding, has this commission any jurisdiction, right or authority to inquire into such matters, or to demand the information which the question



McKeen Motor Car for the Sunset Central Lines.

calls for, and with all due respects to the commission we are constrained to advise the witness that he is not required to and ought not to answer the question.”

The Interstate Commerce Commission will seek to have a federal judge issue an order compelling the witnesses to give the information it requires.

McKeen Motor Cars for the Sunset-Central Lines.

Several McKeen gasoline motor cars of the new model type “C,” have been built for and delivered to the Sunset-Central Lines of Louisiana and Texas. One of the new cars and front truck are herewith illustrated, from which it will be noted that the car body is practically identical with the original designs. While the latest model of motor truck involves the same standard principles heretofore employed, the new design represents such improvements as are the result of nine years’ experience in the manufacture of these cars, and combines the collective experience of fifty odd railroads using this equipment.

The gasoline engine is entirely enclosed, the machinery is self-lubricated and operates automatically as far as practicable, the idea being to eliminate almost entirely the personal equation of the operator. Among the chief features of the new power truck are: Integral cast steel side frames, M. C. B. wheels and axles, and a new design driving box permitting its removal without dropping the wheels. The machinery and all moving parts are enclosed in oil tight dust and fool proof casings, thereby eliminating much of the wear and tear, and while decreasing the liability of accident, serving also to require less attention from the motorman. The crank shaft, cam shafts, bearings, rods, air pump, water pump, etc., are automatically lubricated by means of an oiling system in which the lubricant repeats its circuit continuously. Located between the cylinder units is an auxiliary hand oiler whereby the crank and rod bearings can be oiled, thereby facilitating the lubrication of the journals in starting in cold weather. In case of hot journals, emergency oil can also be applied through this auxiliary lubricator with minimum inconvenience to the motorman.

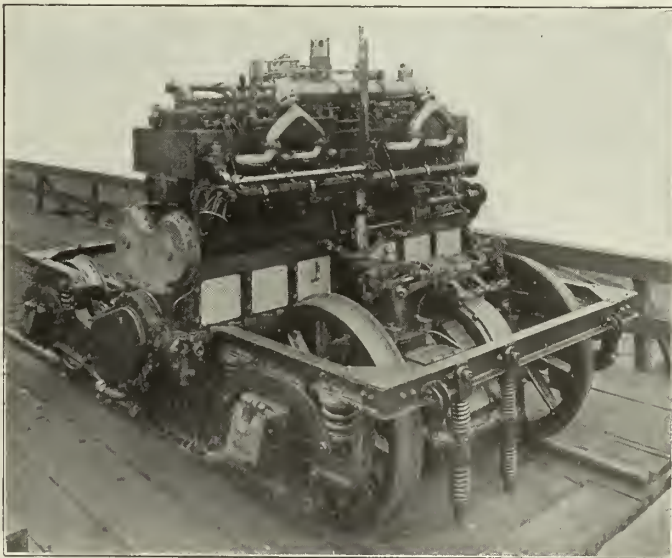
The manifold pipes in the new design are water jacketed by means of which the gases are heated and more equally distributed to the different cylinders. Increased water space has been provided around valves and cylinder heads to permit of overloading the engine, while the valves proper are of tungsten steel, a material which allows them to operate without distortion even though red hot. The special design of triple piston ring is used to insure compression though pistons and cylinders are badly worn. In the improved design of mechanical transmission, a multiple disc friction clutch has been developed which with the in-

creased number of friction elements is expected to give more positive action and about 96 per cent efficiency. The speed gears of the transmission are of the herringbone type instead of the ordinary involute spur gears, affording greater strength, greater efficiency and prolonged life. The new power truck has had its wearing surfaces increased, its mechanism simplified and the number of parts reduced to the extent that with greater reliability and freedom from accident, fifty per cent reduction in the cost of repairs is anticipated.

General specifications of the Sunset-Central cars are:

Engine, 200 horsepower McKeen standard, six cylinder, air starting and reversible.

Weight of car in working order.....	78,000 lbs.
Length between pulling faces of couplers..	72 feet 3¾ inches
Length over end sills.....	70 feet 0 inches
Length of engine compartment	13 feet 8 inches
Length of baggage compartment	8 feet 6 inches
Length of smoking compartment	16 feet 4⅞ inches
Length of passenger compartment	28 feet 0⅞ inches
Width inside	9 feet 4¾ inches
Width over side sills	9 feet 8 inches
Width over sheathing	9 feet 8¼ inches
Width over all	10 feet 2¾ inches
Height, top of rail to top of car (light)...	11 feet 9⅞ inches
Height, floor to ceiling at center of car...	7 feet 5⅝ inches
Seating capacity, passenger compart-	
ment 54, smoking compartment 29.	
Total	83



Engine Truck, McKeen Motor Car for the Sunset Central Lines.

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WILLARD A. SMITH	- - - - -	President and Manager
HAROLD A. SMITH	- - - - -	Assistant Manager
W. M. CAMP	- - - - -	Editor
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JOHN M. LAMMEDEE	- - - - -	
H. H. WALL	- - - - -	

Eastern Office, 30 Church St. (Hudson Terminal), New York	
A. E. HOOVEN	- - - - - Manager, Eastern Dept.

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SATURDAY, JANUARY 24, 1914.

It is pleasant to learn from President Wilson and members of his cabinet that "business is now on a settled basis." This reminds one of the old explanation of the statement that "business is looking up," namely that "that is the only way it can look when it is flat on its back." It is additionally comforting to know that there is solid concrete foundation under the back, even though it may be found rather slippery.

The fact that in the absence of any pronounced and general railroad demand for iron and steel mill products there is a demand for substantially one-half of the output for general needs, is a very strong point in the present depression. If to a normal non-railroad demand a favorable Interstate Commerce Commission ruling should be made, it will be readily admitted that the present 60 per cent average production would be sufficiently augmented to restore conditions to the old level. It is this anticipa-

tion that constitutes the strong undertone to the market and which points to ascending quotations.

In the accounts which appeared in the papers last week regarding the state of civil war in South Africa and the repression of a great strike by martial law and force of arms, there seems to have been no mention made of the fact that the railways on which the strike originated, are government owned. A long paralysis of business followed such a strike on the same roads last year. Government ownership means martial law. Italy and France have recently proved this. The only government ownership which can claim to be successful is in Germany and Japan, governments of absolutism.

An interesting view is taken of the 78 Brandeis questions by some of the railway officials to whom they have been propounded. They say that they are glad of the opportunity to state the truth. The air is surcharged with insinuation and misrepresentation. Suppressed boils are harder to deal with than those which can be reached and brought to a head. The innuendo, the "I could if I would," the covert allusion, the shaking of the head, the explanation of "why the other fellow took the business," the indefinite slander which no one can answer because to do so would suggest that he was hit—these things make the honest railway man sigh for a definite charge which he can stand up to like a man and refute.

This lurid atmosphere of opinion is not composed of graft charges only, it is just the same with the matter of efficiency. Some men would just as soon be called thieves, as fools. The constant dropping of remarks discrediting railway management and operation, is wearing away the patience of those who know the criticism to be unjust. If refuted by facts and argument, this same "scientific management" bug keeps up its poison stings just the same. It reminds one of the old definition of critics—"the men who have failed in literature and art."

When a confidence man or other crook advertises to tell people how to get rich, men of sense naturally inquire why he doesn't go at it and get rich himself. There are plenty of opportunities for good railway men; why do not these men who can tell just how everything ought to be done in railway operation, get a job and demonstrate? Simply because it is easier to tell others how to do things and get paid for the telling, than it is to get out and accomplish the same things yourself.

A streak of lightning or a real live electric storm, will clear a murky atmosphere. It may have been Mr. Brandeis' intention to accomplish this very purpose, but we doubt it because his questions have been preceded by charges which he hopes to prove. It is just possible that he may be on the verge of proving too much. He may not be able to locate the thing which he thinks he is on the scent of. It is a parlous thing

to thunder in the index, and peter out in the conclusion.

At least it is pleasant to know that some managements are glad of the opportunity to vindicate themselves and say some things which they could not say as long as the charges were so vague and tenuous. More strength to their elbow!

The Western Railway Club at its meeting Jan. 20, had contributed to its proceedings by Mr. F. B. Farmer, of the Westinghouse Air Brake Co., a notably comprehensive treatise on the subject of train handling; the analysis of the subject being based on strictly up-to-date conditions. There is undoubtedly no branch of the mechanical department that has felt the stress of the rapid developments during the past few years than has the air-brake department, and at the same time it must be said that no department has made any better record in keeping abreast of the times. The changes in methods and policy by which a road manages to meet the requirements of the changing times are none the less interesting and are frequently much more important than are the actual physical changes introduced in furthering the same ends. One of these, relating directly to the air brake department, has to do with the methods which certain roads have found advisable to adopt in utilizing their air-brake instruction cars.

It has grown increasingly evident of late that to continue to employ the instruction car, estimating its value in the academic sense, is to fall far short of imparting to the men on the road any adequate idea of how to manipulate the brakes under any great number of the many new conditions that the heavier and longer trains of mixed equipment have introduced. The air-brake instructor these days who remains merely an instructor and does not go out with the enginemen he would seek to instruct, and become a close student of these new complications in train handling, cannot possibly acquire full knowledge of these conditions himself, much less disclose to others a code of brake manipulation whereby satisfactory results can be obtained. Realizing these facts, certain roads have abandoned their cars for the usual forms of instruction and instead have their air-brake instructors perform their duties and cover their territory in much the same manner as do the traveling engineers. The cars in the meantime, as on the Atchison, Topeka & Santa Fe Ry., are turned over for stated intervals to the road foremen of engines, who are encouraged to make use of them in such manner as they may see fit. In this manner the engineers have the advantage of assistance from an instructor of broader outlook through his everyday contact with a rapidly developing art, and the road foreman is given opportunity to make use of the instruction car in such manner as will best meet the needs in his immediate territory, the peculiarities of which, the usual instructor, with his stereotyped assortment of information, would

not be likely to comprehend properly even were he disposed to do so.

The supervision of railway financing by the Interstate Commerce Commission is not disagreeable to railway managements and if opposed in Congress it will be on the ground of state rights. Many of the states now have laws lodging that power with their state railway commission or public utilities boards. Attention has been especially directed to this subject by the New Haven and Frisco cases. It is reasonably safe to leave this matter with the state, as the corporations are creatures of the state and not of the federal government. Most railway companies proposing new financing now find it necessary to obtain consents in more than one state. With the necessity of securing federal consent also, it will be necessary apparently for state and federal commissions to co-operate. Such arrangements should be made as will keep down the expense and prevent unnecessary delay. In England the "parliamentary expenses of new construction are enormous, and as they enter into the capitalization the people have to pay the interest. The burdens placed upon American railways by the requirements of commissions are steadily mounting up and already aggregate a heavy charge upon revenues.

The power of the federal government to supervise the financing of state corporations is, of course, based upon the tremendous clause, "power to regulate commerce between the states". The proposed law ought, in the minds of many, to be preceded by a national incorporation law, which would largely do away with the evils of dual regulation. The railways would greatly prefer one regulating power to deal with, but apparently that divine event is far off. Meantime, as both the federal and state governments assume one new power after another, the dual control increases and "the plot thickens".

The gentleman from Iowa, who aspires to be a thorn in the side of all railways as well as those of the state which pays him, has succeeded in getting Senator Kenyon of that state to submit to the United States Senate, a screed on government ownership which had already received some publicity. The opportunity came in a debate on the bill for building a government railway in Alaska; and the senator suggested the appointment of a federal commission to study and report upon the subject of government ownership of railways in other countries. Mr. Thorne's speculations are based upon the assumption that the government can borrow any amount of money it chooses at three per cent or less and save the amount between that and the railway revenue as its profit. He figures a profit in this way of over four hundred million dollars a year.

The same argument can just as plausibly be advanced for government ownership and operation of all industries—farms, factories, mines, merchandising, etc.

Why not conduct all industries by the whole and for the whole, and do away with individualism altogether? The fact is that the argument thus advanced in the weakest possible for government ownership. It begs all other questions and is so thin an assumption and prophecy that no commission with any brains would attach any weight to it.

Senator Kenyon's suggestion of a commission is, to say the least premature. He himself says the time has not come, and suggests the vital point of the whole subject when he says:

"There can be no government ownership of railroads if the civil service is to be stricken down. A great body of men thrust into national political life would be able to perpetuate any administration."

The government of Great Britain has established a commission to investigate this subject. It will have every advantage that any American commission could have, and its report will be of just as much value to this country as a report of a commission of its own. There are enough commissions and agencies of various kinds now at work disturbing the commonwealth and spending its money.

Mr. Thorne is entirely too modest in his claim of possible profit to the government. He admits this and hence doesn't have to prove it. But a suggestion is in order. As freight rates on government-owned railways are from one and one-half to three times those now prevailing in this country, why should not the U. S. government take advantage of that fact and raise the rates on its own roads to a parity with the average? This would increase Mr. Thorne's millions to billions and give Congress plenty of money to add to that which it now dissipates. Senator Aldrich claimed that the government wastes three hundred millions of dollars a year. That estimate should now be revised upwards. The American people seem to enjoy this profusion of the legislators. Surely it will be willing to forego all private business in order that its spenders at Washington may have unlimited treasure to scatter to the winds. By all means let us pledge our persons, our purses, and our sacred honor that the government may have the wherewithal to spend "like a drunken sailor"!

The C. B. & Q. R. R. Experiments with Treated Ties.

Considerable interest attaches to the paper read by Mr. Waterman at the annual meeting of the American Wood Preservers' Association, held in New Orleans this week. Mr. Waterman is superintendent of timber preservation for the Chicago, Burlington & Quincy R. R., and in his paper, extracts from which are published on page 152 in this issue, he describes experiments with treated ties of various kinds of timbers laid in lots of 1000 ties, at 26 different locations on the Burlington system, one experimental piece of track

for each division. The zinc-chloride, zinc-creosote and creosoting processes have been used in these experiments.

One of the first things to meet the attention of the reader of this paper is the large variety of timbers represented in the experiments, including several that have never been classed as tie timbers, by reason of very inferior durability service when laid in the ground as, for instance, birch, elm, maple, hickory and poplar. The experiments have been in progress upwards of four years, and yet Mr. Waterman states that not one of the treated ties has been removed from the track by reason of decay, whereas more than 80 per cent of untreated ties laid alternately with the treated ones, and at the same time, have had to be renewed on account of decay. Owing to the miscellaneous character of the timbers there is nothing surprising that such a large percentage of the ties in the natural state of the wood, have rotted out in four years.

As the duration of these experiments up to the present time has not been sufficient to afford data for broad conclusions on the value of specific treatments applied, the author of this paper refrains from such conclusions, but the progress thus far is encouraging for prolonged life of the ties. He does, however, go into some detail with results that have been obtained with zinc-treated ties used in the course of regular track maintenance during the past fourteen years. On the whole, these results would seem to be very good. For instance zinc-treated red oak ties laid in track where the grade and curvature is heavy, and under operation of Mallet locomotives, were all in service at the end of twelve years, and only 3½ per cent of the same were removed by reason of decay during the thirteenth year. From present appearances, Mr. Waterman estimates that not more than 20 per cent of these ties will have been removed by the end of the fifteenth year of service. This is certainly a very good record for red oak, which, in its natural state, is a timber of the inferior class when used for ties. Of zinc-treated pine ties laid in western Nebraska and eastern Colorado, 95 per cent were still in service after thirteen years. This record refers to ties in a stretch of fourteen miles of track, and both of these exceptional records pertain to a dry climate, such as is found in what is commonly known as the "dry-farming" country.

In the moister climate of Illinois 90 per cent of zinc-treated red oak ties have given a life of nine years and 60 per cent of them 10 years. The influence of climate is therefore apparent, but still the record of even these is very good, as it shows that the service of these treated ties will be two and one-half to three or more times that of the same kind of timber untreated, when used without tie plates, with presumably a better record if used with tie plates, as the author states that the renewing of these ties was because of mechanical wear and not by reason of decay.

In view of the suddenness with which a number of

railroads abandoned the zinc-chloride treatment and stampeded in the direction of various modified creosote processes that were newly-devised, some years ago, there is every reason to reflect upon the results mentioned in Mr. Waterman's paper. When such prolonged life in ties can be obtained at a cost of one-third to one-half that of applying creosote and modified creosoting processes, the economical aspects of the question are evident, if one is not actually reminded of the proverbial stone which the masons rejected, but which was finally placed at the head of the corner.

Interesting as the foregoing service records are, yet the most telling thing about this paper is the author's comment on the importance of proper treatment, which is made to include both seasoning of the timber and application of the preservative. It is not necessary here to dwell upon certain well known phases of these two questions, for it is known that a great many railroad ties have been, and are being, treated without any kind of seasoning worthy of the name, and it is not necessary to go into particulars of what we have already shown a number of times, which is that a great deal of poor work has been done with adulterated solutions and hurry-up methods of injection.

So far as the Burlington system is concerned, it is due to say that from the start, this company has given

painstaking care to its tie treating work. In previous papers Mr. Waterman has emphatically made known his opposition to the plan of treating timber that is only partially seasoned, merely for the sake of keeping the plant going. Aside from this, the handling of timber under solution in treating plants, the selection of antiseptics, and the purity thereof, methods of injection, etc.—all these have become questions of a specialized branch of engineering, and it has been found that the best success cannot be had without earnest study of all the conditions involved. Different varieties of timber and in some instances, different specimens of the same variety, have individual characteristics of growth, cell formation, and density which have to be taken into account before the injection of the solution can intelligently be done.

Desirable results in tie preservation cannot be obtained by sending the ties through a treating plant with as little attention to their behavior as might be given to rock passed through a crusher. For some years past the quality of rail steel has been a troublesome question with railway engineers, but, leaving the matter of safety of operation out of consideration, the quality of work in treating ties is hardly less important, for the average cost of maintaining ties in the track is greater than that of maintaining the rails.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Wanted, A Backbone.

"If those of us who are or have been directly concerned in the management of public utilities sometimes give expression to the indignation which we experience at the tendency of the public to reckon us all as public enemies and at the injustice of some of the decisions rendered against us by the commissions and courts, then by many we are charged with being reactionaries. On the other hand, if we passively submit to unjust accusations and confiscatory decisions, we confirm in these who are responsible therefor the opinion that we have no adequate defense.

"This timid course, which by many is defended as being tactful, is all too prevalent in the United States. This is unworthy of men who are sincere in their convictions and in their determination to conduct their affairs honestly and for the protection of those whose interests have been entrusted to them."—Dr. Alex. C. Humphreys, president Stevens Institute.

Government Management and Credit.

"Before taking up the broad question of government ownership of railroads, why should we not consider the success or failure of the management of municipalities. Are all cities well governed? The city council of Chicago this morning passed a budget which possibly may be subjected to the scrutiny of efficiency experts. It might be suggested that before government ownership of railroads is put into effect, they try municipal ownership of gas plants and street railways. The government owned Intercolonial Railway of Canada, has been cited repeatedly. I have been told that before elections the management of that road has found it

advisable to increase the number of employes in the maintenance department. The point also has been made that the government's credit is so it would be able to take over railroad property easily. The government's credit today is so good because its debts are so small, comparatively. If it should take over the debts of the railroads it is a question whether the credit would be as good."—F. A. Delano, president Chicago, Indianapolis & Louisville Ry.

The Delaware & Hudson Strike.

"Railroad men predict that the distance-limit for dragging a derailed freight car over cross-ties has now been increased from 3½ miles to 20."—New York Evening Post.

Government Management Destroys Individual Initiative.

"Certain it is that the magnitude of railroad operations in the United States warrants the most careful consideration of the proposition for government ownership and control of the railroads. Under government ownership it is hardly possible we could expect the quick responsiveness to traffic requirements that exists under competitive conditions, nor the ultimate efficiency and economy which are the prime incentives under private ownership. The possibility for wrongdoing and the difficulty of detecting it and applying remedial measures would be increased immeasurably, but the most important feature is that governmental ownership would destroy the individual initiative of almost 2,000,000 railroad employees now imbued with ambition. It would reduce them from free thinking individuals to automatons,

subject to the military discipline of the most gigantic political machine that could possibly be devised, controlling, as it would, their annual incomes, which aggregate \$1,270,000,000. To concentrate this power in the hands of the chief executive of the nation—an elective office—or to a departmental board subject to the will of the chief executive, would be a most dangerous undertaking. The United States would be relegated quickly to the European standard of class distinction; family connections would qualify applicants for official positions, and the working class never could hope to rise above a certain station.”—B. A. Worthington, president Chicago & Alton Ry.

Railway Managers of High-Minded Integrity.

“To him who insists that the railroads should be judged by their black sheep, it is fair in answer to invite attention to many exemplars of high-minded integrity in the administration of railroad property. We in the South can cite shining examples of such rectitude. I may be forgiven a proud reference to my late chief, William Wilson Finley, whose opportunities were not less than those of any of the flagrant individuals to whom illusion has been made, but who after years of devotion to a public duty and the practice of a large private charity, left an estate the amount of which, as announced in the public press, is at once a certificate of candid character and an illustration of just administration. One who knew them can add to the same roll of honor two more executives of railroads in the South who have recently gone to the grave—Thomas M. Emerson and John W. Thomas, Jr.”—Fairfax Harrison, president, Southern Railway, in an address to the Chamber of Commerce of Chattanooga, Jan. 20, 1914.

Regulated to Death.

“Bill Yokim was an excellent fellow who kept a livery stable and set up to be a great horse expert. One day, Bill had a colt coming in which he was going to break, and a number of friends were invited to witness the performance. The spectators sat on the fence while Bill trained the colt. It took him about an hour and a half, and when he got through the colt was dead. Bill Yokim’s experience, I fear, may be repeated if we remain passive and permit our politicians, perhaps I should say, rulers, to keep on regulating or training the railroad and other forms of public service corporations; they will be well trained, but they will be dead. Some day, possibly not before the millennium, the people will reach the conclusion that there are only two ways of treating railroad business. One is to treat it as a function of government, and the other is to treat it as commerce, or business subject to reasonable regulation. There is no middle ground. It is impossible, in the long run, to persuade private capital to invest in railroads if politicians the governmental bureaucrats are to exercise all the functions of ownership and management. It may be in the power of the government to destroy a part or the whole of the private capital which has heretofore been invested in the railroads, on the theory that the investor was to have some voice in managing his business, but it is not in the power of the government to make individuals repeat any such foolish experiment, and they will not do it.”—Howard Elliott, in an address to the Lotos Club of New York.

ing shop. It is not the number of pits, and to a certain extent not the number of men, that determines the output of an erecting shop, but the ability of all other departments to furnish the erecting shop with its needs promptly.—J. A. Carney, proceedings of the Western Railway Club.

Judge Prouty Argues That Power to Initiate Rates Should be Given the Interstate Commerce Commission.

Speaking not as a member of the Interstate Commerce Commission but as a private citizen, Judge Prouty argued that full power to initiate and change railway rates should be lodged with the Commission. He believed this would benefit the railways and the shipping public, and solve many problems which are now becoming serious. Elasticity, he argued, should give way to stability in rates.

Interstate Commerce Commissioner C. A. Prouty made an informal address to the Traffic Club of Chicago at a luncheon, January 16th. He began by speaking of the numerous changes now made in railway tariffs. He recently had a record made of the changes filed with the Interstate Commerce Commission during ten days, beginning with October 22, 1913. The number of changes in passenger and express rates were very large, but as this was abnormal owing to the readjustment of passenger rates to conform with decisions favoring state laws, and the new express rates required by the orders of the Commission, he left these two classes out of the question. The changes in freight rates filed were, in round numbers, 15,000 advances and 29,000 reductions. In this amount, single changes were included which covered a large number of others, such as changes in classification, but in each case this was only counted as one change. He did not believe that anybody was particularly benefited by these changes. They arose from various local causes and most of them, from a general standpoint, were wholly unnecessary. Following this, he had written to the traffic managers of three systems, asking their opinion as to whether these changes were of general value to the shippers or the railroads, and whether the time had not come when no changes should be made either up or down without the consent of the Interstate Commerce Commission. The replies received agreed with his position, that these changes are not valuable and that the time had come when most of them should cease.

He then asked “Has not the time come for the Interstate Commerce Commission to have the same power in making rates as is now held by most state commissioners?” He had formerly agreed with the railway people and economists in general that elasticity in rates was absolutely necessary. Indeed, he had himself written an article to that effect some seventeen years ago, and it was by his suggestion that the present law made orders fixed by the Commission on rates expire in two years. He has been changing his mind and now considers that stability in rates is much more important than elasticity and that the public needed rates upon which it can depend; that is, the great mass of rates. There will always, he said, be some elasticity needed and some changes, due to seasons of the year, types of cars and various conditions; but these could be easily handled by the Commission and would not, in the least, conflict with stability in the great mass of rates.

He believed that the government must regulate, but that it must leave private capital as free as possible and that there should be the least possible interference with railway management. But the railroads do not now make rates. They are made by competitors, by shippers and by federal and state commissions. No road can increase its rates even by 1% alone, hence the right which now resides in the railroads to initiate is of no importance and they would lose

Shop Output.—There is nothing on a railroad that is more clastic in its operation than is an erecting shop. This applies to car repairs as well as locomotive repairs, and the output of any erecting shop is dependent upon material, men and organization. The erecting shop is served by all other departments and is entirely dependent upon them and upon their efficiency depends the efficiency of the erect-

nothing by surrendering this power to the Interstate Commerce Commission. Competition in rates between railways is dead anyway. The only competition which now exists is one of service, and that is the only competition that is of value to the public. When the general level of rates is reduced to the lowest possible average (as he believed is now the case), any movement down at one point means a movement up at another, and this is not a condition that is beneficial to either the shippers or the railroads.

The argument has been made that the Interstate Commerce Commission could not handle the immense bulk of rates as it was physically impossible for them to do so. He believed, however, that this can be done by this Commission with the less expenditure than can be done in any other way or is now done. Regulation now is in spots, instead of a broad, comprehensive regulation. He believed that rate schedules should be greatly simplified and that this could be done, illustrating it by reference to apparently small schedules of some foreign countries. He believed also that simplification would make for stability while elasticity means constant changes.

One of the most difficult public problems at the present time is the dual control of railways by the federal and state commissions. He was not surprised by the decision in the Minnesota rate case; that simply left questions where they stood before. The Shreveport case, however, which is now before the Supreme Court, involves a matter of doubtful issue, and is, in his opinion, the most important case which the Supreme Court has ever been called upon to decide. There is, in this case, a conflict and defiance between the state commissions and the federal authority. If the power to initiate and establish rates generally were lodged with the Interstate Commerce Commission, the states would have to leave these rates alone. Federal made rates would simplify the problem and if the Interstate Commerce Commission named schedules, they would have the same effect as the decisions of the United States Supreme Courts now have over state courts. The results would be co-operation instead of conflict between the state and federal commissions.

An interesting illustration of what can be done with this co-operation was to be found in the recent conference of the Interstate Commerce Commission and the New England state commissions in regard to the proposed increase of freight rates of the Boston & Maine R. R. Perfect agree-

ment had been arrived at with resulting benefits to everyone.

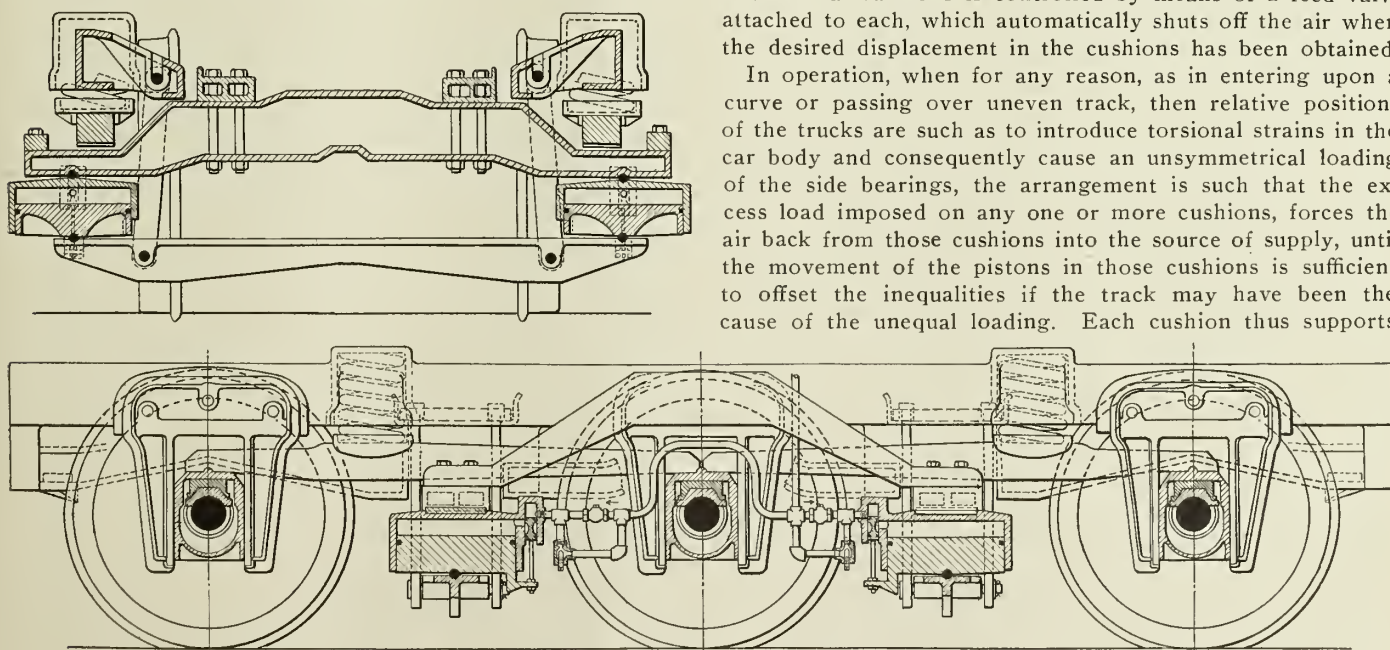
Judge Prouty, in beginning his address, desired to impress the members with the fact that he was speaking as a private individual to private individuals. He had expected to cease to be a member of the Interstate Commerce Commission on November 1st, but had not as yet been relieved. He was not representing, in his sentiments, the Commission as a whole or any other individual member of the Commission.

A Pneumatic-Cushion Carrying System for Passenger Cars.

The change from wood to steel in passenger car construction has brought with it, among other problems, that introduced by the non-yielding of the car body to the torsional forces introduced when passing over uneven track, and more especially in rounding curves. Because of this inelasticity, excess pressures are brought to bear on diagonally opposite side bearings, and trucks are bound and prevented from curving properly; so much so that not a few of the recent derailments to steel passenger cars and trains are thought to be directly chargeable to this fault. A proposed method of attacking this problem has been devised by the Gurley Engineering Co. and associates, of Chicago, same consisting of substituting for the usual elliptical springs at the ends of the center bolsters, a series of air-cushions or dash-pots. These are of such size as to enable them to carry the weight of the car when charged with air at approximately train line pressure. For a car having six-wheel trucks and a body weighing approximately 50 tons, the inside diameters of each of the eight cushions calculated for an air pressure of from 60 to 65 pounds, should be about 16½ ins.

With a normal displacement of two inches, each 16½ in. cushion would require about 430 cu. ins. of air, which for the 72 cushions on a nine-car train, would amount to a total of 30,960 cu. ins. of air at the predetermined carrying pressure. To charge the cushions of a train of this length, it is estimated that an interval of about two minutes would be required. The system not involving the discharge of air to the atmosphere for any purpose, any further drain than the above on the air brake system should be such only as might result from leakage past the piston rings by means of which the cushions are packed. The quantity of air admitted to the several cushions is controlled by means of a feed valve attached to each, which automatically shuts off the air when the desired displacement in the cushions has been obtained.

In operation, when for any reason, as in entering upon a curve or passing over uneven track, then relative positions of the trucks are such as to introduce torsional strains in the car body and consequently cause an unsymmetrical loading of the side bearings, the arrangement is such that the excess load imposed on any one or more cushions, forces the air back from those cushions into the source of supply, until the movement of the pistons in those cushions is sufficient to offset the inequalities if the track may have been the cause of the unequal loading. Each cushion thus supports



Pneumatic-Cushion Carrying System for Passenger Cars.

an approximately equal share of the load (the variation being designed not to exceed 8 per cent) with a minimum capacity for recoil, so that the heaving effect usual in cars carried entirely by springs, due to their stored-up energy when subjected to more than normal compression, should be very largely if not entirely eliminated.

The effect of suddenly overloading the cushions to the extent that they might otherwise be completely closed, is guarded against by placing check valves in the feed pipes to the cushions and by providing a by-pass containing a choking valve in each case, through which the air must pass in its return to the source of supply. The excess load being removed from any one cushion allows free ingress from supply line until the predetermined depth of air cushion has been restored. In practice it is planned to draw the air from the train line through a suitable controlling valve, storing a reserve supply in a small auxiliary reservoir, so that at no time can sufficient quantities be drawn from the train line to affect the brakes.

Experiments with Treated Ties.

By J. H. WATERMAN, SUPERINTENDENT OF TIMBER PRESERVATION,
C. B. & Q. R. R.

Facts gathered from observation and inspection of experiments with treated ties. From a paper read at the annual meeting of the American Wood Preservers' Association, New Orleans, Jan. 20-22, 1914. Data of good results with zinc chloride treatment. The importance of thorough seasoning and careful treatment.

In 1907 the Burlington road erected a treating plant at Galesburg, Ill. At that time Mr. F. J. Angier was superintendent of timber preservation for the road and he, with Mr. A. W. Newton, general inspector of permanent way and structures, evolved a scheme for testing out, on every division on the Burlington system, 1000 ties. These ties were to be put in, in a continual string, or as it is termed, "out of face." Untreated ties were to be put in alternately with treated ties. Three different kinds of treatment were used. The Burnettizing process (Zinc Chloride), Card process, which is an emulsion of zinc chloride and creosote, and the straight creosote process. Various kinds of woods were used as follows: Ash, birch, cypress, cottonwood, elm, soft maple, red gum, hemlock, beech, hickory, poplar, hard maple, pin oak, loblolly pine, chestnut, red oak, sycamore, tamarack, tupelo gum and white oak.

A detailed report has been written on this subject by Mr. Angier, showing by prints, how the ties were laid and records kept. (See Proceedings, Wood Preservers' Association 1911, page 129.)

May 10th, 1910, I succeeded Mr. Angier, and one of my duties is to carefully look after and inspect the experimental ties. There are over 26,000 experimental ties, in round numbers, and I personally inspect every tie, and it is one of the pleasant tasks I perform. Most of the experimental ties were laid in 1909, so that we have had only four years' actual experience with these ties, and you may smile when I tell you that I have reported to our people that in the next ten or fifteen years I will be able to tell them something about the actual results which may be obtained by properly treating ties. However, I am optimistic enough to say, without fear of having to take it back, that many of the treated ties will be in the track twelve to fifteen years, and I will not be surprised to find some of them giving us longer service than that. After four years' service in track, not one tie, treated with any process, has been taken out on account of decay. There have been a few ties taken out because they were broken and split. Over 80 per cent of the untreated ties laid in the track in 1909 have been taken out on account of decay.

The treatment we want to use is the treatment that will preserve the ties so that we can get the mechanical life out of them.

Money spent for treating ties that will preserve the wood from decay longer than the timber will mechanically wear is thrown away.

The foregoing refers to experimental ties which were laid in thousand lots on various divisions of the road, but I have some facts to give you which cannot be disputed. They refer to ties that were put in track in 1900.

In 1900 we laid, out of face, 550 ties on the Deadwood line, at a point near Mystic, S. Dak., on a 3 per cent grade and a 12 deg. curve, and for the past five years we have been running Mallet engines over this track. I inspected these ties Sept. 4, 1913, and I found all of them in the track except 21. Eighteen were taken out in 1912, on account of rot, and three were taken out for laboratory tests; 100 per cent of the ties gave twelve years' service.

These ties were red oak, treated with zinc chloride, at our tie plant located at Edgemont. There is no question but what 80 per cent of these ties will give use over fifteen years' service.

This experiment, you will note, is in a dry climate, which is favorable to the zinc chloride treatment. The ties were not plated when first laid, and since the ties were put in the rail has been changed once. I will be very much disappointed if 50 per cent of these ties do not give us twenty years' service.

Between Sidney, Nebr., and Petz, Colo., we have 14 miles of track which was laid with pine ties, treated in 1900. I inspected this track Sept. 2, 1913, and over 95 per cent of all the ties were still in the track and there was rail length after rail length where not a single tie had been taken out. These ties were treated at our own plant with $\frac{1}{2}$ pound of zinc chloride per cubic foot. The ties are not all plated, only the curves being protected with tie plates.

This experiment also is in a dry climate, but it would lead me to conclude that where you can treat ties for ten cents or less per tie with zinc chloride and they are to be used in the dry climate of western Nebraska, Colorado, Montana, South Dakota or climates similar to that, the zinc chloride treatment will surely give satisfaction. Now whether the treatments with oil in that climate would give us better service or not, we will have to wait patiently to find out.

Between Nov. 15, 1903, and Feb. 5, 1904, the Burlington road laid ten miles of track between Concord and Jacksonville, Ill., with red oak ties treated with zinc chloride. In this track there were laid 35,000 ties, in round numbers. To date there are 21,000 of these ties still in the track. In other words, 60 per cent of these ties have given us ten years' life. Over 90 per cent of these ties gave us nine years' life.

These ties were laid in the winter, on a new grade that was frozen, and they had very hard usage. They were not plated. I saw many of the ties which were taken out last year. They were not removed because they had decayed, but because they were simply mechanically worn out by the rail, which would have been prevented, had the ties been plated when they were first laid in the track. On account of recommendations which have been made to our people, all treated ties are now plated when put in the track.

The question immediately comes up, "Why has the C. B. & Q. R. R. got such results with zinc chloride treated ties as are stated in this paper?" The reason is because the ties have been treated properly and thoroughly. I was on the Pacific coast last fall and a general manager of one of the great trunk lines of this country told me personally that they had ties treated with zinc chloride that were taken out in three years, and he was very skeptical about the results obtained from treated ties.

What is the matter? They were not properly treated. They were on the stump today, tomorrow in the retorts, the next day in the track, and a few months later they were taking them out. This is overdrawn, I will admit, but by overdrawing it we are able to focus our eyes on the facts, and the facts are these: to get proper results from treating ties, either with zinc

chloride or by any other process, (1st) you must have your ties properly seasoned; (2nd) you must see that the ties are thoroughly and carefully treated.

From the above you might be inclined to draw the conclusion that I am personally favoring the treatment of ties with zinc chloride. I want to state to you that such is not the intent of this paper; but I am showing you some actual facts that have been accomplished and what we can expect if ties are treated properly with zinc chloride.

I have called your attention to the ties treated in the West, where we are getting from twelve to fifteen years' service out of them. I have also called your attention to ties treated in the Middle West, between Concord and Jacksonville, Ill., which is considered a trying climate, at least on ties, and what we have gotten out of ties properly treated with zinc chloride. If the emulsion of straight creosote, full-cell process, or the empty-cell process will give us better service than I have shown above, I will certainly report it to this association when I have gathered the facts.

I am here to state to you, and I believe it should be published broadcast throughout this country, that it is a crime to use inferior woods without treatment of some kind. Anything is better than no treatment. We talk about conserving our forests. We spend sixty years in growing a tie tree and we put it in the track and it decays in three years, and no one says anything about it, when, if it was properly treated, it would give twelve to twenty years' service.

A few months ago it was my privilege to take a trip in the extreme West, and I rode over one of our great trunk lines, where I got reliable information as to the results they were getting from untreated ties placed in track. Few of the ties gave over four years' service, and at the end of five years all of them were taken out. This was on one hundred miles or more of new track which was built five years ago, 1908, and today they are renewing every tie which had not been renewed prior to 1913.

Talk about conserving our resources, so far as our forests go! Through the kindness of our president I was sent to Canada to represent this association in a meeting of the Canadian Forestry Association, which met in Winnipeg, July 7, 1913, and I challenged the men gathered there to show me any organization which was doing more to conserve the forest resources of North America than the American Wood Preservers' Association.

Lord Strathcona and Mount Royal.

Lord Strathcona and Mount Royal, honored as one of the greatest empire builders of Canada, and of whose life the crowning achievement was the construction of the Canadian Pacific Ry., died at his home in London, January 21, aged 93 years. Lord Strathcona, or Donald Alexander Smith, as was his name, was a native of Scotland. He came to Canada as a youth, and entered the service of the Hudson Bay Company when 18 years old. After years of work with this company in the wilderness, first as clerk at a company post in Labrador, and later in the Northwest, he became chief factor and later resident governor and chief commissioner of the company in Canada. He was the last to hold this position. In 1870 he was elected to the first session of the Manitoba legislature and to the Canadian House of Commons, and was made a member of the first executive council of the Northwest Territory. Four years later he resigned from the provincial legislature, but until 1896, except from 1880 to 1887, he remained a member of the dominion parliament. In 1896 he was appointed Canadian High Commissioner to London, to succeed Sir Charles Tupper, and became a member of the Queen's Privy Council for Canada.

After his active connection with the work of the Hudson Bay Company ceased he became interested in railroads. In 1872 he became interested with James J. Hill and two other associates in the rehabilitation of the St. Paul & Pacific Ry.,

an enterprise which afterward proved to be the beginning of Mr. Hill's "life adventure." To the construction of the Canadian Pacific Ry., Lord Strathcona gave five of the best years of his life, in the period subsequent to 1880.

The rails between the east and west were connected in November, 1885, and in the year following he was rewarded for his services with knighthood in the Order of St. Michael and St. George. His cousin, the first Lord Mount Stephen, who had been a collaborator in the Smith-Stephen syndicate, which constructed the road, had already been recognized with a baronetcy, and both had been immortalized in the names of two of the greatest mountains of the Canadian Rockies, Mount Donald and Mount Stephen. Wealth and many other honors followed in the years to come, including the peerage to which he was elevated in 1897.

Lord Strathcona throughout his life maintained a reputation for sterling integrity and rugged honesty. He was a man of strong religious convictions, and was always associated with the Presbyterian church. He was a generous benefactor of many charitable and philanthropic enterprises. His wife survived until last November, and his last illness really dated from the shock sustained in that bereavement.

Report on the Wreck at Clayton, Ala.

A report has been returned by H. W. Belnap, official inspector of safety appliances, Interstate Commerce Commission, covering his investigation of the derailment wreck which occurred on the Central of Georgia Ry., Nov. 13, 1913, about four miles east of Clayton, Ala., which resulted in the death of 9 passengers and the injury of 389 passengers and one employee. The inspector's examination did not disclose any defects of consequence in the rolling equipment, and the employees involved in the accident, the report states, were experienced men, not working in violation of any of the provisions of the hours-of-service law.

The report does however allege and describe at some length an extremely bad condition of track. The rails were 56-lb., rolled in 1883, and seemed to have been breaking to an alarming extent in the 9-mile section on which the wreck occurred. The ties were untreated pine or cypress, averaging 16 to the rail and according to the report, a great many were in absolutely unserviceable condition and unable to support the rails or give a secure spike hold. Following are Mr. Belnap's conclusions:

"While the direct cause of this accident was a broken rail, bad track conditions and speed inconsistent with safety were material contributing causes, both of the derailment itself and of its distressing results. The track in the vicinity of this accident was in a deplorable condition. Foreman Beasley had been in charge of Section No. 44 but 16 days, during which time he had found 14 broken rails, 13 of which he had patched and left in the track. Considering the traffic on this branch, but two trains each way per day, and the weight of the cars and engines using the track, it is evident that these rails have outlived their usefulness. The method of repairing these numerous breaks indicates that material is not furnished for making repairs in a proper manner. When rails of this character are used on rotten ties, without ballast, and with an inadequate force of men to patrol the track and perform necessary work, as this investigation shows was the condition existing on this branch, accidents of this character may be expected to occur.

"With the kind of track existing in the vicinity of this derailment it is doubtful if trains could be run with safety even at the comparatively low speed allowed by the schedule. The maximum speed permitted, as shown by the minimum time between stations, certainly is not safe. Furthermore, the method of indicating this maximum speed is not such as surely to enforce the desired result, as there is nothing to prevent an engineman from running 60 or more miles per hour over por-

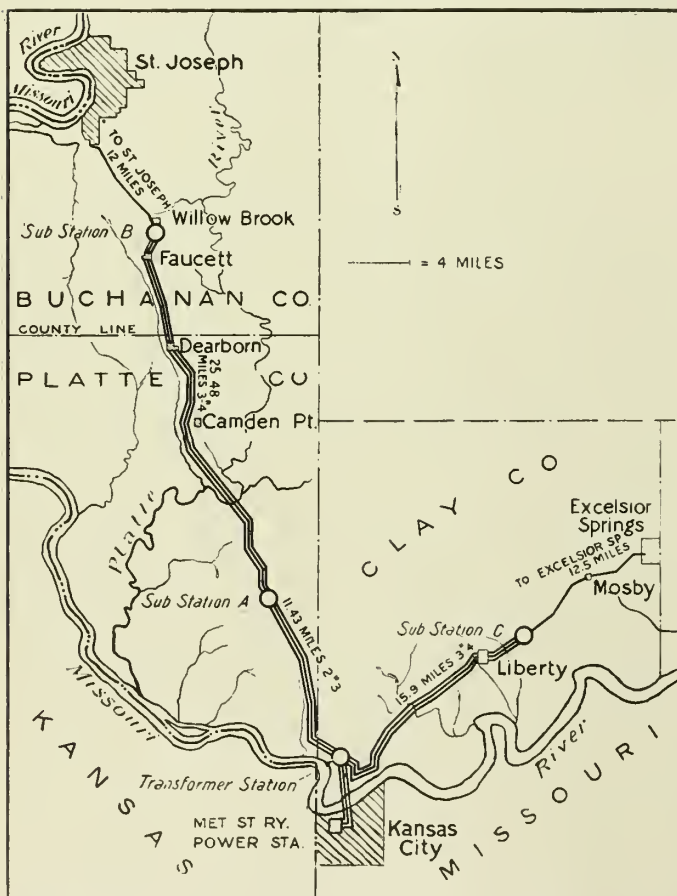
tions of the road, providing only that he does not exceed the minimum allowed between stations. The speed limit on this branch should be definitely stated in miles per hour, and it

should be placed low enough to insure comparative safety in moving trains over the patched rails and rotten ties composing this track."

Kansas City, Clay County & St. Joseph Interurban Railway

Description of a high-speed interurban railway operated by direct current on 1200 volts pressure, recently completed connecting Kansas City, St. Joseph and Excelsior Springs, Mo.

The Kansas City, Clay County & St. Joseph Ry. has lately been completed, affording a high-speed short route electric interurban line between Kansas City and St. Joseph, Mo. It operates on the 1,200-volt direct current system. The accompanying map shows the location of the line. There are two branches, one from Kansas City to Excelsior Springs and the other from Kansas City to St. Joseph, these having



Map Showing Route and Transmission Line of the Kansas City, Clay County & St. Joseph Electric Railway.

a length of 28.35 and 52.42 miles respectively. The Kansas City terminal of the railway is located at Thirteenth and Walnut streets in the heart of the retail, theatre and hotel district.

The road purchases its power under a 25-year contract with the Metropolitan Street Railway Co., of Kansas City. It is generated in the power plant at Third and Cherry streets at three phase, 25 cycles and 6,600 volts, alternating current. Over the pole line of the Union Depot Bridge & Terminal Co., the power is transmitted to the railway's transformer station, located in North Kansas City at the junctions of the two divisions of the road. The 6,600-volt current is stepped up to 33,000 volts at this point and delivered to the interurban railway's transmission lines.

The transformer station, an exterior view of which is

shown in the accompanying illustration, is 36 ft. square, over all, and is two stories high. Thoroughly fire-proof construction is used throughout. The first story is divided into a dispatcher's office, trainmen's room, toilet and bath-room for the trainmen, also, transformer compartments; while the second story is given up to the switch room.

The design of this transformer station includes a very interesting feature; the transformer compartments. Each of these compartments measures 9 ft. x 10 ft. with a height equal to that of the first floor. They are divided from one another and the remainder of the building by fire-proof walls that have no openings. Entrance to each compartment is through an 8-ft. x 11-ft. steel door opening from the outside of the building. Ventilation for each compartment is secured by a hinged ventilator and by metal framed windows with gratings at the top of each compartment.

The main electrical equipment of this transformer station consists of three Westinghouse 750-kva., oil-insulated, self-cooled, single-phase, 25-cycle, 6,600 to 33,000-volt transformers with necessary switchboards and switching apparatus. Also a Westinghouse 5-kva., type SK, single-phase, 25-cycle, 6,600-220-110-volt transformer supplies the 110-volt power for lighting the transformer station and the shops, and the 220-volt current for the shop machinery.

There are three substations on this system for converting the high tension 33,000-volt, 25-cycle, alternating-current to 1,200-volt direct current; one on the Excelsior Springs division and two on the St. Joseph division. The construction of the substation buildings is very similar to that of the transformer station. These buildings have a ground plan 43 ft. 6 in. by 41 ft. They are divided into two divisions, by a brick fire wall, whose openings are protected by steel doors. In the larger of these compartments are installed the transformers, electrolytic lightning arresters and auxiliary apparatus, while the rotaries and switchboards are installed in the smaller compartment. The substations are all one-story buildings.



Exterior View of Transformer Substation, Kansas City, Clay County & St. Joseph Ry.



Typical Rotary Converter Substation, Kansas City, Clay County & St. Joseph Ry.

The main equipment of each substation consists of two Westinghouse 500-kw., 1,200-volt, 750 r.p.m. commutating-pole rotary converters, self-starting from alternating current side. These rotaries are insulated for and can be operated at 1,500 volts. This high-speed instead of 500 r.p.m. was chosen because somewhat better efficiencies are obtainable at all loads and a more stable commutation at heavy overloads. With a six-pole rotary converter operating at 500 r.p.m. it is not possible to place the brushes as advantageously as with the four-pole rotaries at higher speed. The space between the poles on the 750 r.p.m. four-pole rotaries is greater and allows for a more advantageous armature winding for the high-voltage than can be obtained on a 500 r.p.m. rotary. This is due to the fact that a greater number of commutator bars can be employed with a correspondingly average reduced potential difference between bars, thus permitting a more advantageous use of commutating poles. Heavier overloads can also be carried by four-pole rotaries due to the more advantageous proportioning



High Tension Switch Room, Transformer Station, Kansas City, Clay County & St. Joseph Ry.

of the machine, so that overloads up to 200 per cent of the rated capacity of the machine, or three times the full load current of 416 amperes, for swinging periods of twenty seconds without undue heating or injurious sparking could be guaranteed.

The trolley wire, three-phase transmission line, one telephone circuit and the feeder cable are all carried along the road by one pole line, and also space is allowed on the cross-arms for signal wires. The design of the overhead construction is such that the road may ultimately be operated at 1500 volts direct current, with 1200 volts direct current for initial operation. In general five-point catenary bracket construction is used, span construction being employed only on long overhead viaducts and bridges, also for short distances in cities. Westinghouse flexible catenary hangers and curve pull-offs are used.

The rolling stock equipment consists of 27 cars. A 45-minute headway is maintained on the Excelsior Springs division and a 70-minute headway on the St. Joseph division. Trains are usually composed of one car, although on some occasions two-car trains are operated. No. 000 B. & S. gage, hard-drawn standard grooved copper wire having a tensile strength of 46,500 lbs. per square inch is used for the trolley.

Telephone Train Dispatching During the Past Year.

Recent orders for telephone train dispatching equipment emphasise the successful results which have attended the substitution of the telephone for the telegraph in this branch of railway service, and illustrate the extent to which the new apparatus is displacing the old.

Adaptation of the telephone to train dispatching has made notable gains during the twelve months just past. About 2200 miles of railway are covered by equipment orders but recently placed. At the beginning of 1913 there were approximately 70,000 miles of road in the United States and Canada using



View Showing Catenary Line Construction, Kansas City, Clay County & St. Joseph Ry.

this method of controlling the movements of trains. Changing over from one method of train dispatching to another is a process which necessarily entails a great deal of deliberation on the part of railroad officials and such a radical change as that from telegraph to telephone requires considerable time for its consummation. The fact that 70,000 miles out of a possible 265,000 or over 30 per cent, have been equipped with telephones in the comparatively short space of four years is indisputable evidence of the good work being done with the new system. Since the beginning of the year, apparatus for a large number of extensions to existing equipments has been ordered and a number of other railroad systems have placed orders for their first telephone lines.

The Seaboard Air Line has placed an order for Western Electric apparatus to be used in extending its telephone dispatching circuits from Columbia, S. C., to Jacksonville, Florida, a distance of approximately 285 miles. A total of 34 way stations has been equipped with desk-type telephones and selector sets for signaling. The dispatcher is located at Jacksonville.

Seven circuits are to be equipped on the Missouri, Kansas & Texas Railway, making a total of 1000 miles of new telephone lines. Way stations will be equipped with No. 101-B selector sets for selective signaling and No. 1048 telephone arms of the folding gate type for talking. The divisions to be equipped are as follows: Muskogee division extending from Osage to McAlester, Okla., a distance of 186 miles, with the dispatcher at McAlester; 23 way stations will be equipped. San Antonio division extending from San Antonio to Smithfield, Texas, a distance of 101 miles with the dispatcher at Smithfield; 11 way stations will be equipped. Houston division, extending from Houston to Smithfield, Texas, a distance of 117 miles, with dispatcher at Smithfield; 13 way stations will be equipped. Sedalia division extending from Sedalia to Parsons, Mo., a distance of 160 miles, with the dispatcher at Parsons; 28 way stations will be equipped. Kansas City division extending from Kansas City to Parsons, Mo., a distance of 107 miles, with the dispatcher at Parsons; 19 way stations will be equipped. St. Louis division extending from St. Louis to Sedalia, Mo., a distance of 227 miles, with the dispatcher at Sedalia; 33 way stations will be equipped. Cherokee division extending from Wagoner, Okla., to Parsons, Mo., a distance of 102 miles with the dispatcher at Parsons; 16 way stations will be equipped. The Missouri, Kansas & Texas lines will also be equipped with 150 siding telephones of the No. 1293 type. Wire chief's test panels and apparatus cabinets equipped with simplex relays, resistances and protectors for the dispatchers' offices will also be furnished.

Two new telephone train dispatching circuits have been added to the lines of the New York Central. One circuit extends from Oswego to Rome, New York, with a side line bridged on at Richland and extended to Watertown, making a total mileage of 101. Twenty-three way stations are equipped with telephones and Western Electric No. 102-B selector sets. The dispatcher is located at Oswego. The other circuit extends from Oswego through Richland to Syracuse, New York, a distance of 70 miles. Eighteen way stations are equipped with telephone and selector sets for selective signaling. The dispatcher for this circuit is also located at Oswego.

Additions to existing circuits are to be made by the Chicago & Northwestern Ry. One new telephone dispatching line is to extend from South Pekin to Benld, Illinois, a distance of approximately 105 miles. Twenty-three way stations are to be equipped with telephones and No. 102 type selector sets for the selective signaling over this new division of road. A message circuit for handling telephone traffic other than train dispatching will be installed over the Peoria division and will extend from Nelson to South Pekin, Ill., a distance of about 85 miles. Eighteen way stations will be equipped with telephones and selective signaling sets. The dispatchers for each circuit will be located at South Pekin. Thirty-eight Western Electric waiting room telephones are to be installed in the stations along these two divisions.

The Chicago, Burlington & Quincy is planning to add three new train dispatching and one message circuit and has placed orders for the necessary apparatus. The message circuit and one of the train dispatching circuits will be installed over the division extending from Burlington, Ia., to Hannibal, Mo., a distance of approximately 100 miles, with the dispatcher at Hannibal. A total of 22 No. 102 type selector sets and telephones will be furnished for the way stations along the line. Another of the train dispatching circuits will be installed between Alliance and Ravenna, Neb., a distance of about 240 miles. The dispatcher will be located at Alliance. Twenty-seven way stations will be equipped with telephones and selective signaling apparatus. Apparatus for one blocking circuit will also be furnished with 25 station equipments. This provides for making connections between different circuits and connecting telephone sets to train, message or block wires in either of two directions. The third train dispatching circuit is to extend from Creston to Pacific Junction, Iowa, with the dispatcher at Creston. This division, which is about 65 miles long, will have 23 way stations equipped with telephones and selector sets for signaling.

The Denver & Rio Grande R. R. has purchased a quantity of composite equipment for use on its lines. This equipment consists of 72 wall sets of the Western Electric No. 1312-A type for use at way stations and 26 No. 1314-A portable sets for the use of train crews. These portable sets are equipped with cords and line poles so that communication may be established with headquarters from any point on the line by merely hooking the line pole over the telephone wires which parallel the track.

The Iowa Railway & Light Co., which operates the Cedar Rapids & Iowa City Ry., has ordered telephone train dispatching apparatus for equipping its entire line. This road extends a distance of approximately 30 miles, operating its passenger trains by electricity and freight service by steam. Ten way stations will be equipped with telephones and selective signaling apparatus. No. 102 selector sets containing the Western Electric No. 50 type selector will be used for signaling way station operators. Portable telephones will be furnished for the use of train crews. These telephones will be fitted with cords and plugs arranged for plugging into pole jacks which will be placed at a convenient height on telephone poles along the right-of-way. This arrangement will make it possible for train crews to communicate with headquarters from any point on the line, and is especially valuable in emergencies. The train dispatcher will be located at Cedar Rapids.

Another road which recently adopted dispatching trains by telephone is the Lehigh & New England Ry. The total mileage which is to be equipped at present is approximately 120. The remainder of the line will be equipped at a future date. The present telephone circuits will extend from Lansford to Hainesburg Junction, Pa., with spurs running from Benders Junction to Bethlehem and from Bath Junction to Martin's Creek. The dispatcher will be at Bethlehem. Twenty-one way stations will be equipped with telephones and No. 101-B selector sets containing the No. 50 type selector for the selective signaling. There will also be sixteen siding telephones of the Western Electric No. 1317 type installed at points along the line. The No. 1332 type portable telephone is to be carried by train crews.

Many other roads are rapidly joining the ranks of telephone users. These new installations add a little over 2200 miles to the already large mileage over which the dispatching of trains, both passenger and freight, are governed by means of the telephone. The railroads have also found it profitable to install telephones for handling communications other than dispatching messages. Roads already using this method of communication over a part of their line are constantly adding to their

equipment. Almost as fast as installing work is completed on one division, it is begun on another.

Postal Revenue and Expenses.

Vice-President H. B. Helm of the Louisiana Ry. & Navigation Co., has issued an address on this subject to the employees of the road, which analyzes and states clearly the hardship imposed by the Government in its existing method of paying that company for carrying the mails. It is a concrete case which clearly illustrates the general situation, and the unfairness and tyranny now exercised by the government through the post-office department.

For some time past there has been a great deal of space used in newspapers and other publications, in discussing the postal rates paid the railroads. Some of these publica-

mail cranes furnished for this exclusive use, fair return for transportation of the postal clerks, and a reasonable compensation on the value of the property used.

Only a few items will be enumerated to prove that the above allowance does not meet the cost when computed on a fair basis.

The cost of repairs to mail and express cars for the past year, computed on basis of actual miles made and divided one-half each to mail and express, would amount to \$3,087.20.

The cost of the mail car proportion of repairs to passenger locomotives, computed on the same basis, was \$2,675.55.

The wages of engineers and firemen pulling mail trains, computed on same basis, \$3,087.20.

The fuel consumed by mail train engines, the lubricants



THE DANGER OF UNREGULATED REGULATION.

tions have advised that just compensation should be allowed; others, through lack of understanding of true conditions, no doubt, have loudly advocated a reduction of the rates now in effect. As a rule, the American people, as a whole, are lovers of fair play. It is not at all probable that any large proportion of the people expect or desire to have the railroads perform the service that it does in connection with the transportation of mail, without receiving reasonable compensation for such service. In order that you may know the effect of the present adjustment on the L. R. & N., the following figures are presented:

The total amount of revenue received from the post-office department for the year ending June 30, 1913, was \$24,097.

The total miles made by trains handling mail, for one year, on the basis now running, is 473,040; rate per mile, .0509.

While it would be very difficult, if not impossible, to figure the exact cost of this service, it will probably be conceded by all fair minded people that a compensation should be allowed which would fairly cover its proportion of the expense of operating these trains, the handling of mails at stations, the use of equipment furnished, the cost of

used, the cost of operating fuel and water stations, chargeable on the same basis, was \$6,791.85.

The cost of passenger train crews, chargeable on same basis, \$2,881.38.

Cleaning mail cars, heating and lighting, lubrication and other supplies, amounted to \$1,852.32.

The cost of mail cars transferred over the Mississippi river and bridge tolls paid other companies amounted to \$1,445.

The value of transportation furnished the railway postal clerks as now run, computed on basis of lowest rate of passage sold, viz., 2 cents per mile east of the Mississippi river and 2½ cents west, would amount to \$5,091.71.

These few items of transportation service alone, total \$26,912.21; or a cost per mail train mile of .0561 cents; or an excess in a few of the transportation items over the gross revenue of .0052 cents.

Nothing is included in the above for cost of service at stations; nothing for transporting mail to and from post offices; nothing for any proportion of track expense; nothing for supervision of shop expense; nothing for superintendence of transportation or dispatching trains; nothing for switch engine service at inclines or terminals; nothing

for miscellaneous transportation expense, such as clearing wrecks, loss and damage to persons or live stock, etc.; nothing for general expense or insurance on equipment used in this service, and nothing to provide for any return to the owner of the road on capital invested.

The establishment of the parcel post service has largely decreased the earnings of the railroad company. Practically all of the matter now handled by the parcel post was formerly handled by the express company, on which substantial revenue accrued to the railroad company. A conservative estimate of the loss in revenue thus occasioned, would run the figures into many thousand dollars per annum. The weight and bulk of these shipments have, of course, been transferred to the mail compartment, and in many ways, add to the cost over that which would have been occasioned if handled by express.

On July 1st, the postoffice department made a so-called adjustment of their rates of pay, to compensate the railroad for this added service. This amount, like all mail service compensation, was fixed arbitrarily by the department; the railroad having no voice in the matter. The amount of the so-called adjustment which was allowed this company figures an increase of only 3.4 per cent on the total mail revenue, or one-sixth of a cent per mile.

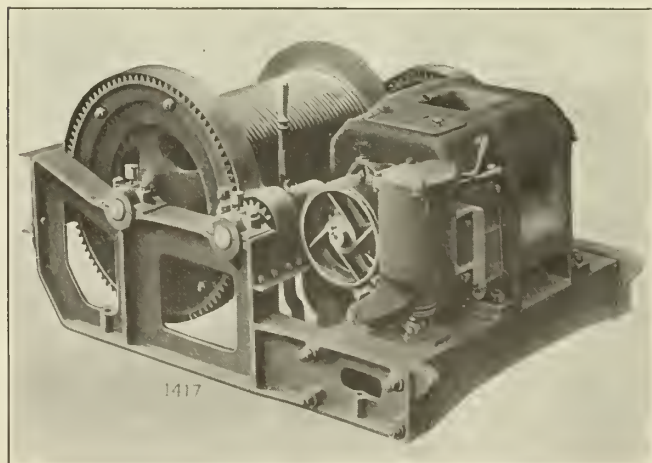
Therefore, you will readily see that the mail services furnished by the L. R. & N. at the rates fixed by the government are at a large loss to the company.

Portable Electric Drag, Shaw Electric Crane Co.

The Shaw Electric Crane Co. has perfected a type of drag illustrated herewith, which is useful and admirably suited for handling cars in freight sheds or repair shops, as a portable electric winch, as a stationary hoist for general contracting work and kindred service. The frame consists of heavy cast steel sides securely connected by cast and structural steel cross pieces, forming a rigid unit. The bottoms of the frames are flush for skidding and are provided with bosses for holding-down bolts. Lugs are also provided for the attachment of hauling links for moving the machine to different locations.

The winding drum is of cast iron, machined with grooves to keep the hauling cable in place. The cable is of special plow steel rope, $\frac{3}{4}$ inch in diameter, 19 wires to the strand, 6 strands and a hemp core. All shafts are carried in capped bearings with bronze bushings. The gears are of steel with cut teeth, all gears being guarded. The drum pinion is free on the shaft and a jaw clutch is provided thereon for coupling same to shaft. The drum is, therefore, free to rotate when necessary to unwind the rope by pulling on it. The clutch may be left in engagement and motor controlled at proper speed to unwind rope as the end is carried away.

The motor is of the Shaw company's standard type Z crane



Portable Electric Drag, Shaw Electric Crane Co.

motor. It is rated on a basis of 40° C. temperature rise after 30 minutes run with full load, and is designed exclusively for crane and hoist service. The machine is built either with or without such auxiliaries as guide drum or niggerhead, as may be desired, and can be altered to meet special requirements. Manning, Maxwell & Moore, 87 Liberty street, New York, are the selling agents for this line of machinery and should be applied to in case further information is desired.

Railway and Engineering Literature.

The Chicago Pneumatic Tool Co., Fisher Building, Chicago, is circulating as Bulletin No. 167, a treatise on losses through the safety valves of locomotives and a description of Zebree safety valve discharge register, for which device this company has taken the sales agency. A description of this register will be found on page 148 of the Railway Review for Feb. 17, 1912.

* * *

Herman Bacharach, distributor of industrial and scientific instruments, 14 Broad street, Pittsburgh, Pa., is sending out literature describing the steam engine indicators manufactured by the H. Maihik Aktiengesellschaft, Hamburg, which firm he represents in this country.

* * *

The W. S. Rockwell Company, 50 Church street, New York, has issued catalog No. 20 illustrating and describing a great variety of both oil and coal fired furnaces for all kinds of industrial heating operations. These include reduction, melting, forging and heat-treating furnaces of all types.

* * *

Bulletin "K," by the Mesta Machine Co., Pittsburg, Pa., pertains to several types of heavy gears and rolling mill pinions built by that firm. A feature of Mesta cast gears of large size where perfect roundness is essential, is the casting of the rims and the spiders separately, thus eliminating distortions liable to result from shrinkage of the arms.

* * *

A late sixteen page pamphlet by the Cincinnati Milling Machine Co., Cincinnati, O., describes three of the types of "semi-automatic manufacturing millers" which are manufactured by that firm, these being the duplex, plain, and face millers in the 28 in. size. A feature of these machines is the intermittent feed whereby the gaps between different pieces of work secured to the tables of the machines are automatically traversed at a higher rate of speed than is permissible with the milling cutters engaged, thereby effecting considerable savings in the time otherwise required for operations on parts set up in this way. These machines are especially adapted for milling such work as is manufactured in large quantities.

* * *

The General Electric Co., Schenectady, N. Y., has issued bulletin A4131, describing storage battery locomotives. The bulletin outlines the general conditions under which the use of such locomotives are desirable or advantageous and illustrates and describes various devices and sizes which have been built and placed in service. The bulletin is accompanied by a data sheet for the use of those who wish further information on this subject.

* * *

The Sprague Electric Works of the General Electric Co., has issued pamphlet bulletin No. 247, superseding a previous number, describing round type direct current motors.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

At a joint meeting of the American Society of Mechanical Engineers with the Engineers' Club, of Philadelphia, held in Philadelphia, Pa., on January 7, George R. Henderson, consulting engineer for the Baldwin Locomotive Works, gave an illustrated discourse on the subject of recent locomotive development. In addition to treating the subject from the standpoint of enlarged size and the introduction of new types of engines, Mr. Henderson enumerated and dwelt upon the development of the various accessories that have

been introduced to facilitate the economical operation of modern heavy motor power units. The discourse was concluded with the presentation of a number of views portraying features of construction of the Transandine Railway, connecting Argentine and Chile.

The Chicago Section of the American Institute of Electrical Engineers and the electrical section of the Western Society of Engineers will hold a joint meeting, Monday evening, January 26, in the rooms of the latter organization, 1735 Monadnock block, Chicago. Mr. Bion J. Arnold will address the meeting on "City Transportation: Subways and Railroad Terminals." On Monday evening, February 2, Mr. E. J. Mehren of the Engineering Record, New York city, will address the meeting on "The Making of a Technical Journal."

The Railway Club of Pittsburgh held its regular meeting for January, at the Monongahela house, in Pittsburgh, on Friday, January 23. The paper presented at the meeting was entitled "Thermit and its Latest Development in Railway Shop Practice," the author being W. R. Hulbert, assisted by H. D. Kelly of the Goldschmidt Thermit Co. This was illustrated by means of moving picture views and lantern slides, and demonstration of pipe welds, burning holes in steel plate, etc., was given.

Through the courtesy of the Fort Pitt Malleable Iron Co.,

Duquesne Steel Foundry Co., Pittsburgh Steel Foundry Co., and the Graham Nut Co., the members of the Railway Club of Pittsburgh and their ladies will be tendered a complimentary entertainment and dance at the armory in Coraopolis, Pa., on Tuesday evening, January 27, 1914. The committee, representing the industrial plants referred to above, consisting of Messrs. Frank J. Lanahan, L. A. Way, O. S. Pulliam and Harry C. Graham has charge of the arrangements.

The Boston branch of the American Society of Mechanical Engineers will hold a meeting in Boston, Mass., on Tuesday, February 3, at which time papers will be presented on the general subject of recent development and present tendencies in railroad rolling stock, electrical equipment and permanent way. Messrs. Henry Bartlett, Frederic B. Hall and A. B. Corthell are among those scheduled to participate in the discussion.

Arrangements are being made for the meeting, May 23, of the American Iron and Steel Institute, in New York city. The membership having reached the 1000 mark the directors have increased the limit to 1250 so as to admit a waiting list of 100. The committee on program for the spring meeting consists of: James A. Farrell, E. A. S. Clarke, John C. Maben, John A. Topping, Charles M. Schwab and F. S. Witherbee.

The Railway Supply Man's Point of View

Get Your Stockholders to Work.

The suggestion recently made in our editorial columns, that both railway and railway supply companies should get their stockholders lined up and interested in influencing public sentiment toward fair treatment of the railways, is meeting with response. The following letter is interesting in this connection. Most stockholders have other extensive interests and by working with their associates in other lines of business can accomplish much. While it is easy to say that stockholders in railway and railway supply concerns are "interested parties" it should not be forgotten that every business man is really an interested party. The great business organizations are pronouncing themselves on this question. Let the individual companies exercise their influence also!

Kalamazoo, Mich., January 19, 1914.

Editor, Railway Review:

The annual meeting of the stockholders of our company was held on Thursday, January 15th. The meeting proved a very pleasant one and was well attended by the stockholders, composed chiefly of the heads of large industries located here in Kalamazoo.

It was during the meeting that the matter of the increase of freight rates, which railroads have been asking for and which the commission has under consideration at the present time, was brought up by the writer, and I have taken up no matter more interesting than this. All of our stockholders, while some are very heavy shippers, one being president and general manager of the largest paper company in the country, agreed that the railroads were entitled to the increase they had asked for. I might add that amongst our stockholders, we have two wealthy farmers, and you, no doubt, have heard a great deal about the farmer being against railroads; but it surprised me to see how very outspoken these gentlemen were in regard to this matter, in favor of making this concession.

My object in writing you is, to say that I think manu-

facturers in general, that is, the heads of business should take up matters of this kind and discuss them with their stockholders, as I believe a whole lot of good can be accomplished towards assisting the railroads in securing what justly belongs to them. Often feeling is created, due to the lack of knowledge as to just what the railroads are doing towards helping the shipper.

J. McKinnon, President,
Kalamazoo Railway Supply Co.

Supply Men Oppose Legislation Compelling Unnecessary Purchases.

President Geo. A. Post of the Railway Business Association appeared before the sub-committee of the house committee on Interstate and Foreign Commerce, at Washington, January 19, in opposition to the bills requiring that the substitution of all-steel passenger cars for wood or part wood cars, in from four to ten years. Mr. Post presented a very complete argument against such legislation and argued that the Interstate Commerce Commission should be given authority to require the use of steel cars within its discretion. As this subject has recently been treated very fully from all standpoints in a series of five articles in these columns, we refrain from giving Mr. Post's argument in full. He quoted the building capacity of the country and the immense outlay which would be required by the railways. This, after allowing for the normal outlay in new cars, he showed would amount to \$392,700,000 as an excess of outlay which the law would command. This would cripple the roads financially and delay other necessary improvements, some of which will be required by other laws. The details of the individual bills he criticized also, and said: "Our view as to steel car legislation is merely the application to that particular subject of a general policy of regulation which our organization has advanced for five years. This policy is that the law-making body should avoid dealing with details

of regulation and should instead lay down some very general rule of guidance for an expert, permanent commission, to whose discretion details should be entrusted. Exact and full knowledge of a highly technical subject is an advantage which commissioners are better situated to obtain than congressmen. A permanent commission can be made up of men having qualification for that special function and all giving all of their time to the work. They labor in close co-operation and when they act, each member may fairly be held accountable."

"All of the steel car bills seem to provide for retirement at the earliest possible moment of all wooden passenger train cars. The Interstate Commerce Commission, after a series of investigations of accidents, does not so recommend, but suggests that if a mandatory law be enacted 'its application in the first instance, should be confined to *important high speed trains.*' 'There are,' the commission remarks, 'a great number of wooden cars now in service, and the carriers should be permitted to make use of these cars on branch lines and in local service until they can be replaced by steel equipment.' If it be true that many trains can safely be operated with wooden cars, it would seem of great importance to use them until worn out. The manufacturers whom I represent do not believe it to be in their interest, even temporarily, that great quantities of railway equipment shall be wasted, and certainly it would be against the public interest. The amount which can be spent for all purposes combined is limited. Many other expensive improvements for safety are demanded."

"We earnestly urge that if you enact a law compelling the railways to expend these vast sums you place upon the rate-regulating power the responsibility of determining the time limit within which the work shall be completed and of permitting the carriers such revenues as may be necessary for its accomplishment. By so doing you will assure the people of the United States upon the word of its potent regulating body that safety in travel by rail will be promoted as rapidly as the financial resources of the railway companies will permit."

Good Inspection Advantageous to Manufacturer as Well as Buyer.

Robert W. Hunt & Co., inspecting and testing engineers, publish a monthly bulletin for their employees only. Their inspectors contribute to its columns; and many good ideas are brought out. The following is by John Allen Bushnell, inspector at the Maryland Steel Co. plant.

In this age of progress and keen competition between rival manufacturers it is the one whose products show the best results that will secure the future orders. Most manufacturers having this in mind try in every way possible to give their customers the best satisfaction obtainable, but their well meant efforts often go for naught on account of some slight inefficiency, neglect or lack of co-operation, on the part of their employees.

The purchaser finding his orders not entirely satisfactory, transfers his future contracts to some other firm, with probably the same results as before; he then sees the necessity of appointing a representative or inspector to watch his interests, to see that he is getting all that he is paying for and to see that the manufacturer is living up to the standard of his specifications.

The purchaser's representative or inspector is, to all outward appearances received very cordially by the head and lesser officials of the firm, but frequently is only regarded as a "trouble maker" by the employees in general, as he is watching the faithful performance of their duties in the interest of his employer whom he represents and is not slow to note any deviation from general good practice which is very easily overlooked by anyone less interested,

especially those whose chief desire it is to turn out the greatest amount of work or tonnage.

Any detention or rejection of the work naturally leads to friction even though not openly shown, it creates a desire for contracts with "no inspection," for then any mistakes or shortcomings can slip through unobserved, which certainly means a loss to the customer on account of inferior workmanship and a loss to the manufacturer on account of the dissatisfaction of his customer; all of this is contrary to the wishes of the manufacturer and in fact, the very thing he has been doing his very best to avoid but is so often at the mercy of those who consider quantity before quality.

The representative or inspector observing any delinquency on the part of the employees connected with his work, should bring the matter directly to the notice of the proper officials who are only too glad to adjust the trouble and remedy conditions that they were probably unaware existed, and it is not long before they see in the inspector an advantage, that instead of a "trouble maker," they have an expert in their own particular line of business assisting them to raise the standard of their work to the standard of the customer's specification and satisfaction, thereby insuring their chances for future orders.

Buying Car Specialties Direct or Through Car Builders.

Editor, Railway Review:

I want to suggest that in the purchase of cars, particularly passenger equipment, by the various railway companies, I think they are adding to the cost of their cars by having the car builders furnish too many of the specialties which are bought from the various railway supply companies. It is the common practice with a great many roads to purchase the cars from the car builders, including most of the specialties. The car builder has to make a profit on these; and furthermore he delays ordering the specialties until a very short time before they are actually required, with the result that the manufacturer, who is furnishing them, has to work overtime to make deliveries, which increases the cost, and eventually the railroad company has to pay this.

It would result in a saving to the railroad, in my judgment, if they would buy direct from the manufacturer as many of the specialties as possible, placing their orders for them when the orders for the cars are placed or at about that time, thus allowing the specialty manufacturer to have reasonable time in which to manufacture his goods. In many cases the car builder delays placing orders for specialties until nearly time for the delivery of the cars, resulting in necessary overtime, hasty purchase of materials and otherwise increasing the cost of the product. This eventually must be paid for by somebody, and that somebody is the railroad company.

* * *

Railway Service as a Training School for Railway Supply Business.—III.

Burton W. Mudge was almost born on wheels. When he was only three weeks old the family removed from Michigan for New Mexico, where his father (now president of the Chicago, Rock Island & Pacific) was then a conductor on the Santa Fe. He was educated in the public schools of New Mexico, Texas and Colorado, as their residence was changed by the promotion of the elder Mudge; and graduated at Kemper Military School, Boonville, Mo., in 1898. His first railway position was fuel clerk on the Santa Fe at Wellington, Kan., and the same

year he took a course in stenography in Chicago, following which he was general manager's secretary for two years.

To learn more of the actual operations of a railroad he became clerk to the assistant superintendent of the Chicago & North Western at Oshkosh, Wis.; from there he moved back to the Santa Fe as timekeeper and accountant in the superintendent's office at Fort Madison, Iowa, where he was soon promoted to be chief clerk. Frank Dolan, the superintendent, being promoted to superintendent of the joint Santa Fe-Colorado Southern Division at Pueblo, took Mr. Mudge with him as chief clerk. Thence to Fort Worth, Texas, as chief clerk to the general superintendent of the



Burton W. Mudge, President, Mudge & Company.

Fort Worth and Denver. With this line he stayed three years part of which time he was trainmaster at Childress Texas. Next he was at Topeka, Kan., as chief clerk to the general superintendent of the Rock Island, and then became chief clerk to the general manager of the same line at Chicago, until January, 1907, when he was promoted to assistant to the general manager.

In 1908, Mr. Mudge entered the railway supply business, having while yet a comparatively young man had quite a varied experience in railroading; but preferring a commercial career. He is president of Mudge & Co., Railroad Specialties, Chicago.

The National Railway Appliances Association is sending out a series of handsome bulletins regarding the exhibition in Chicago, March 16-20. These bulletins have already stirred up considerable new interest and inquiry.

What Inspection Covers.

The following is a list of the materials which Robert W. Hunt & Co. inspect for the Union Pacific and Southern Pacific. The roads sometime ago abolished their own inspection staff and contracted all of their work to the bureau named. The list gives a good idea of the extent of their kind of work:

Analyses, chemical	Belting: Leather, rubber
Angle bars	Billet steel
Antimonial alloy.	Blooms
Axles: Car, driving, engine truck	Boilers: At Baldwin Locomotive
and tender	Works
Babbitt metal	Boiler steel
Bearing metals	Boiler tubes
Bearings: Journal	Bolsters: Body, truck

Bolts and nuts: Track, machine, carriage
 Bolts: Galvanized
 Bond wires
 Brake beams
 Brake shoes
 Bridges, viaducts and other steel structures
 Cable. Steel
 Cars: Electric street car (bodies only); electric street car (trucks only);
 Gasoline, hand and push cars, velocipedes, etc.;
 Snow plows,
 Freight cars,
 Box cars,
 Caboose cars,
 Flat cars, with or without removable sides or ends;
 Gondola cars,
 Hopper bottom cars,
 Oil cars,
 Refrigerator cars,
 Stock cars,
 Other freight cars,
 Auto air dump cars,
 Passenger cars,
 Baggage cars,
 Coaches and chair,
 Combination baggage and passenger,
 Combination baggage and postal,
 Combination baggage and buffet,
 Dining cars,
 Observation cars,
 Postal cars,
 Carbide, calcium
 Castings: Brass, cast iron, galvanized iron, mal. iron, steel
 Catenary hangers
 Cement
 Chain
 Channel pins
 Chloride of zinc
 Chromium, analysis of
 Coal, analysis of
 Copper ingots
 Coppers, gravity
 Copper sulphate
 Coppers or copper, analysis of
 Couplers: Car or locomotive, miscellaneous parts, knuckles
 Cranes: Locomotive and wrecking, or parts thereof
 Crank Pins
 Creosote
 Cylinders: Rough, finished
 Felt: Hair
 Fencing: Wire, maintenance of way
 Fibre parts
 Fireboxes, complete
 Firebox steel
 Forgings: General locomotive, miscellaneous
 Frogs, switches, crossings and other special track work
 Fusees
 Gears and pinions, motor
 Galvanized iron or steel, analysis of
 Hose: Air brake, air signal
 Steam
 Water and shop air,
 Air tool or shop,
 Fire, water,
 Tank.
 Hair Felt: For refrigerator car insulation
 Insulating fibre
 Iron: Bar, cast, double refined, engine bolt, stay bolt, malleable, planished, wrought.
 Japan drier
 Joints: Rail
 Joints: Rail insulating parts
 Journal bearings
 Journal boxes or lids
 Knuckles
 Lead ingots
 Lead sheets
 Lead, pig
 Linseed oil
 Locomotives: Electric, gasoline motor car, steam
 Malleable iron castings
 Matting or tiling rubber
 Nut locks
 Oil: Linseed, signal or other petroleum products
 Paint
 Petroleum products
 Pile drivers
 Pipe:
 Black and galvanized,
 Steam, gas and water,
 Wrought iron or steel,
 Brass and copper,
 C. I. culvert, C. I. water, C. I. specials;
 Line pipe, 6 in. and over; line pipe under 6 in.;
 Oil well casing 8 in. and over; oil well casing under 8 in.;
 Rotary drill.
 Pipe fittings
 Piston rods
 Planished iron
 Plows: Snow
 Rails: Standard section, girder or guard section
 Rail bonds: Copper
 Reinforcing steel
 Rivets
 Roof sheets
 Sampling (all)
 Screws: Lag
 Sheets: Galvanized steel or iron, tin plate or terne plate
 Solder
 Spikes: Drive, screw
 Springs and spring steel: (All kinds);
 Staybolt iron
 Staybolts, caps and sleeves
 Steel:
 Bars, plates and shapes;
 Boiler and firebox,
 Cast,
 Pressed,
 Spring.
 Structures
 Switches
 Tank steel
 Tie plates
 Tiling: Rubber
 Tires: Steel
 Tools: Track
 Torpedoes
 Trucks: Baggage and warehouse
 Tubing
 Vanadium
 Velocipedes
 Wagons and carts
 Waste
 Weights: Of scrap checking, etc.
 Wheels: Cast iron, wheel centers, wrought steel
 Wire:
 Bare copper,
 Galvanized iron,
 Copper clad,
 Galvanized stranded,
 Galvanized line,
 Insulated copper,
 Bond wire
 Wire netting
 Zincs: Battery

SUPPLY TRADE NOTES.

—James H. Ward has been elected a vice-president of the Bethlehem Steel Corporation.

—The Westinghouse Electric & Mfg. Co. reports the recent shipment to a large railway company in the Middle West of a 26-panel switchboard in record breaking time. On the 28th of November the contract for the board was signed, calling for delivery in 26 days, with a bonus and penalty clause. On December 10, or twelve days later, the entire switchboard was shipped complete from the works, and it was done without employing any overtime. The board was designed to control one 800 kw., 250-volt D. C. generator, two 37½ kw. 250-volt D. C. generators, two exciters, two 850 kva., 480-volt, 3-phase, A. C. generators, the remainder of the panels being devoted to A. C. and D. C. feeders.

—The United States Light & Heating Co. has changed the location of its New York City branch sales office from 30 Church street to 210 W. Fiftieth street. This change brings

the New York U-S-L service station and sales office in the same building. The general offices of the company remain at 30 Church street.

—**The Browning Engineering Co.**, Cleveland, Ohio, has changed its name to the Browning Company.

—**Peter M. Kling** has been appointed assistant to the president of the Laconia Car Co., and will make his headquarters at the works at Laconia, N. H. Mr. Kling was vice-president and general manager of the St. Louis Car Co. for a number of years, and then acted in the same capacity with the John Stephenson Co. until that company was sold to the J. G. Brill Co. He then went with the Pressed Steel Car Co., where he was for several years manager of the passenger car department, which he organized, and in this position he had charge of the building of all steel passenger cars. For the past year he has been connected with the Brooklyn Rapid Transit Co. Mr. Kling's experience in shop work and ability as a designer and builder of all classes of cars, will add materially to the strength of the Laconia Car company's forces.

RAILWAY NEWS.

Alabama Great Southern.—The Alabama Great Southern R. R. will soon commence work on improvements for which money was recently provided by an issue of bonds as mentioned in our issue of December 6. The company proposes first to construct three miles of line to connect the Alabama Great Southern and the Southern Railway at Chattanooga, Tenn., and provide access to the recently completed tunnel at Chattanooga. Second on the list of betterments is the construction of 27 miles of double track between York, Ala., and Meridian, Miss. The company will, after that work is completed, continue its plan of double-tracking and making other necessary improvements.

Atlantic Coast Line.—The directors of the Atlantic Coast Line Co., of Connecticut, which controls the Atlantic Coast Line system of railroads and the Louisville & Nashville system, a total of over thirteen thousand miles of railroad, will recommend to stockholders that the capital stock be reduced one-half by a distribution from the assets of the holding concern. The outstanding stock of the Connecticut company amounts to \$17,640,000; there will be a reduction to \$8,820,000, in exchange for which will be delivered to stockholders \$17,640,000 of the railroad company stock, or the equivalent of the present total capital of the holding concern. Thus, the reduction in the stock benefits the stockholders of the holding company to the extent of half its present capitalization. In financial quarters this action is said to be a forerunner of a voluntary dissolution. The ownership of \$30,600,000 of the \$60,000,000 stock of the Louisville & Nashville by the Atlantic Coast Line is now being investigated by the Department of Justice, on the grounds that they are competing lines, and hence should be separated.

Birmingham & Southeastern.—See New Roads and Projects under Alabama.

Boston & Maine.—An agreement by a majority of the holders of \$10,000,000 of the notes of the Boston & Maine R. R., due on February 3, to an extension for four months, has been announced. Directors of the company hope that the minority holders will make the same concessions. In any event they say that the action of the majority has saved the company from possible bankruptcy or a receivership, for the time being at least. With \$17,000,000 in notes coming due on June 2, the company will have to take care of the entire \$27,000,000 on that date, but officials hope that the balance sheet will then show improvement sufficient to encourage bankers to enter some sort of a general refunding plan.

Canadian Pacific.—Owing to the large amount of work left over from 1913 the Canadian Pacific Ry. it is said, has decided not to undertake any new enterprises this year. To prepare any more extensive plans would only mean leaving them over until 1915. Under the circumstances the company's energies are to be centered on pushing ahead the double-tracking, the completion of 600 miles of branch line extensions that have already been started, and to make all headway possible on the tunnel through the Selkirks and the terminal improvements in Winnipeg, Man., and Vancouver, B. C.

Chicago, Anamosa & Northern.—The Chicago, Anamosa & Northern R. R. was sold at public auction January 21 for \$252,030.09. George B. Caldwell and Louis E. Myers of Chicago were the purchasers. They held a judgment for that amount against the road. The property included \$300,000 bonds and \$600,000 worth of railroad stock.

Chicago & North Western.—The Chicago & Northwestern Ry. is to elevate its tracks through Kenosha, Wis., during the next seven years at a cost of approximately \$1,500,000, and in addition to this the company will spend in Kenosha \$150,000 rearranging its industrial tracks. President W. A. Gardner of the company is said to have notified Mayor Head that the plans for this work had been approved by the board of directors.

Chicago, Rock Island & Pacific.—The Chicago, Rock Island & Pacific Ry. is reported to be contemplating construction of a new route between Wilburton, Okla., and Ola, Ark.

Erie Railroad.—The general offices of the Erie Railroad in Chicago have been removed from the Railway Exchange building to the thirteenth floor of the Transportation building, 608 South Dearborn street.

Grand Trunk.—The end of steel on the Grand Trunk Pacific Ry. is reported to have reached Fort George, B. C., January 14, from the east. Announcement has been made that the end of steel will rest at Fort George through the winter. The railway yards at this point will be completed this winter, and in the early spring tracklaying will be resumed on the 144 miles of grade west of Fort George now ready for the steel.

Gulf, Florida & Alabama.—The Gulf, Florida & Alabama Ry. is reported to have recently sold \$2,000,000 of bonds to provide funds for the extension to Pine Hill, Ala. This work is under contract. It is expected that the road will ultimately be extended to a connection with the Illinois Central and St. Louis & San Francisco railroads at Jasper, Ala. Construction contemplated north of Tuscaloosa will entail extra heavy work.

Louisville & Nashville.—In our previous issue mention was made of new securities authorized by the South & North Alabama R. R. It is reported that a part of the proceeds of these bonds will be used in building an extension into several points south of Birmingham, Ala. This work, it is stated, will include the building of a new line to Selma. Double-tracking of the line south of Birmingham will be commenced as soon as work now being done at Blount Springs is completed.

Missouri, Kansas & Texas.—The Missouri, Kansas & Texas Ry., it is reported, will relay 100 miles of its San Antonio division in Texas with 85-lb. rails. It is further said that the company will spend this year for improvements in Texas from \$1,250,000 to \$1,500,000.

New York, New Haven & Hartford.—Directors of the New Haven road, at a meeting in New York city, January 15, ratified the agreement recently entered into by Chairman Howard Elliott and United States Attorney General McReynolds for the dissolution of the New Haven system through the divorce of the Boston & Maine and Boston & Albany railroads, all its trolley lines and some steamship lines. The directors accepted the resignation of J. P. Morgan, Edwin Milner and Galen L. Stone. Mr. Stone's resignation was said to be due to his connection with an underwriting syndicate formed to relieve the New Haven of its steamship holdings.

Norfolk & Western.—The Norfolk & Western Ry. has awarded the Virginia Bridge & Iron Company, Roanoke, Va., the contract for the construction of the supports to be used in that portion of the electrification of the railroad company's line between Bluefield and Vivian, W. Va., in the Pocahontas coal field. The amount of the contract is \$100,000 and work will be begun within 60 days. The power station is being constructed at Bluestone Junction on the east side of the mountain.

St. Louis Southwestern.—The St. Louis Southwestern Ry. and allied companies announce the removal of their general offices at St. Louis, Mo., to the seventeenth floor of the Railway Exchange building.

Western Maryland.—Tracks of the Western Maryland Ry. on the West Virginia division suffered severe flood damage on account of the recent break of the dam of the West Virginia Pulp & Paper Co. at Dobbin, W. Va.

PERSONALS.

A. H. Gilbert has been appointed assistant superintendent of the Globe division of the Arizona Eastern R. R., at Globe, Ariz., effective January 16, 1914, vice S. B. Moore, resigned.

H. T. Malcolmson has been appointed superintendent of car service of the Toronto, Hamilton & Buffalo Ry., with office at Hamilton, Ont.

A. H. Westfall, general manager of the Chicago, Indianapolis & Louisville Ry., with office at Chicago, has resigned to become president of the Kelvin Sultana Copper Co.

William H. Bancroft, vice-president and general manager of the Oregon Short Line R. R. and first vice-president of the San Pedro, Los Angeles & Salt Lake R. R., with headquarters at Salt Lake City, Utah, according to a dispatch from Salt Lake City, has resigned the former office, effective February 1. Mr. Bancroft, it is stated, wishes to be relieved of a part of his arduous duties. He will retain his position as vice-president of the San Pedro, Los Angeles & Salt Lake and will also continue as president of the Utah Light & Railway Co.

R. L. Murphy has been appointed tie and timber agent of the Cincinnati, New Orleans & Texas Pacific Ry., with office at Cincinnati, Ohio.

Edgar A. Richard has been appointed acting auditor of the Pacific & Idaho Northern Ry. and the Central Idaho Telegraph & Telephone Co., with headquarters at New Meadows, Idaho, succeeding E. A. Chavannes.

G. A. Coleman has been appointed acting trainmaster of the Chicago, Peoria & St. Louis Ry. with headquarters at Springfield, Ill., and the position of superintendent formerly held by T. H. Pindell has been abolished.

J. M. Davis, whose appointment as assistant general manager of the Baltimore & Ohio Southwestern R. R. and Cincinnati, Hamilton & Dayton Ry. has been noted in a previous



J. M. Davis, Assistant General Manager of the Baltimore & Ohio Southwestern—Cincinnati, Hamilton & Dayton.

issue of the Railway Review, was born November 5, 1871. He entered railway service in 1888 as a freight brakeman on the San Antonio & Aransas Pass Ry. From September, 1891, to October, 1894, he was stenographer to the superintendent of the Gulf, Colorado & Santa Fe Ry. at Temple, Tex. Resigning this position, he became chief clerk to the superintendent of the Mexican Central Ry. at Tampico, Mex., where he remained until October, 1895; and from then until March, 1896, was employed in the general manager's office of the Great Northern Ry. at Duluth, Minn. After filling other positions of a clerical nature, Mr. Davis was made assistant superintendent of the Great Northern at Melrose, Minn., which position he filled from March to July, 1898. From that date until January, 1900, he was superintendent of the Breckenridge and Montana divisions of the Great Northern. Mr. Davis then entered the service of the Erie Railroad as superintendent at Scranton, Pa., where he was stationed until March, 1902, when he became superintendent of the Union Steamboat line of the Erie, at Buffalo. In August, 1902, he became superintendent of the Allegheny division of the Erie, remaining until May, 1903. Returning to the Great Northern Ry., he was successively superintendent of the Superior, Dakota and Minot divisions until July, 1905, when he

was promoted to assistant general superintendent of the Central district, at Minot, N. D. Next he was assistant general superintendent of the Oregon Short Line R. R., Union Pacific and Southern Pacific lines, with headquarters at Salt Lake City, Utah, until November, 1907, after which time he was acting general superintendent until June, 1908. Mr. Davis was next promoted to general superintendent of the Oregon Short Line and Southern Pacific Co. in Nevada, filling such position until June, 1910. From this latter date to the present time he has been general superintendent of the Central district of the Southern Pacific Co. at San Francisco.

A. C. Elston has recently been appointed superintendent of the New York division of the Erie Railroad as noted in our issue of January 10. Mr. Elston began his railway career as an operator with the New York, Susquehanna & Western R. R. in 1880 and he served that company until 1902 as operator agent, dispatcher and chief dispatcher. From March, 1902, to December, 1903, he was division operator on the Erie Railroad. He was appointed superintendent of the New York, Susquehanna & Western in December, 1903; superintendent of the New York division of the Erie in August, 1904, and in June, 1910, he became superintendent of the Buffalo division. Mr. Elston was appointed general agent at Chicago a year ago and on January 1, 1914, was made superintendent of the New York division of the Erie, with headquarters at Jersey City, N. J.

C. B. Epworth has been appointed acting real estate and tax agent of the Pittsburgh, Shawmut & Northern R. R., with headquarters at Angelica, N. Y.

F. J. Thomure, traffic manager of the Mississippi River & Bonne Terre Ry., effective January 19, was appointed general manager in charge of all departments, with office at Bonne Terre, Mo.

R. S. Goodrich has been appointed transportation inspector of the Atchison, Topeka & Santa Fe Ry., Coast Lines, in charge of territory between Albuquerque, N. Mex., and Needles, Cal., with headquarters at Winslow, Ariz., succeeding W. R. White, assigned to other duties.

G. F. Turley, whose appointment as general manager of the Virginia-Carolina Rv. and New River, Holston & Western R. R. was recently noted in these columns, was born at Oakland, Md., December 20, 1867. He was educated in the public schools at Hagerstown, Md., and in 1882 entered the service of the Shenandoah Valley R. R. (now the Shenandoah division of the Norfolk & Western Ry.) as messenger and clerk in the traffic department. From 1887 to 1889 he was clerk and telegraph operator at Hagerstown, then for nine years operator, chief clerk to trainmaster, dispatcher and chief dispatcher at Shenandoah, Va., and from 1898 to 1902 dispatcher and chief dispatcher of the same road, the Norfolk & Western, at Roanoke, Va. Mr. Turley held the position of assistant trainmaster at Bluefield and Williamson, W. Va., from 1902 to 1905 and from 1905 to 1912 trainmaster of the same road at Roanoke. He then became trainmaster at Portsmouth, Ohio, and was promoted from that position on December 15, 1913, to become general manager of the Virginia-Carolina and New River, Holston and Western with headquarters at Abingdon, Va. Both of these lines are subsidiaries of the Norfolk & Western, in process of extension into timber and mineral countries.

TRAFFIC.

J. J. Hronik has been appointed traveling agent of the land and industrial department of the Southern Railway, with headquarters at Denver, Col., succeeding H. R. Buckley, promoted.

C. L. Chapman, assistant to general traffic manager of the Erie Railroad, effective January 1, was appointed assistant general traffic manager, with office at 50 Church street, New York.

George E. Murrell has been appointed agent of the land and industrial department of the Southern Railway, with headquarters at Columbia, S. C., succeeding E. F. Cole, resigned.

Thomas R. Ryan, traffic manager of the Mexico Northwestern Ry., at Ciudad Juarez, Chih., Mex., has resigned to accept appointment as director of traffic of a large railway system in Brazil.

F. L. Hanna has been appointed general agent of the Atchison, Topeka & Santa Fe Ry., Coast Lines, with office at Oakland, Cal., succeeding J. J. Warren, deceased.

W. L. Stannard, general agent of the freight department of the Chicago & North Western Ry. at Detroit, Mich., has been appointed general agent of both freight and passenger departments.

A. J. Fox, general agent of the freight department of the Seaboard Air Line Ry. at Baltimore, Md., has been appointed assistant general freight agent, with headquarters at Jacksonville, Fla., succeeding **B. C. Prince**, promoted.

ENGINEERING.

George H. Bremner, hitherto district engineer of Chicago, Burlington & Quincy R. R. at Chicago, has assumed his new duties as assistant engineer of the central district of the railroad valuation department of the Interstate Commerce Commission. Mr. Bremner is treasurer of the American Railway Engineering Association.

A. D. Millard, roadmaster of the Chicago, Peoria & St. Louis Ry. at Jacksonville, Ill., has been appointed engineer, with headquarters at Springfield.

MECHANICAL.

G. H. Ashman, assistant master mechanic of the Juanita shops of the Pennsylvania Railroad, at Altoona, Pa., has resigned to accept a position with the General Electric Co. at Schenectady, N. Y.

A. C. Adams, superintendent of motive power of the Spokane, Portland & Seattle Ry., at Portland, Ore., has resigned.

OBITUARY.

Herbert De Wayne Carter, assistant freight traffic manager of the New York Central Lines east of Buffalo, died at Bellevue hospital in New York city, January 18, aged 53 years.

John W. Honan, general yardmaster of the Delaware, Lackawanna & Western R. R. at Elmira, N. Y., died January 18, in New York city.

Harry Jerome Neff, general freight and passenger agent of the St. Louis, Brownsville & Mexico Ry., with headquarters at Kingsville, Tex., died January 9, at Houston, Tex., aged 35 years.

NEW ROADS AND PROJECTS.

Alabama.—The recent authorization by the Birmingham & Southeastern Ry. of an issue of \$1,500,000 of bonds is, according to a report, an indication that the railroad will soon be extended to Birmingham, Ala. It would require about 75 miles of extension to reach Birmingham. The company has had in view for more than a year an extension of 24 miles from Eclectic to Rockford, which is in the direction of Birmingham. It has also proposed a connection in a southerly direction from Union Springs to Louisville, Ala., 25 miles.

See Alabama Great Southern R. R. under Railway News.

See also Louisville & Nashville R. R. under Railway News.

British Columbia.—Officials of the Pacific Great Eastern Ry. expect that a total of about 200 miles of track will be laid by that company during 1914. Grading is now in progress.

Illinois.—Construction of a new railroad from Chicago to Cairo, Ill., passing through Springfield, is proposed by the Chicago, Springfield & Cairo R. R. A large part of its right-of-way is reported to have been secured. Emory Fraser is counsel.

Indiana.—The Chicago & Wabash Valley R. R., according to report, is having surveys made for the construction of an extension from McCosburg, Ind., south to Montmorenci, 30 miles, and to Crown Point, six miles.

Minnesota.—The Grand Marais & Northwestern Ry. is building a new line from Grand Marais, Minn., west to Ely. Arthur Mitchell, Duluth, Minn., is president of the railroad.

Ontario.—Petition has been made to the Canadian government for incorporation of a railroad to be constructed from Wiarton, Ont., or from a point in Keppel township, northerly through the townships of Amabel, Albemarle, Eastnor, Lindsay and St. Edmunds, Ont., to a point at or near Tobermory, Ont., with branches from different points on the route, and with power to operate ferries in connection with the lines. E. C. Spereman, Owen Sound, Ont., is solicitor for the applicants.

The ratepayers of St. Catharines, Ont., are to vote on the proposition to give a bonus of \$100,000 to the Canadian Northern Ry. for the extension of its line through St. Catharines.

Texas.—It is expected that the Matador Northern R. R. will be operating trains some time the latter part of February. The line, now being constructed into Matador, Tex., will connect with the Quanah, Acme & Pacific Ry. at a point near Roaring Springs, Tex.

It is stated that arrangements have been completed for financing the extension of the Quanah, Acme & Pacific Ry. from Plainview, Tex., to Roaring Springs and construction will be started soon. Citizens of Plainview have succeeded in raising \$100,000 by public subscription to be used in securing right-of-way from the Floyd county line. Part of this amount will also be utilized in securing the terminal facilities at Plainview and as a cash bonus for the proposed extension. The management promise that the line will be completed and in operation by September of next year.

Electric Railways.

The Tidewater Southern Ry., formerly a steam line, extending from Stockton, Cal., to Modesto, Cal., is now operated by electricity.

Track is being laid on the new railway between Walnut Springs and Glen Rose, Tex. The line, which will be 14 miles long, is being built by Walnut Springs and Glen Rose capital.

The extension of the Oakland, Antioch & Eastern Ry. from Oakland to Mallard, Cal., was opened January 17. There remains of the original plans for extension only 48 miles to be added to the present construction to reach Sacramento.

Westinghouse, Church, Kerr & Co. have received a contract from the Salt Lake & Utah R. R. to make an examination and report on a proposed electric railway from Salt Lake City to Payson, Utah. This company will also make an examination and report on a street railway project for the Nashville Traction Company, Nashville, Tenn.

Announcement has been made by officials of the Georgia Coast & Piedmont R. R. that the Darien-Brunswick extension will be formally opened on February 15. This extension, though only 13 miles in length, is one of the heaviest pieces of construction in the south. It is stated that the extension to Brunswick has cost approximately \$600,000.

The Weston & Glenville Ry., a proposed line 27 miles in length from Weston, W. Va., to Glenville, via Camden, Alum Bridge and Linn, has elected Lloyd Rinehart president and general manager; Andrew Admiston, first vice-president; Louis Bennett, second vice-president; Lloyd Beeghley, treasurer, and Wm. Rafferty, secretary.

The Sewickley & Edgworth Ry. has been chartered in Pennsylvania, capital stock \$12,000, to build electric railway lines from Pittsburg, Pa., to important points in Ohio and Indiana. The incorporators are: William Walker, Leet township; Henry Oliver, W. F. Lloyd, W. B. Carson and J. L. Foster, of Pittsburg.

The Thibodaux, Houma & New Orleans R. R. is being organized to build a 50-mile electric railway from Thibodaux, La., to New Orleans. A report says that construction will begin soon between Houma and Thibodaux. The Mayor of Houma, La., may be able to give information.

Application for a charter has been made by the Rochester & Hillsboro R. R. to build an electric railway from Springfield, Ill., to Hillsboro, with a branch from Rochester to Taylorville. Capital, \$100,000. The incorporators are: Frank M. McGowan, Nathaniel J. Hamilton, A. Barker, M. D. Barker, and Jesse H. Thomas, all of Springfield.

Application for a charter has been made by the Illinois County R. R. to build interurban lines to connect these cities and towns in Illinois: Irvington, Salem, Centralia, Central City, Junction City, Sandoval and Odin. Capital, \$300,000. Incorporators: G. E. Ellis, R. A. Warner, E. E. Fyke, all of Centralia.

Announcement is made that the rapid completion of the Dallas-Greenville (Texas) interurban line by the Eastern Texas Traction Co. has been assured by an arrangement made with the Stone & Webster interests to assist in the financing of the road. As a result of this arrangement, it is announced, the traction company has funds in hand to proceed with its work, the grading of almost the entire line having already been completed.

Major A. B. Blevins, of the North Louisiana Electric Co., with headquarters in the Commercial National Bank building at Shreveport, La., has been quoted as saying that financing is practically settled, and it is expected to begin construction in March on the proposed interurban railway from Shreveport to Monroe, La., about 100 miles. Among others interested are Glen Walker, of Shreveport; J. T. Austin, of Monroe; W. F. Devereaux, of Minden, and Savary M. Lewis, R. M. Gill and Chas. Lawrence, of Ruston, La.

James U. Jackson, of Augusta, Ga., promoter of the Carolina & Georgia Ry. which is to be built from Columbia, S. C., to Augusta, Ga., is reported as saying that entrance to

Columbia will be over the Congaree River bridge of the Seaboard Air Line Ry. At Augusta connection will be made with the Georgia & Florida Railway, and this will enable it and the Central of Georgia Railway to have an outlet to the mill section of North and South Carolina. The connection which will be had at Greenwood with the Piedmont Northern lines, is considered important. These will eventually be connected up between Spartanburg and Gastonia, so that there will be a through electric railway system as far north as Charlotte, N. C. The Carolina & Georgia is also closely affiliated, it is said, with the company controlling the Parss Shoals hydro-electric development at Columbia and the similar development on the Savannah river near Augusta. There will be no long distance power transmission required anywhere on the railway, for at Greenwood it will obtain power from the Southern Power Co.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Wabash Railroad has issued specifications and asked for prices on 60 locomotives of various types.

—The Fort Worth Belt Ry. has ordered 1 switching (0-6-0) locomotive from the American Locomotive Co.

—The Texas, Oklahoma & Eastern R. R. has ordered 2 locomotives from the American Locomotive Co.

—The Northwestern Pacific R. R. has ordered 6 locomotives from the American Locomotive Co.

—The Tampa & Gulf Coast Ry. will soon purchase additional locomotives.

—The Chesapeake & Ohio Ry. will purchase 12 Mallet and 8 Pacific type locomotives. This item has been confirmed. It is also reported that the company contemplates the purchase of 10 Mikado locomotives.

—The Alabama, Florida & Southern R. R. has ordered 1 ten-wheel type (4-6-0) locomotive from the Baldwin Locomotive Works.

—The East Broad Top R. R. & Coal Co. has ordered 1 Mikado type (2-8-2) locomotive from the Baldwin Locomotive Works.

—The Gainesville & Northwestern R. R. has ordered 1 ten-wheel type (4-6-0) locomotive from the Baldwin Locomotive Works.

—The Delaware, Lackawanna & Western R. R., reported in the Railway Review of January 17 as in the market for additional locomotives, is inquiring for 18 Pacific type (4-6-2) locomotives, 4 for passenger and 14 for freight service.

Freight Cars.

—The Live Poultry Transportation Co., Chicago, has ordered 240 poultry cars from the Haskell & Barker Car Co.

—Swift & Company, Chicago, are in the market for 200 steel double deck stock cars.

—The New England Coal & Coke Co., according to report, has ordered 200 hopper cars from the Pressed Steel Car Co.

—The Chesapeake & Ohio Ry. is reported in the market for 2000 gondola, 1000 box and 1000 hopper cars.

Passenger Cars.

—The Delaware, Lackawanna & Western R. R. is reported as ordering 10 passenger cars from the Pullman Company.

—The Tampa & Gulf Coast Ry., it is said, will purchase several passenger cars.

Signals and Interlocking.

—The Philadelphia & Reading Ry. has contracted with the Federal Signal Co. for the installation of a 36-lever mechanical interlocking plant at Hopewell, N. J., on the New York division. Power operated home and dwarf signals will be used.

—Completion of the electric block signal system on the main line of the Pennsylvania Railroad, from New York to Pittsburgh, is included in the company's improvement budget for the present year.

Iron and Steel.

—The Southern Railway has awarded contract to the Tennessee Coal, Iron & Railroad Co. for steel rails to take care of its requirements up to June 30, 1914.

—The St. Louis & San Francisco R. R. will soon award contracts for six months' steel rail requirements.

—The Chicago & North Western Ry. has ordered 35,000 tons of rails from the Illinois Steel Co.

—The Delaware, Lackawanna & Western R. R. has divided an order for 15,000 tons of rails between the Pennsylvania Steel Co., Lackawanna Steel Co., and Bethlehem Steel Co.

Bridges.

—The Green Bay & Western R. R. has awarded the contract for the erection of a reinforced concrete bridge, 70 ft. long, over the Wolf river at Shiocton, Wis., to the Greiling Bros. Co., Green Bay, Wis.

—Press reports state that the erection of a new bridge across the Missouri river at Kansas City, Mo., is under consideration. The proposed structure would facilitate entrance of the Chicago, Burlington & Quincy R. R., Wabash R. R. and Rock Island Lines into the new union station.

—See Railway News under Norfolk & Western Ry.

—It is reported that the Tampa & Gulf Coast Ry. will soon build two long bridges and several small ones. O. N. Axtell, Tampa, Fla., is chief engineer.

—Plans for eliminating the grade crossings at Bailey avenue, Buffalo, N. Y., are reported to be under consideration by the grade crossing commission. The crossings involved are those of the Delaware, Lackawanna & Western and Pennsylvania railroads. It is estimated that this work will cost between \$300,000 and \$400,000.

—The receivers for the Wabash Railroad have petitioned the United States District Court for permission to contract with the Chicago & Western Indiana R. R. for the construction of a tunnel under the tracks of the Wabash in Chicago, as a part of the scheme to eliminate the grade crossing near Seventy-fifth street and Lowe avenue.

—See Railway News under Chicago & North Western Ry.

—The Widell Construction Co. has started work on a viaduct at Tenth street, Omaha, Neb. The railroads which will pay for this work and over whose tracks the structure is to be erected are the Missouri Pacific Ry., Chicago & North Western Ry. and Illinois Central R. R. Another viaduct is to be built at Locust street.

Buildings, Terminals, Etc.

—The Louisville & Nashville R. R. has purchased property on Fifth street, Cincinnati, Ohio, with the intention, it is said, of enlarging its yards.

—The new station of the Missouri, Kansas & Texas Ry. at Houston, Tex., which cost approximately \$165,000, will be formally opened on February 1.

—The Erie Railroad has been directed to repair and rebuild its station at Corning, N. Y.

—The New York, Philadelphia & Norfolk Ry. has awarded contract to Roberts & Schaefer Co., Chicago, for building a reinforced concrete fireproof (Holmen type) locomotive coaling and sanding plant, at Cape Charles, Va. Contract price, \$17,000.

—The Atlantic Coast Line R. R., it is said, will make improvements and erect additional shop buildings at Waycross, Ga.

—The Kansas City, Mexico & Orient Ry. will enlarge its shops at Wichita, Kan. Westinghouse, Church, Kerr & Co., New York, are said to be preparing plans.

—The Cincinnati, Hamilton & Dayton Ry., it is said, is contemplating rebuilding its ore handling bridge on the docks near Rossford, Ohio. The original structure was demolished by a storm last July, entailing an approximate loss of \$100,000.

—The Pennsylvania Railroad has closed contracts with the McMyler Interstate Co., of Bedford, O., for a fast ore-discharging plant to be installed at the Girard Point terminal, Philadelphia.

—The Pennsylvania Lines West have awarded contract for steel for a new freight station at Pittsburgh, Pa., to the McClintic-Marshall Co.

—Docks of the Atlantic Coast Line R. R. at Jacksonville, Fla., were destroyed by fire on January 17. Press reports estimate a loss of \$400,000.

—The New York Central & Hudson River R. R. has let contract to F. I. Ley & Co., Springfield, Mass., for the erection of a new station at White Plains, N. Y. It is estimated that the new structure will cost about \$75,000.

—The Gulf, Colorado & Santa Fe Ry. has appropriated \$61,906 for improvement of its yards at Galveston, Tex.

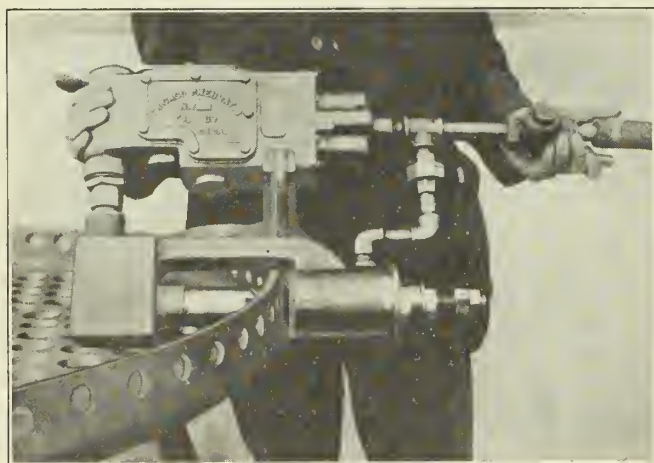
—The Wabash Railroad has announced the completion of

its freight terminals at Detroit, Mich. The plant is at Twelfth street and the river. The outbound freight house is 800 ft. long and 50 ft. wide, with floor space of 24,000 sq. ft. The loading tracks will accommodate 60 cars. The house is equipped with springless disk scales, entirely automatic in action, and freight is trucked direct from the team to the car. The inbound freight house is 600 ft. long and 80 ft. wide, with a floor space of 48,000 sq. ft. and track capacity for 60 cars. The local freight office is on the second floor of the inbound freight house and is commodious and well lighted, with separate rooms for the agent, cashier, telegraph operators, customs officers, inspection bureau and cartage company.

—The Charleston Northern Ry. has acquired a site in Charleston, S. C., for terminals. The proposed new road is expected to begin construction at Charleston within a short time.

The Chicago Countersinking Machine.

The Chicago Pneumatic Tool Co. has gotten out a combined drilling and countersinking device to be operated in connection with the Little Giant drill. It is fitted with a No. 4 Morse taper spindle and is kept from turning by means of lugs which fit around the housing. Ball bearings are used throughout and



The Chicago Countersinking Machine.

bevel gears are enclosed in an oil tight chamber. The feed is automatic; being regulated by means of an air chamber or push-up device, which forces the drill against the work with constant pressure. The weight of machine complete is 35 pounds. The shortest distance from drill to side of flange is $1\frac{1}{2}$ inches and the machine is equipped with drill $1\frac{1}{16}$ inches diameter. Further information may be obtained from the Chicago Pneumatic Tool Co., Fisher building, Chicago.

Patents on Railway Devices.

ISSUED BY UNITED STATES PATENT OFFICE, JAN. 13, 1914.

Fixture for car window curtains or shades, 1,083,924—Plato G. Emery, Chicago, Ill.
 Locomotive side frame, 1,083,937—Charles E. Lilley, Bluefield, W. Va., assignor to Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.
 Foldable stair for sleeping-car berths, 1,083,939—Elizabeth C. Paterson, Philadelphia, Pa.
 Air brake, 1,083,971—Gustav B. Wolf, Smithville, Tex.
 Hopper car underframe construction, 1,083,977—Winfield H. Yost, Montreal, Quebec, Canada, assignor to Rodger Ballast Car Co., Chicago, Ill.
 Railway tie, 1,084,013—Henry L. Hollis, Chicago, Ill.
 Ventilator for cars, 1,084,021—Aldis H. Marden, Somerville, Mass.
 Rail fastener, 1,084,035—Isidoro Romo and Frederick D. Ritter, Mexico, Mexico.
 Tube-feeding device for swaging machines, 1,084,042—Frank L. Sessions, Lakewood, Ohio, assignor to The Standard Welding Co., Cleveland, Ohio.
 Automatic railway control system, 1,084,047—Charles S. Stanton, Cooperstown, N. Y.

Rail joint, 1,084,072—Ray W. Davis, Brownsville, Pa.
 Flue cutter, 1,084,097—Graves R. Maupin, Moberly, Mo.
 Car seal, 1,084,112—Harry R. Romberger, Greenwood, Miss.
 Car roof frame, 1,084,128—William S. Bidle and Joseph A. Costello, Cleveland, Ohio, assignors to Cleveland Car Specialty Co., Cleveland, Ohio.
 Method of heating axles preparatory to forging, 1,084,156—Henrik V. Loss, Philadelphia, Pa.
 Release rigging, 1,084,163—Walter P. Murphy, Chicago, Ill.
 Journal box, 1,084,191—Joseph Blockley Beadman, Keighley, and Harry Johnson Macklin, Ulverston, England.
 Rail anticreeper, 1,084,227—Frederick A. Preston, Highland Park, Ill., assignor to The P. & M. Co., Chicago, Ill.
 Hand brake for railway cars, 1,084,247—Charley C. Bolen, Marion, Ohio.
 Apparatus for dumping cars, 1,084,256—James Hazelitt Cotton, Bellevue, Pa., assignor to Orenstein-Arthur Koppel Co.
 Rail brace, 1,084,260—Rufus M. Evans, Tecumseh, Kans.
 Dump car, 1,084,271 and 1,084,272—Karl H. Hansen, Pittsburgh, Pa., assignor to Orenstein-Arthur Koppel Co., Berlin, Germany.
 Car truck side frame, 1,084,278—George T. Johnson, Columbus, Ohio, assignor to The Buckeye Steel Castings Co., Columbus, Ohio.
 Sectional ring for rod packing, 1,084,281—Charles W. G. King, Philadelphia, Pa., assignor to The United States Metallic Packing Co., Philadelphia, Pa.
 Steam engine valve reversing gear, 1,084,286—John L. Mohun, Brooklyn, N. Y.
 Anticreeper for rails, 1,084,288—Philip W. Moore, Evanston, Ill., assignor to The P. & M. Co., Chicago, Ill.
 Railway car truck, 1,084,297—Willard F. Richards, Depew, N. Y., assignor to Gould Coupler Co., New York, N. Y.
 Electric locomotive, 1,084,317 and 1,084,318—William Dalton, Schenectady, N. Y.
 Slide valve, 1,084,354—Joseph Miller, Chicago, Ill.
 Automatic car coupling, 1,084,367 and 1,084,368—Allison Dalrymple Smith, Edinburgh, Scotland.
 Railroad spike, 1,084,372—Henry A. Sommermeyer, Elmore, Minn.
 Signal circuit closing device, 1,084,382—William W. Alexander, Denver, Colo., deceased, assignor to The Protective Signal Manufacturing Co., Denver, Colo.
 Locomotive, 1,084,388—Harvey W. Bell, Yonkers, N. Y.
 Safety car brake apparatus, 1,084,391—James C. Boyd, Pitscairn, Pa.
 Self locking spike, 1,084,405—George I. De Force and Moses Dryfoos, Erie, Pa.
 Oil burning furnace for locomotive boilers, 1,084,431—Joseph J. Haskin, Stockton, Cal.
 Car dumping mechanism, 1,084,437 and 1,084,438—George H. Hulett, Cleveland, Ohio, assignor to The Wellman-Seaver-Morgan Co., Cleveland, Ohio.
 Railway switch, 1,084,440—Samuel James, Waco, Tex., assignor to William C. Hasha, Waco, Tex.
 Brake operating means for railway cars, 1,084,445—John W. Keeney, Diamond, W. Va.
 Means for stopping trains, 1,084,463—William T. B. McDonald, Granby, Quebec, Canada, assignor to MacDonald Car Buffer Limited, Montreal, Quebec.
 Freight car, 1,084,477—David E. Peterson, Philadelphia, Pa.
 Device for coaling and watering locomotives, 1,084,481—Virgil Rainer, Oak Hill, Ohio.
 Rail joint, 1,084,484—Jacob Homer Robbins, Gillespie, Ill.
 Car coupling, 1,084,485—Augusta Lee Roberts and Bertha Louise Kahne Roberts, Ashland, Ky.
 Cross tie, 1,084,501—Lewis A. Stoner, Lancaster, Pa.
 Automatic brake controlling device, 1,084,503—George C. Sweet, U. S. Navy.
 Electrically operated air brake, 1,084,506—Harry L. Tooker, Winslow, Ariz.
 Side bearing, 1,084,522—George L. Allen, Wilmington, N. C.
 Tongue switch, 1,084,525—Victor Angerer, Ridley Park, and Arthur B. Davenport, Jr., Philadelphia, Pa., assignors to William Wharton, Jr. & Co., Philadelphia, Pa.
 Triple valve for air brakes, 1,084,554—Carrie M. Grace Mann, administratrix of William Brayton Mann, deceased, Baltimore, Md.
 Locomotive boiler, 1,084,555—James M. McClellon, Everett, Mass.
 Compressed air brake, 1,084,574—Joseph de Lipkowski, Paris, France.
 Mail bag catcher and deliverer, 1,084,579—Henry Jenkins, Gillette, Wyo.
 Automatic air and steam coupling attachment for railway cars, 1,084,586—Hans Videbak, Calgary, Alberta.

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The Advance Rate Hearing Proceeds.

Hearings in the application of the eastern railroads for five per cent rate increases, were resumed before the Interstate Commerce Commission, in Washington, January 26. The sessions will continue until March 1. The commission announced the following schedule under which the testimony on the various days will be segregated by the specific commodities indicated. January 26, petroleum; January 27, ice; January 28, tile, brick, clay; January 29, boots and shoes; January 30, flour; January 31, peanuts; February 2-4 bituminous coal; February 5 linseed oil, corn oil, etc.; February 6, glucose, starch and other corn by-products; February 7, wooden barrels, pails, tubs, etc.; February 9, sand and gravel; February 10, cement; February 11, iron and steel articles, cast iron pipe, and raw materials entering into the manufacturing processes of same; February 12-14, Lake-and-rail rates; February 16, glass; February 17, coffee; February 18, pulp and paper; February 19, plaster; February 20-21, lumber and forest products; February 24, packing-house products; February 25, limestone; February 26, salt; February 27, fruit; February 28, stone, marble, granite; March 2, hides and leather; March 3, sugar, molasses and syrup; March 4, truck-farm products and fish; March 5, hay and grain. George S. Patterson, general counsel for the Pennsylvania Railroad, made a statement, on Monday, for all the railroads interested, saying they expected to present supplementary evidence in support of the advance as the hearing proceeded. Charges that the proposed increase on petroleum would discriminate heavily against independent refineries in favor of the Standard Oil Co. were made, on Monday, by F. W. Boltz, traffic manager of the National Petroleum Association, an organization of forty-odd oil companies. Robert S. Few, president of the Sun Oil Co., of Toledo, was the first witness for the petroleum shippers. He testified that the proposed increases were, in many instances, actually greater than 5 per cent, and that to allow the petroleum advance would be to grant to the Standard Oil Co. an advantage over independents because the Standard was shipping oil through its own pipe lines to hotly competitive districts. H. W. Bahrenburg, of Hoboken, N. J., president of the Natural Ice Association of America and head of the Mountain Ice Co., the largest individual shipper in his territory, declared that the ice business would not stand the proposed advance. He said the records showed irregular shipments, deficient equipment and slow handling added six per cent of the present rates to the carrier's cost of handling. Tile, brick and clay shippers submitted a mass of data on their business, on Wednesday, and presented witnesses who agreed with those of other industries previously heard that the carriers could increase their revenues more than 5 per cent by improving their service and eliminating unnecessary expenditures.

Failure of Condemnation Suit, Western Union Telegraph Co.

The Western Union Telegraph Co., of Illinois, has been denied the right to institute condemnation proceedings against the Louisville & Nashville R. R., by Judge W. S. Dewey, of Cairo, Ill., sitting in the county court at Belle-

ville, Ill. The telegraph company was granted an appeal to the supreme court. The case after being started in the county in the superior court at New Haven, Conn., on January 21. court two years ago, was taken through two divisions of the federal court, and finally sent back to the county court for a rehearing. The railroad company entered a motion to dismiss the petition on the grounds that the Western Union had no right to condemn along a railroad's right of way. Before the court passed on this question an amended petition was filed, asking that the court compel the railroad company to enter into an agreement for construction of a second telegraph line along its right of way. Judge Dewey refused the petition. A twenty-five-year agreement between the companies recently expired. The railroad refused to renew it. A similar battle is being waged in twelve other states.

Wreck on Michigan Central R. R.

Four persons were killed and a dozen others were injured as the result of a head-on collision on January 26 between a passenger train and a freight train on the Saginaw division of the Michigan Central R. R., three miles north of Jackson, Mich. A misunderstanding of orders is understood to have been responsible for the accident. The force of the collision was such that the smoking car was telescoped over the baggage car, practically enveloping it. The passenger train was running on schedule time, while the freight which should have taken a siding to allow the passenger to pass, ran beyond the switch and the two trains met head on while going at a good rate of speed.

Flagman Guilty of Manslaughter.

Charles H. Murray, of Holyoke, Mass., flagman of the Bar Harbor express on the New York, New Haven & Hartford R. R., which was wrecked at North Haven last September, exacting a toll of 21 lives, pleaded guilty to manslaughter in the superior court at New Haven, Conn., on January 21. He was sentenced to one year in jail, but sentence was deferred and Murray was placed in the care of a probation officer.

Train Robbery, Southern Ry.

Three masked men boarded a Southern Railway south-bound passenger train at Facklers, Ala., on the night of January 24 and after cutting off the engine and two cars, robbed the mail and express cars. After running some distance, the robbers sprang from the train, leaving the engine and two cars to run wild a distance of nineteen miles. Several hours later the dead engine was found at Larkinsville. The robbers obtained a sum not exceeding \$100, which they secured by blowing the express-car safe. No attempt was made to rob passengers, who remained inside the coaches while the men were looting the express and mail cars. The only mail received by the train was second-class matter.

Forest Fire Losses in Michigan.

The annual report of the Michigan state forestry warden, William R. Oates, states that losses by forest fires in Michigan which have approximated upwards of \$1,000,000 annually for 50 years, dropped from \$3,400,000 in 1911 to \$67,000 in 1912 and to less than \$23,000 in 1913. Mr. Oates says that his department cannot in fairness claim more than a nominal credit in the diminution of forest fires. The curbing, suppression and prevention of forest fires and the resultant reduction of loss is due to a systematic and thorough organization of the township supervisors of the forest district as local fire wardens and the educational posters and literature on the suppression of forest fires, placed through them before the township communities. The

improvement and standardization of locomotives and right of way inspection, the report states, helped materially; while the moral enlistment of 3000 school boys of the forest district as Michigan Forest Scouts, with the prime purpose of prevention of forest and reforestation, was an important factor. Among the other important agencies in preventing fires was the protective service instituted by the public domain commission on its reserves of state lands; the practical and energetic field work of the several independent lumbermen's protective associations; the splendid publicity given by the city and country press of Michigan on all matters pertaining to forestry and the prevention and suppression of forest fires. Notable in view of the marked reduction of loss by forest fires is the fact that many more were reported to the department in 1913 than were reported in 1911, when the loss on merchantable timber and other readily estimated property was stupendous.

Fire Losses on the Pennsylvania Railroad.

Reports just compiled show that last year 823 fires occurred on the property of the Pennsylvania Railroad system. This was the smallest number of fires in a year since 1904. The fire loss for the year was \$271,288, the smallest, with the exception of one year, in the past 35 years. To protect more carefully the property of its shippers which might be in freight stations or in transit, and also its own plant, the Pennsylvania has in the past six years enlarged its fire fighting system and so improved its method of inspection that the result is fewer fires occur, and railroad employees now extinguish many fires which formerly would have gained headway and caused consequent losses. As showing the steady improvement in efficiency, in 1908 the company's employees extinguished 274 fires out of a total of 1379 which occurred on railroad property. In 1909, out of 929 fires the railroad's own men put out 321. In 1910 they extinguished 379 and in 1913, 413 fires—more than half of the total number of fires. This steady increase in the efficiency of the fire fighting brigade was further developed last year by special training of employees, as well as by the efforts of the insurance department of the railroad to bring to the attention of all employees the number of fires occurring from preventable causes, and pointing out how to insure their prevention. A circular is to be issued by the railroad giving the causes of all fires on the Pennsylvania system East and West of Pittsburgh in 1913, in order that employees may realize that their efforts to minimize losses from fire are effective and are appreciated.

Promotion of Safety in Mining.

The forthcoming third annual report of the national Bureau of Mines, Joseph A. Holmes, director, gives the following summary of progress made by the bureau in promoting safety measures in mines throughout the country: "During the few years since the beginning of the mine safety investigations authorized by congress there has been a marked increase in the general interest taken by miners, mine owners, and the general public in all questions relating to safety; and, in spite of the fact that there has been a considerable increase in the amount of coal mined and in the number of coal miners employed, there has been a marked decrease in the number of fatalities and bodily injuries in mining operations. It is not claimed that, acting alone, the Bureau of Mines has brought about these changes for the better; nor, indeed, is it claimed that the bureau has been the main factor in bringing about these improvements. The bureau has endeavored to organize and lead in this movement; it has conducted a series of investigations and has disseminated a large amount of information bearing on accident prevention, and in this work it has had

the hearty aid and co-operation of the state mine inspectors, mine owners, and the miners.

"One beneficial result from the work of the bureau is that it encourages research and inspection, the purchase of mine rescue and first-aid equipment, and the maintenance of mine rescue corps by the private mining companies. It is sometimes claimed that investigations and other activities on the part of the national government discourage similar activities on the part of mining companies. But such has not been the case. On the contrary, the activities of the Bureau of Mines have increased the work of private laboratories and of engineers in private practice or employed by private mining companies, and in the various mining camps where our cars have done training and demonstration work mine rescue and first-aid corps or squads have been organized quite generally among the miners and have been equipped and maintained at the expense of the mine owners. At the time the bureau first undertook the development of modern protective methods, both as regards rescue work at mine disasters and recovery work at mine fires, there were in the United States only a few sets of rescue breathing apparatus, and these were in use in the metal mines at Anaconda, Mont. There are now owned and in use by private stations and mining companies several thousand sets of such apparatus, besides auxiliary equipment for fire fighting, in addition to the large number of such apparatus owned by the bureau and widely distributed among its various cars and stations."

The Transportation Factor in Food Costs.

Speaking before one of the sessions of the farmers' week at the New Jersey experiment station, New Brunswick,, George D. Ogden, general freight agent of the Pennsylvania Railroad, produced the following figures designed to show the average freight charge which is paid on the portions of food sufficient for one meal for an average family of five persons. He estimated the freight charges on the following articles of food which are common to the average table:

Commodity	Cost	Freight
Apples (5)	\$ 7.50	1/8c
Beef (2 lbs.)	35.00	1 c
Berries, fresh (2 qts.).....	10.00	1 1/2c
Cabbage (1 head, 5 lbs.).....	5.00	1/4c
Chicken (5 lbs.)	90.00	1 1/4c
Milk (1 qt.)	9.00	1/2c
Onions (10)	2.70	3/4c
Oysters (1 qt.)	22.00	1/8c
Peaches, fresh (2 qts.).....	10.00	1 c
Potatoes (6)	3.75	1/2c
Tomatoes, canned (1 can).....	5.80	1/8c
Tomatoes, fresh (2 qts.).....	4.00	1/2c
Turnips (6)	3.00	2/8c

Mr. Ogden also stated that one cent would pay the freight respectively upon enough apples for eight meals for a family of five, enough beef for one meal, enough cabbage for four meals, milk for two meals, onions for one and one-third meals, oysters for three, potatoes for two meals, canned tomatoes for three meals, fresh tomatoes for two meals and turnips for one and one-half meals.

Prize for Non-Rubber Automobile Tire.

The Austrian ministry of war has offered \$10,000 as a prize to be awarded to the person who will, with adherence to certain prescribed conditions, construct an elastic tire for motor freight trucks. Besides the specific attributes of pure rubber, such as elasticity and adhesiveness, the new material must possess (1) essentially greater durability, or (2) with equal durability the attribute of essentially smaller cost of

construction than the rubber tires, thereby reducing the expense of operating motor freight wagons. Its weight must not exceed that of the pure rubber tire. Competitors may hand in a model of the fabric in natural or reduced size, together with drawing and description, at latest by June 30,

1914, at the Automobil-Versuchsabteilung (Automobile Trial Division), VI. Gumpendorferstrasse 1, Vienna. Further details may be found in the Militärische Rundschau, published at I. Graben 23, Vienna, and to be had also on application in German of the K. K. Kriegsministerium, Vienna, Austria.

Maintenance of Equipment Costs

Compared with Locomotive Fuel Costs for Fiscal Year 1913.

We give for whatever interest the figures may possess, the record for the fiscal year 1913, of the expenses of locomotive fuel, locomotive maintenance and freight car maintenance, on thirty-three representative railway systems. On eleven of these roads it cost more to maintain the locomotives than for all the fuel which they burned. The average tractive power of the locomotives on these eleven roads was 16.67 tons. On the other 22 roads the average tractive power was 14.48 tons. These figures, however, do not prove anything conclusively. It is evident that the cost of fuel depends largely upon the location of the supply. As an illustration, the figures for the Chicago & Northwestern for fuel are high, but as it has now its own lines to the mines in Illinois, that cost will doubtless be greatly reduced in the future. Several roads which have a high average tractive power (like the Great Northern, 18.26 tons; and the Lake Shore & Michigan Southern, 17.59 tons) expended more for fuel than for locomotive repairs. On these 11 roads the average cost of locomotive maintenance per ton mile was .0765 cts.; while on the other 22, the

average was .0709 cts. Among the latter there were seven roads whose ton mile cost was greater than the average of the 11 roads. It will be noticed also that on 10 roads it cost more for locomotive repairs than it did for freight car repairs. On 14 roads freight car repairs cost more than fuel for locomotives. The Pennsylvania Railroad expended \$3,752,069 more for locomotive maintenance than for fuel—33.5 per cent. It expended \$4,631,020 more for freight car maintenance than for locomotive fuel—41.4 per cent. On that road the cost of locomotive maintenance per ton mile was .0655, considerably less than the average of the other roads, and exceeded by 17 roads out of the 33. Its cost of freight car maintenance per ton mile was .0693—a cost which was exceeded by 17 roads out of the 33. The figures of ton mile costs of fuel, locomotive maintenance and freight car maintenance for 11 years are being prepared and will be presented later.

Road	Total Expense Fuel for Locomotives.	Total Expense Maintenance of Locomotives.	Total Expense Maintenance of Freight Cars.
Atchison, T. & S. F.	\$ 6,499,539	\$ 8,126,219	\$ 5,141,551
Atlantic Coast Line.....	2,874,381	1,958,832	2,618,475
Baltimore & Ohio.....	6,380,071	7,909,150	7,890,822
Boston & Maine.....	5,425,278	3,187,704	3,164,698
Central Rd., N. J.....	2,085,202	1,513,641	2,121,891
Ches. & Ohio.....	1,806,105	2,542,981	3,842,350
Chicago & Alton.....	1,203,441	1,488,941	1,366,989
Chicago & Northwestern.....	8,240,040	4,688,207	5,016,122
Chicago, Burlington & Quincy.....	6,859,209	5,554,114	7,884,874
Chicago, Milwaukee & St. Paul.....	7,965,911	5,347,859	5,527,861
Chicago, Rock Island & Pacific.....	7,151,929	4,528,026	3,345,747
Delaware, Lackawanna & Western.....	2,805,264	2,316,201	2,717,981
Erie	3,657,745	3,670,001	4,371,792
Great Northern	6,431,151	4,106,960	3,668,216
Illinois Central	4,667,716	5,315,644	6,736,995
Lake Shore & Michigan Southern.....	3,926,888	3,125,011	5,679,820
Louisville & Nashville.....	3,393,590	3,741,206	5,907,719
Lehigh Valley	3,698,525	2,709,024	3,852,327
Missouri Pacific	2,600,319	2,075,147	1,838,956
Minneapolis & St. Louis.....	1,042,642	570,486	450,511
Michigan Central	3,323,535	2,034,044	2,453,105
N. Y. Central & H. R.....	8,714,982	8,597,382	8,591,294
N. Y., N. H. & H.....	5,603,087	2,937,404	3,403,829
Norfolk & Western.....	2,729,176	3,005,099	4,413,952
Northern Pacific	7,256,018	3,434,987	3,776,654
Pennsylvania	11,187,448	14,939,517	15,818,468
Philadelphia & Reading.....	3,754,774	3,106,568	4,408,029
St. Louis & San Francisco.....	3,263,919	2,584,751	2,194,850
Southern Pacific	5,626,878	6,668,774	3,342,422
Southern	4,205,089	4,594,236	4,987,978
Toledo, St. Louis & Western.....	379,949	258,012	235,534
Union Pacific	4,147,409	3,453,869	1,565,776
Wabash	2,770,256	2,660,556	1,745,719
Averages	4,596,286	4,022,744	4,244,948

Doubling the Load Capacity of an Old Railroad Viaduct

By W. T. CURTIS.

The author, who is contracting engineer for the Wisconsin Bridge & Iron Co., describes the design and execution of a scheme of reinforcement for the Manistee River viaduct of the Pere Marquette R. R., 100 miles north of Grand Rapids, Mich. The increasing loads had necessitated strengthening of the structure, and a neat and economical method was contrived. Extracted from a paper read before the Western Society of Engineers, June 9, 1913.

In 1888 the Chicago & West Michigan Ry. built a wrought iron single track viaduct across the Manistee river located about 100 miles north of the city of Grand Rapids, Mich., at a point now known as High Bridge, and recently established as a postoffice and flag station, on the Pere Marquette R. R. which system absorbed the old Chicago & West Michigan Ry. some years ago. This viaduct is 1,170 ft. long, consisting in the main of 14 tower spans 75 ft. high by 30 ft. long, supporting 45-ft. spans between towers, and one 150-ft. river span across the main channel of the stream. The 30-ft. and the 45-ft. spans were, in the original construction, simple deck plate girders spaced 8 ft. on centers. The river span consisted of ordinary 150-ft. deck trusses spaced 14 ft. on centers. This structure as built 25 years ago, appeared as shown in the accompanying illustration, Fig. 1.

During the winter of 1911-2, the structure was reinforced for heavier loading and stands today as appears in the illustration, Fig. 2, taken from about the same point of view as Fig. 1. A comparison of Figs. 1 and 2 shows the reconstructed bridge to be somewhat more massive and substantial looking than the original. Fig. 3 is from a photograph taken at a little closer range after reconstruction, in order to bring out more clearly some of the details.

The original structure was designed for a loading about

equal to Cooper's E-25. The rolling stock gradually became heavier and heavier, so that in later years the bridge was somewhat overloaded. In 1911 it was decided by the railway to put still heavier loading (E-50) on the bridge, thus increasing it to an extent which would be unsafe for the old structure. It remained to either replace the structure with a new one, or to reinforce it, and the latter method was elected as being much more economical.

Mr. J. F. Deimling, chief engineer of the Pere Marquette asked for competitive propositions for both cost and design on the reinforcement, submitting, by way of suggestive information, a solution which had been used some years ago on their Mill Creek trestle. This consisted of adding a new line of deck plate girders the entire length of the viaduct on the center line of track, these girders being supported on new independent posts at the center of each bent, as shown in the sketch for bents of north approach only on Plate 1, accompanying. (This scheme was used only on a very small portion of the plan finally adopted, for reasons given later.)

Some tenders were offered on this center girder scheme of reinforcement for the entire Manistee viaduct, but were discarded, partly on account of greater cost but chiefly on account of uncertainty of distribution of load among the three girders, as the old girders on this Manistee viaduct are only 8 ft. centers, making the wood ties so short and stiff as to cause a marked degree of indeterminateness of the distribution of the load among the three girders. A further objection was the rocking or tipping effect over the new center girder as a fulcrum under imperfectly adjusted or worn ties, the shortness of the ties magnifying this difficulty. The girders of the old Mill Creek trestle were spaced further

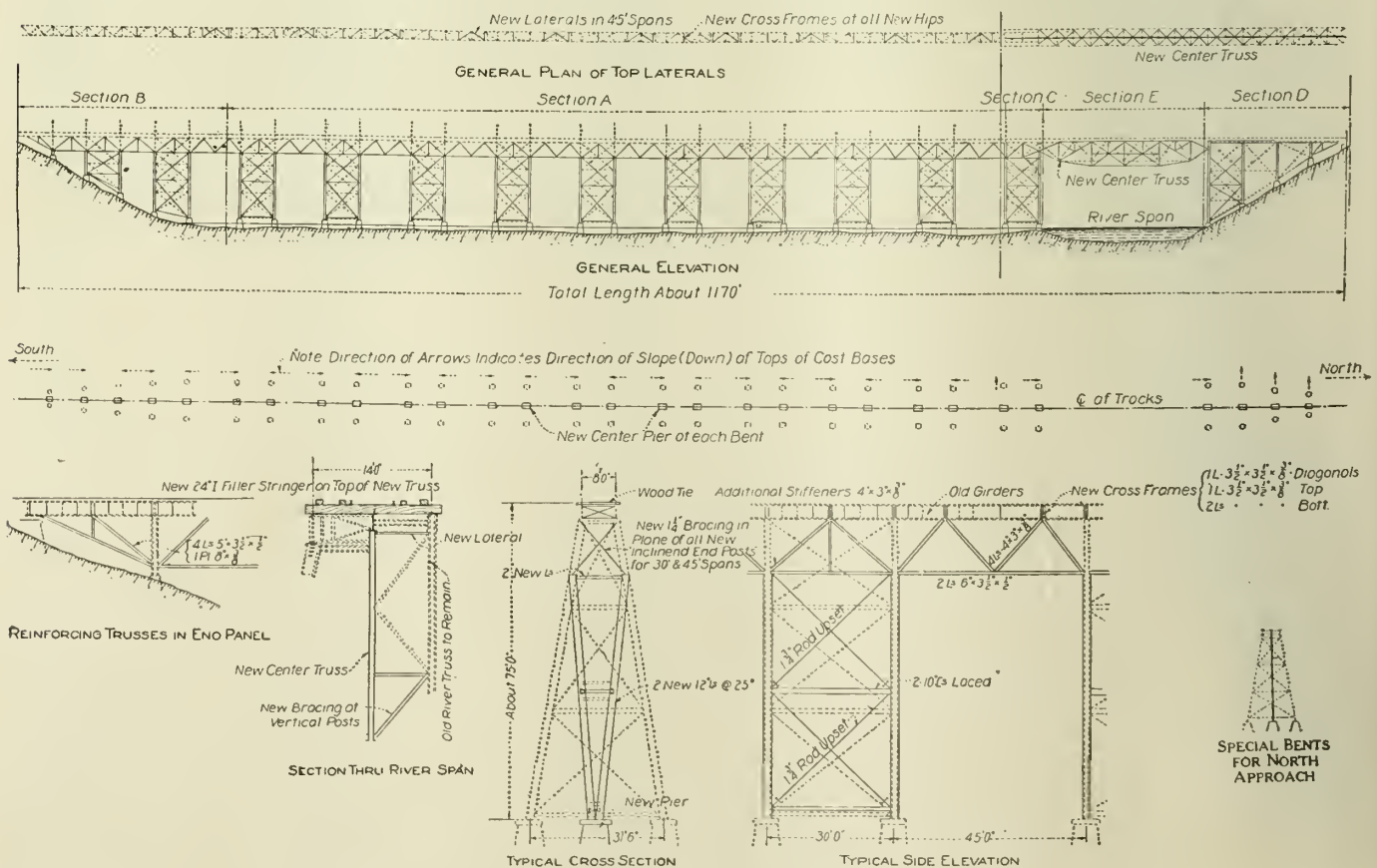


Plate 1—Reinforcement of Manistee River Viaduct, Pere Marquette R. R.



Fig. 2—General View of Manistee River Viaduct, P. M. R., After Reinforcement.



Fig. 1—General View of Manistee River Viaduct, P. M. R., Before Reinforcement.

apart, which made the new middle girder idea less objectionable in that piece of work. A still further objection to this center girder scheme of reinforcement was the fact that the erection would seriously interfere with traffic during a long period of time.

Another scheme considered was to reinforce each of the old legs of the bents by adding another member parallel to it, surmounted with an additional new track girder placed closely along the side of the old girders, making a total of four girders with the old ones. This scheme was discarded as being prohibitively expensive, and somewhat unsightly as giving a pronounced appearance of being patched up.

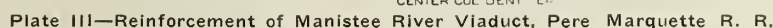
The scheme finally adopted was proposed by the Wisconsin Bridge & Iron Co., being original with the writer, and is shown in Figs. 2 and 3, and also in diagram form, Plate I. The latter shows, in dotted lines, the old or original structure, and in full lines the newly added members. This design was adopted for its economy, its lesser degree of indefiniteness of distribution of loads, its far greater general stiffness, its minimum interference with traffic during construction, and incidentally on account of its having a less patched-up and made-over appearance than either of the other schemes offered.

The governing or fundamental idea of the adopted scheme was to convert the upper or deck portion of the viaduct into a series of deep lattice trusses, of which the old girders would themselves constitute the top chords. This was done by adding a bottom chord about 12 ft. below the girders and introducing a Warren web system between the two chords thus formed. These old deck girders are, of course, stiff enough to resist the bending action of the load, and to deliver these local loads to the panel points of the newly formed truss. In calculation, for safety, the old girders were figured both as simple spans between new panel points, and as continuous girders, the worst result being used in all cases. Additional stiffeners were added and cross frames installed also.

To carry the excess load from these newly formed trusses to the ground, two new columns are added to each bent, starting at the bottom chord of the new trusses and running on an incline down to a new concrete pier built at the center of each old bent. The two new columns thus form a V and make the remodeled bent consist of two A-frames, as shown in the typical cross section sketch at the bottom of Plate I, and as shown quite clearly in perspective in Fig. 3.

This construction has the desired effect of virtually lessening the height of the trestle towers by about 12 ft., for the load is now delivered into the towers at the bottom chord of the newly formed trusses (Fig. 3). Furthermore, this system braces the structure longitudinally by virtue of the depth of the new trusses. Also, the new A-frame form of the bents stiffens the structure transversely. The scheme has the further advantage of being capable of field construction with practically no interference with traffic, as the old girders were not disturbed, except for the drilling of holes, etc., in them. In this manner we preserved for the main length of the viaduct the original two-point-bearing for the ties, which is undoubtedly the best, giving absolute definiteness of load delivery, and doing away with the tendency to tipping or teetering of the ties.

At the river span the system just described could, of course, not be followed, and here a new deck truss 150 ft. long was placed midway between the old trusses. The distance between the old trusses is 14 ft., being thus sufficiently far apart to give longer and consequently more limber ties, permitting of more definite proportioning of loads as delivered from the ties into the two old and the one new trusses, and also minimizing the tipping effect of the ties. In fact, this appeared to be the only reasonable solution of the river span problem, and was the one contemplated in all proposals offered.



For the transverse or wind strains in the 45-ft. spans, new laterals are introduced for the middle panel of the newly formed trusses. These laterals terminate at new cross frames introduced at the panel points of the trusses carrying the wind load down to the bottom chord of the old deck girders, from which the load travels through a system of rod bracing in the plane of the inclined end posts of the new deep trusses to the tops of the newly formed A-frame columns.

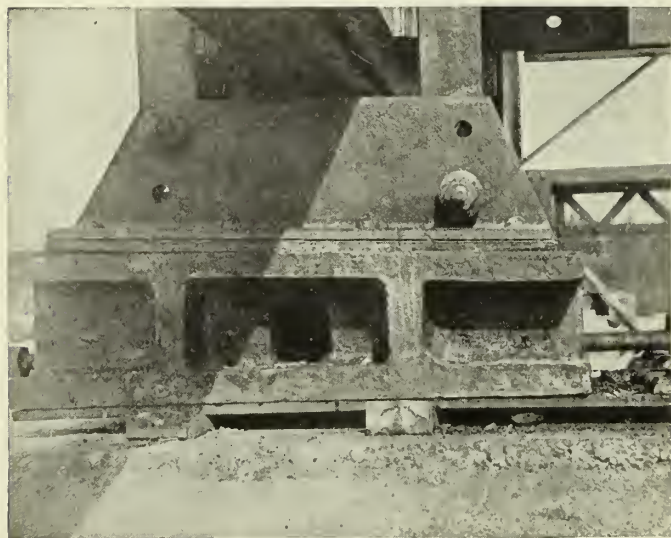


Fig. 4—Adjustable Shoe, Used in Reinforcement of Manistee River Viaduct, Pere Marquette R. R.

From this point to the ground the A-frames themselves constitute the additional wind or transverse bracing. The 30-ft. spans were similarly treated.

For the wind strain in the river and short approach spans which have the new independent straight center column instead of the V-shaped columns, no additional stiffness was afforded by the new column, and the old system of rods was therefore doubled.

For tractive force or longitudinal bracing the newly formed Warren side trusses formed sufficient bracing down to the tops of the newly added V-shaped columns, and the tractive forces are carried from this point to the ground by an entirely new system of bracing in the longitudinal plane of the legs of these new V-columns. (This is shown in typical side elevation, Plate I.)

The solution of the more general problems, while interesting, led incidentally to problems of more minute detail, which were in themselves fully as interesting as the larger problems, and in some instances were fully as important. The detail drawings for the reinforcement of this bridge covered some 35 sheets.

The new V-shaped columns in the tower bents are designed to go half on either side of the old bents straddle fashion, and were shipped "knock down," each leg of the V being in two parts for each of its sections. The lacing bars were shipped riveted to one side of each section, the other side being connected in the field. Plate IV shows these columns. It took careful drafting to insure no interference between the lacing bars of these new members and the old steel work. These new columns were connected to the old tower struts, where convenient, to form a general stiffening to the structure. In the erection of all these new columns the old steel was not disturbed, except for the necessary drilling. This in fact was considered as one of the commendable features of the design.

Connections for the rod bracing between the pairs of reinforcement trusses in the plane of the inclined end posts of these trusses presented a problem which was solved by the use of cast steel hitch brackets, which did away with

what would otherwise have been clumsy and fussy detail. In order to avoid the uncertainty of rivets in tension on these hitch brackets, bolts instead of rivets were used in the outermost holes. These hitch brackets were cut with right and left threads, permitting of direct adjustments of the tension rods.

Much trouble was experienced in finding suitable connections of the new wind-bracing rods to the old bents, which were not converted into the double A-frame form, on account of the old bracing being pin connected. Whenever possible, a connection was made, obviating the necessity of removing the old pins, but this was impossible in some cases.

Particular care was exercised to see that the loads from the new intermediate river truss were delivered properly into the columns, and a somewhat complicated detail resulted, as shown in Plate III, from which it will be observed that the details are so made, in nearly every case, that the old steel is not interfered with. This, in fact, was the aim of the detail work on the entire structure.

Extra care was exercised in all the details to allow for inconsistencies in the old construction. This was done by providing numerous shims and doing a great deal of field drilling that would otherwise not have been necessary. The entire job abounded in painstaking work of this character, in order that the new member would fit the old parts to which it should connect, and at the same time clear the old parts with which it was desired not to interfere. The detail drafting alone on this job cost a little over \$950 for wages paid direct to the draftsman, exclusive of any overhead expense of any kind.

As previously mentioned, the foundations required reinforcing by the introduction of a new or third pier midway



Fig. 5—Use of Locomotive Crane in Reinforcement of Manistee River Viaduct, Pere Marquette R. R.

between the old piers, at each bent for the entire length of the viaduct. These piers were of concrete construction resting on piles, there being 12 piles to each of the standard bents, and 20 piles for the special piers under the new river truss. The piles were driven 35 ft. and were so arranged that they could be driven on either side of the old bent without disturbing the old iron work.

Considerable difficulty was encountered on this foundation work, due to the fact that there existed, unknown to the railway company or to the bridge company, an old corduroy road on the center line of the viaduct for its entire length. This road was covered with several feet of sandy silt, which made it very difficult to remove the corduroy logs. In some cases the piles were driven right through the corduroy, in other cases the logs were removed and in still other cases

being mounted on it. This avoided the necessity of moving the engine as frequently as the driver.

The concrete was mixed and placed in the winter without any unusual expense, aside from the excavation and cofferdam annoyance previously mentioned. Gravel was brought to the site in hopper bottom cars and run out onto the viaduct to a desired point. A few ties beneath the car were then spread and the contents dropped 75 ft. to the ice below. From the stock piles thus formed the gravel was conveyed over the ice to the final point of deposit, the mixing being done in each case right at the forms. The cofferdams were of the Wakefield type.

The weather was very cold most of the time, but we merely had to be sure that the frost was taken out of the dry material to begin with, for most of the concrete was placed

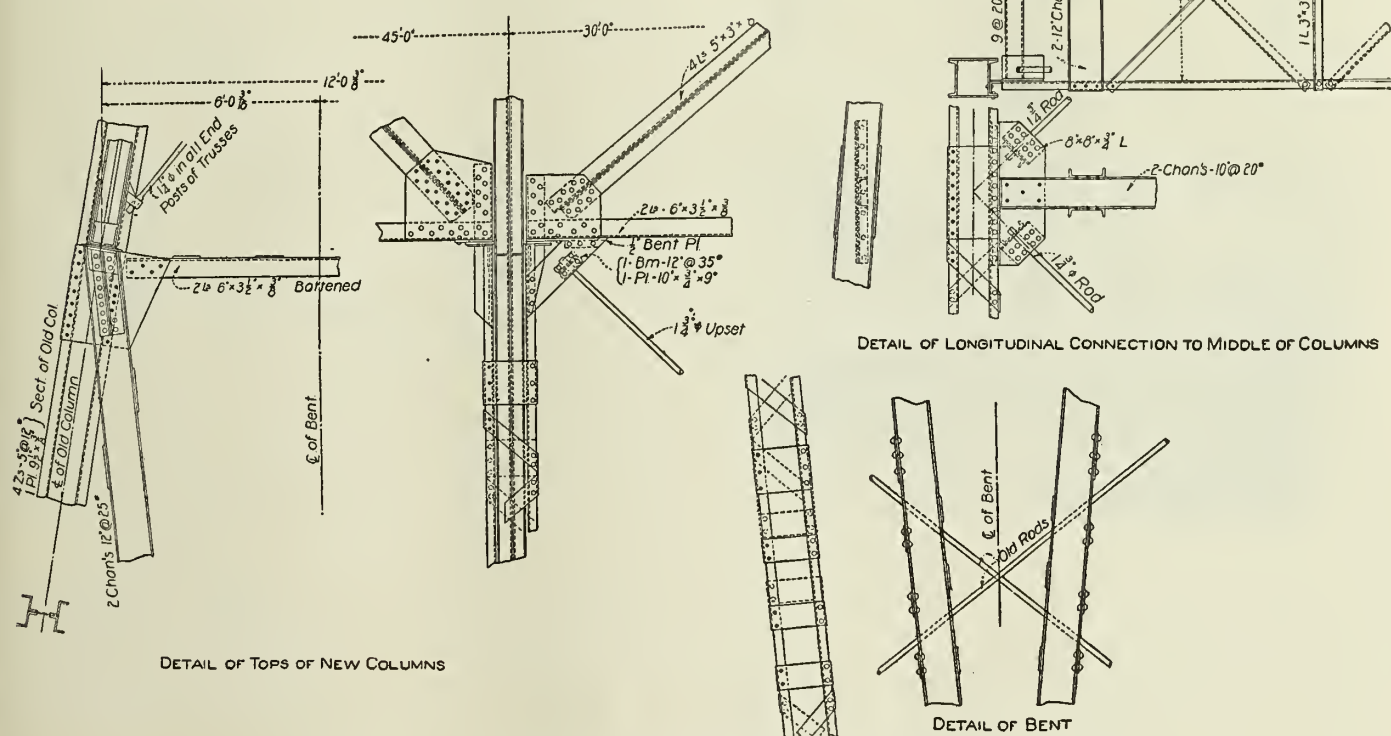


Plate IV—Reinforcement of Manistee River Viaduct, Pere Marquette R. R.

the logs were cut. One way seemed to be about as expensive as another.

Unexpected difficulty was also encountered on account of the water rising some two feet higher than had been previously known. This upset our calculations for cofferdams, causing much delay and expense.

The method of handling the pile driver was quite interesting. It had to be moved many times to drive the small cluster of piles at each of the bents, each cluster being split into two groups as divided by the old iron bents which stood on the center line of each pile cluster. The pile driver was handled from the deck of the structure 75 ft. above, and was placed at the various points of operation without removing any of the old bracing. This not only saved expense but was better for the structure. The driver was picked up near its center of gravity, tilted over with its legs uppermost and its nose or top thrust between the bracing rods of the structure to the desired point of setting up. In this way it was moved along from point to point. Very little timber bracing was used at the foot of the driver, which was guyed to the old iron columns of which there were plenty near each set-up. The engine was handled separately from the driver, not

under water and the small portion which protruded could be protected at slight expense with marsh grass and was kept slightly warm by the larger mass of concrete below the ice.

The erection of the steel work was somewhat unusual, and while at first appearing somewhat formidable, it worked out satisfactorily and with reasonable economy, barring delays due to foundation trouble.

The old work was mostly field bolted, which made the occasional temporary removing of old members less expensive. The field drilling and riveting was an expensive item, there being so much of it. There were about 7000 holes to drill, about 2000 old $\frac{3}{4}$ -in. rivets to knock out and ream the old holes to $\frac{15}{16}$ in., and about 28,700 rivets to drive on the job.

The new steel was handled by a derrick car at the beginning of the work, but this method did not prove entirely satisfactory, and the derrick car was later replaced by a locomotive crane (Fig. 5) which gave better results.

The river span was erected with very little falsework. The new steel columns were first erected at the ends of this span. Then the top chord was raised and suspended from the old structure with steamboat ratchets, the turnbuckles

being placed so as not to interfere with railroad traffic. All new top chord bracing was then placed, this being connected to the old trusses, and all bottom chord bracing removed. The balance of the new truss was then placed with false-work consisting of but a single wood post at either end, and the truss was kept suspended and controlled with 24 turn-buckles until completely riveted.

The work abounded in opportunities for interferences and misfits between old and new parts, but very little trouble in this direction was actually encountered—so little, in fact,

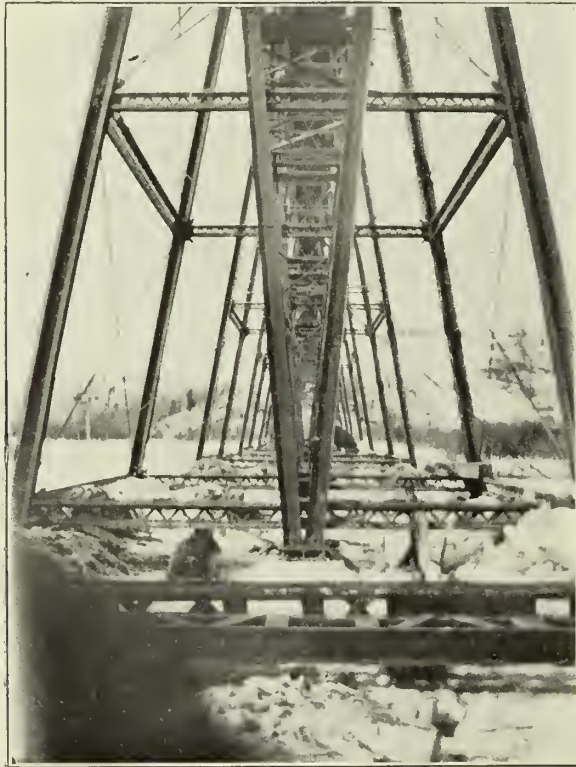


Fig. 6—View Through Towers After Reinforcing.

that we were agreeably surprised, and considered this piece of work as a demonstration of the feasibility of doing this class of reconstruction at reasonable cost.

As mentioned, the old structure was field-bolted (with the exception of buck and lateral bracing between the girders), a fact which was not discovered until after the field work of reconstruction had been begun. The owners on becoming aware of this condition at first seriously considered replacing all old field bolts with new rivets. Careful investigation showed the old structure to be in perfect alignment with none of the bolts loose in the slightest degree, although the structure had seen years of service and had been somewhat overloaded in its later years, so it was decided not to go to the extra expense of replacing the bolts with rivets. As a matter of fact, many of the buck and lateral connections which had been riveted originally, were found to be in bad shape on account of loose rivets, the vibration of passing trains having worn deeply into some of the rivets. While it was realized that the points which had been riveted in the old structure were points subject to more severe service than the points which had been bolted, the investigation satisfied all who participated in it that bolts are in reality much better than are generally considered in ordinary practice. Other observations we have had opportunity to make under somewhat similar circumstances have added evidence to this conclusion.

The cost of the reconstruction was, in round numbers, as follows; these figures including all extras on the work proper and a contractor's profit of 10 per cent, the work having

been undertaken on a percentage basis with a fixed maximum limit:

Foundations in place (Ry. Co. furnished gravel free)	\$10,200.00
New Steel, 455 tons delivered at site (free freight) ..	22,400.00
Erection of steel (free transportation of men and equipment)	11,300.00

Total cost\$43,900.00
which, on a conservative guess, is only about half what a new structure would have cost.

The old structure weighed 496 tons.

Report on the Frisco's Recent Financial History.

The Interstate Commerce Commission transmitted to the United States senate, on January 26, its report covering its investigation of the financial history of the St. Louis & San Francisco system, leading up to the corporation's receivership. The report is signed by Chairman Edgar E. Clark. It cites as among the underlying causes for the insolvency of the road, financial operations which included the acquisition of a number of branch lines and extensions, concerning which transactions much was made public during the course of the commission's hearings, at St. Louis. The report states that the syndicates which promoted these deals profited to the extent of more than \$8,000,000.

The report shows that the debt of the railroad May 27, 1913, when the receivership was ordered, amounted to 82.63 per cent of the total capital liability; the total capital at that time amounting to \$295,633,933.72, of which only \$51,364,100 was capital stock and \$244,269,833.72 was funded debts, including equipment trust notes. That the interest-bearing liabilities of the Frisco system exceeded the stock liability by 375 per cent, "and were wholly disproportionate, when compared with the capitalization of other carriers, including those in the territory west of the Mississippi river," is asserted by the commission, which submits figures for eight selected railroads showing the average ratio of funded debts to capital liability to be 53.65 per cent.

The report declares that the inability of the 'Frisco to meet its obligations seemed to have been apparent for some time prior to the application for a receivership; that strenuous efforts were made by its officers to tide over financial difficulties from day to day; that money was borrowed from all available sources until every avenue of assistance was exhausted, marketable securities being either sold or pledged as collateral under numerous loans, and that, notwithstanding this exhausted financial condition, the Frisco sold to Speyer & Co. of New York \$3,000,000 of its general lien 5 per cent bonds, a transaction which the commission declares warranted condemnation.

Summarized, the commission's report attributes the insolvency of the Frisco to the following causes:

"Disproportionate capitalization.

"The acquisition of new lines.

"The financing by the Frisco of the New Orleans, Texas & Mexico and other south Texas lines.

"The desire for an entrance into Chicago, resulting in the assumption of heavy fixed charges in the acquisition of the stock of the Chicago & Eastern Illinois.

"The sale of its securities at prices so low as to indicate a deplorably weakened credit or an extravagant arrangement with bankers to whom large profits accrued in the purchase of the bonds and the subsequent sale of the same to the public.

"Miscellaneous causes, among which are the payment of dividends on its preferred stock, in spite of its weakened credit and need of money.

"Poor investments and expensive rentals, among which are the investment in the New Orleans Terminal Co. stock in the Kirby Lumber Co. and rentals paid the Crawford Mining Co."

Detailed description is given of the operations of syndicates formed to finance the construction of a number of lines and the sale of such properties to the Frisco, and a summary of these operations, in which certain officers of the Frisco participated, is given as follows:

"Oklahoma City & Western, amount paid in \$2,097,043.95; profit, \$369,278.82.

"St. Louis, San Francisco & New Orleans, amount paid in \$5,300,000; profit, \$837,400.

"St. Louis & Gulf, amount paid in, \$2,700,000; profit, \$1,385,696.52.

"St. Louis & Oklahoma City, amount paid in, \$1,000,000; profit, \$556,150.

"St. Louis, Oklahoma & Southern, \$3,423,432.10; profit, \$719,574.90.

"Adkins Valley & Western, \$3,046,635; profit, \$589,767.32.

"New Iberia & Northern, amount paid in, \$2,000,000; profit, \$500,000.

"St. Louis, Brownsville & Mexico, \$3,981,000; profit, \$3,011,928.

"Colorado Southern, New Orleans & Pacific, amount paid in, \$3,000,000; profit, \$375,000.

"Total amount paid in, \$26,548,111.05; profit, \$8,444,796.51."

dyce, Thomas H. West, Robert H. Brookings and Edward Whittaker, for the purpose of constructing the railroad from Robstown, Tex., to Brownsville. This committee received about 80,000 acres of land and large sums of money donated for the purpose of aiding in the construction of the road and development of the land. The land deals, the cash bonuses and the syndicate exploitations resulted in a profit to the syndicate of \$892,487.21.

"After the Brownsville issued its securities amounting to \$10,756,000, as authorized by the Texas railroad commission," the report continues, "an agreement was executed between the St. Louis Union Trust Co., as syndicate manager, and the Frisco, dated December 1, 1909, under which the Frisco was to purchase these additional securities, having a par value of \$455,450, for the sum of \$11,827,000, with interest from December 1, 1909. Payment was made by the Frisco May 26, 1911, in the sum of \$12,122,897.72."

The principal difficulty with the Brownsville company has been inability to meet the interest on bonds. "The ratio of interest-bearing securities," the report says, "to the total of securities outstanding is 96.06 per cent, an excessive ratio even when compared with the Frisco, which has a ratio of 82.63 per cent."

Desire of the Frisco for an entrance into Chicago resulted

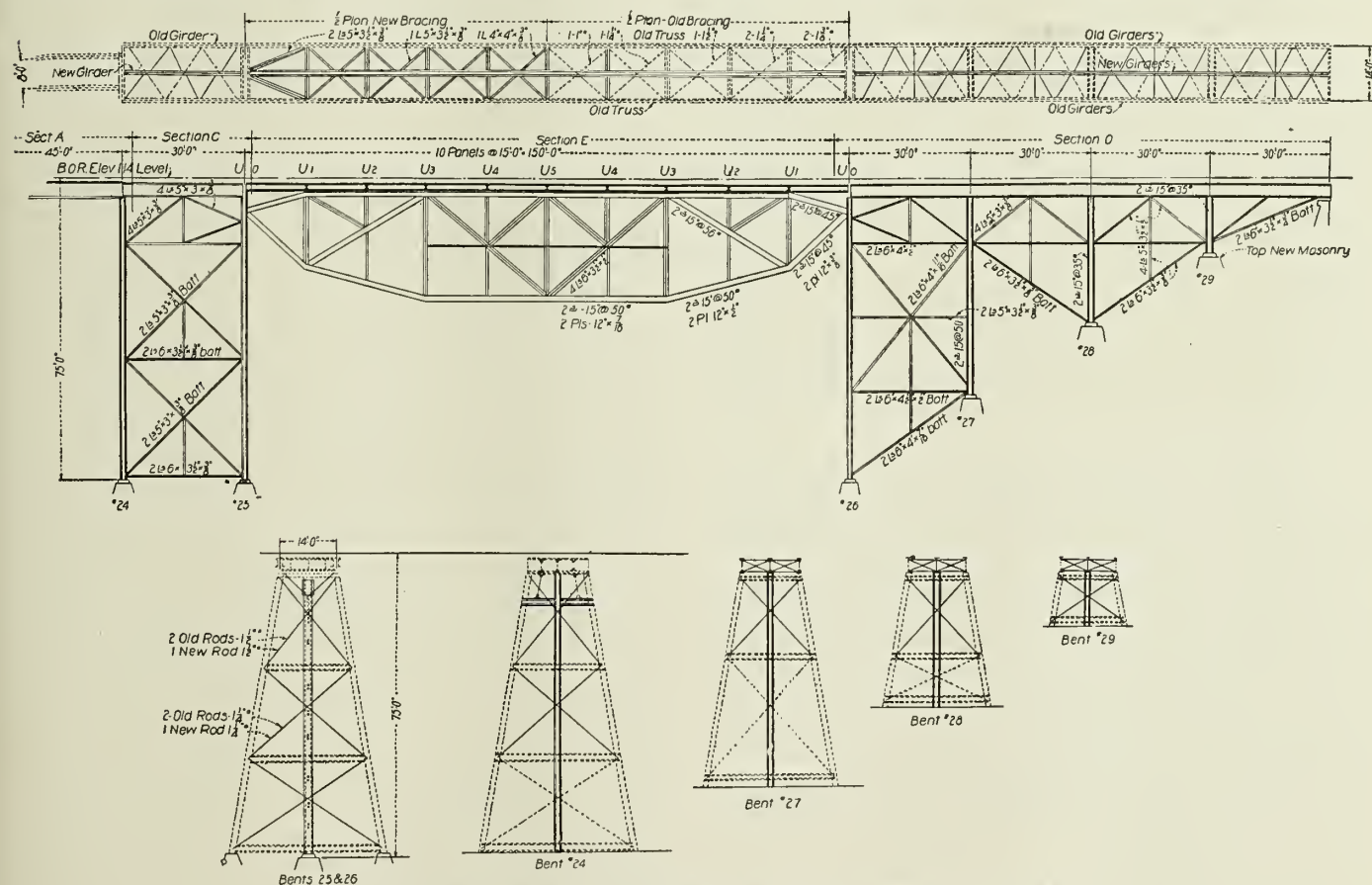


Plate V—Reinforcement of Manistee River Viaduct, Pere Marquette R. R.

The acquirement through a syndicate operation of the St. Louis, Brownsville & Mexico, the report says, represented a profit of 75.66 per cent on the subscription of each syndicate member. The syndicate was composed of ninety-nine members, who contributed \$3,960,999.20 toward the construction of the railroad, and, the report adds, "The effect of the entire transaction was that the syndicate secured a profit of \$3,011,929.75, which included the profits on land, the cash donations, and syndicate operations."

The original Brownsville line, 141 miles in length, was turned over for operation July 4, 1904, and extended to Sinlon, Tex., in April, 1905. In 1903, the report says, a committee of five was organized, composed of B. F. Yoakum, Samuel W. For-

in purchase of the Chicago & Eastern Illinois in 1902 by the issuance of Frisco stock trust certificates upon the basis of \$150 for the preferred and \$250 for the common stock. This transaction, the report says, showed a net loss of \$1,710,388 to May 27, 1913.

Of the policy of the Frisco, the report says:

"The acquisition of new lines greatly in excess of construction cost and the sale of its funded debt securities at extravagant rates of discount, including the payment of premiums of retired issues and commissions to banks and bankers of such issues, the investment in stocks of industrial companies on which no dividends have been paid, the assumption of heavy fixed charges for its Texas lines as well as for the Chicago & East-

ern Illinois, far greater than its returns therefrom, and payment of excessive charges upon the investment in and use of terminal and coal properties, have resulted in the net revenue of the Frisco being absorbed by such charges in a sum which approximates between \$3,500,000 and \$4,000,000 per annum."

Following publication of the report, Speyer & Co., the New York banking firm mentioned therein, sent a letter to Chairman Clark criticizing the report. The letter begins by quoting what the report says on the sale of securities, and in part is as follows:

"You fail to state correctly the circumstances connected with the sale in question. The fact is that the negotiations were commenced in December, 1912, but were not concluded until March 19, 1913, when the contract of sale was signed. Your report states the dates of sales as from April 24 to May 14. While deliveries and payments were made on those dates, the fact is that our obligation to take the bonds had been fixed two months before, and it is not true that at that time 'every appearance indicated insolvency.'"

"The report goes on to say, 'The bankers should have been aware of the poverty of the Frisco and its difficulties in obtaining funds.' This sentence amounts to an intimation that we were not aware of the general financial condition of the Frisco, etc., while the fact is that we were aware of it, as was everybody who paid any attention to such matters. With such knowledge as we had, however, we were of the opinion then, and are of the opinion now, that we were not only justified but in honor bound toward the company and its security holders not to leave it through its financial difficulties which in March were supposed to be only temporary."

"We believed then, and we believe now, that if these negotiations had not been affected by the abnormal condition of the money markets and the impairment of confidence generally which prevailed in the spring of 1913, the company would have been able to meet its obligations. If a banking firm is to run the risk of being censured because it steps forward and gives financial assistance to a railroad corporation which faces a temporary crisis in its financial affairs, we submit that serious and unnecessary embarrassment may often be produced."

"Your report also refers in general terms to 'extravagant arrangements with bankers to whom large profits accrue in the purchase of bonds and subsequent sale of the same to the public. Our total profit on the \$3,000,000 bonds transaction in March, 1913, amounted to three-fourths of 1 per cent, and on our loans we received interest at the rate of 6 per cent per annum. That we have not made unreasonable profits will appear from the fact that during the nine years from March, 1905, to March, 1913, we bought from the company and resold, either directly or indirectly, an aggregate of \$104,988,000 bonds and notes of the Frisco system, and our total profit in interest, commissions and otherwise amounted to \$1,342,366, or about 1¼ per cent. From this amount might justly be deducted the losses which we suffered on our holdings of Frisco shares and bonds at the time of the receivership."

Shop Output.—It is the experience of the writer that the successful installation of piece work has more to do with increasing the output of a shop and perfecting the organization than has any system of cost comparison. With proper supervision and careful study of each detailed price and the conditions under which it is repaired or manufactured, making prices that are liberal with the workmen though getting the maximum output of the machine, we automatically increase the output per square foot of shop area and per machine; we make the workman an interested partner to the transaction and automatically increase our output. The workmen are more contented, they are thrown on their own resources and they become experts in studying the capacity of a machine, its output and methods

of manufacture. It is also possible with this method of repair and manufacture to positively state to the management the saving that may be effected per month or per year by the installation of new machinery.—M. D. Franey, proceedings of the Western Railway Club.

Industry Sidings on Government Owned Roads in Europe.

The following summary of the laws in Germany, France, and Italy, governing the construction and operation of sidings, was prepared by W. G. Bishop, traveling agent of the Industrial Dept. of the B. & O. Rd., and presented at the recent meeting of the Railway Development Assn. It is interesting to note the different way in which shippers are treated by government owned railways, from that which they expect in this country. It is especially timely in view of the I. C. C. decision rendered this week in the case of certain plant railways.

As the Interstate Commerce Commission may endeavor to make uniform the terms upon which private side tracks are constructed, it may be of interest to consider the practices of government-owned railroads in Europe.

In Germany on State railways the applicant pays cost of constructing siding, cost of additions and alterations to the railway rendered necessary by construction of siding, and cost of right-of-way over any land of the State railway which may be used for this siding, and there is no refund.

The State railway will not undertake to construct siding beyond its right-of-way and applicant must have his portion of the work completed and open for traffic simultaneously with the State. Should he fail in this the railway, after a stated period, may remove all works on their land and demand payment from the applicant for expense incurred.

Supervision and maintenance of siding are at the expense of the applicant, 4.76 cents per meter (39.3701 inches) per year must be paid by applicant for labor in maintenance of rails and switches. The report is not clear whether this is per meter of rail or of road. Applicant also pays for the expense arising from extraordinary maintenance of rails and switches due to natural events, such as snow storms; the materials required for maintenance of tracks and switches, including ballast; the expense of maintaining in good repair all earth work, level crossings, bridges, cabins and all other structures, appliances and appurtenances originating in construction of siding, including safety and signal appliances. There is a regular schedule of annual charges for maintenance, oiling and lighting the points and signals and turntables—for instances, for sidings connecting with the main line of the state railway the charge for a single switch is \$10.71.

Accounts rendered by the railway against applicant may be checked by the latter for arithmetical error only.

The railway may operate the siding itself or require the applicant to do so, and in the latter case the railway prescribes the manner in which siding shall be operated. When cars are ready to be taken out they must be coupled up in accordance with the regulations, and they must be clearly marked with their destinations. They must be marshalled in the order prescribed by the railway. If siding is full, period for loading and unloading starts from the hour when cars are offered by the railway, making constructive placement at that hour.

Under a penalty of a fine of \$23.80 per car, the applicant must immediately or in any case before returning the car, advise the agent to whose station the siding belongs if a car or cars has or have been derailed, though no damage may have been caused the equipment thereby.

Applicant is responsible for any damage to cars noticed on removal of cars, but not noticed when cars were put in.

If applicant operated siding with his own men the railway has the right to demand the removal of those of the men who disobey the instructions of the railway officials.

There are regular siding charges, payable by the applicant, for performing the service to and from private sidings. Where the siding connection is at a point intermediate to two stations, the charges are the subject of agreement in each individual case. In all other cases distances are measured from middle of station buildings. These charges range from 11.09 cents per car for .62 of a mile to 45.22 cents per car for 4.97 miles.

These charges are on loaded cars. Empty cars which are moved in for load and are not loaded are charged for as above in addition to incurring demurrage. These charges can only be levied on a car of at least 22,050 pounds capacity. Where several cars of less capacity have to be used the siding charges must be levied practically at the rate of 22,050 pounds cars capacity.

In France private sidings are constructed and maintained at the expense of owner under supervision of the State Railroad Administration.

The railway deliveries cars at point of exchange with the siding. The owner himself does the hauling in the siding.

Cars may not remain on private sidings more than six hours when the siding does not exceed .62 of a mile in length. For each additional .62 of a mile one-half hour is added to the period. At the expiration of this period the railway may exact demurrage equal to the rental value of the car for the excess time.

The railway is authorized to charge for providing rolling stock a fixed price of 2.28 cents a ton (presumably the metric ton of 2205 pounds) for the first .62 of a mile and .76 of a cent per ton for each succeeding kilometer. Each portion of a kilometer is counted as one kilometer.

In Italy applicant for private siding must accompany his request with a plan of the locality on the scale of 1 in 1000, together with a deposit sufficient to cover the expense of surveying, etc. If after the survey the application is refused, actual expenses are deducted from the deposit and the balance returned to the applicant.

On the railway property the construction is carried on at the expense of the applicant; beyond the railway property the applicant does the work himself or pays the railway for doing it.

Applicant must deposit with the railway an amount sufficient to cover the expense of the siding on railway property.

If alterations on the railway property render operation of the siding impracticable, a new siding can only be provided at the cost of the applicant.

Maintenance beyond the line of the railway property must be provided for by the applicant.

Applicant must pay annually in advance to the railway, whatever amount is agreed upon for maintenance and supervision of points, signal, apparatus, etc., on railway property.

All switching outside the railway boundary must be done

by the applicant, but the railway has the right of supervision without in any way diminishing the applicant's responsibility for injuries to persons, damage to property, rolling stock, etc.

For service rendered by the railway in connection with the reception and delivery of cars siding charges must be paid as follows:

A terminable charge of 4.83 cents per car of any capacity.

A marshalling charge of 9.65 cents per car if not exceeding 14 tons (metric of 2205 pounds) capacity ranging to 15.44 cents for a car of over 20 tons capacity.

For taking the car from the marshalling yard to the siding switch, 4.82 cents for cars not exceeding 14 tons to 8.69 cents for cars over 20 tons capacity; this charge being imposed per car per indivisible half kilometers or .31 of a mile.

For the transfer of full carloads from station to applicant's works, the applicant must pay a fixed charge of 9.94 cents per ton of capacity in the car. This would make a charge of \$1.39 for a car of 14 tons capacity. For a car of 20 tons capacity the charge would be \$1.99.

Placing all these charges on a car of over 20 tons capacity it is figured that it would cost the applicant before he could get the loaded car to his works \$2.38.

If the works are distant not more than 328 yards from the siding switch, and if the daily traffic is an average of 15 cars, the free time is six hours. The maximum free time allowance is 9 hours, and this applies when the works are 2000 meters or a little over one and a quarter miles distant, and have an average traffic exceeding 50 cars per day. If free time allowance is exceeded a charge is imposed at the rate of 4.82 cents per car per hour.

If empty car is returned unused this charge for car hire is imposed from the time of placing the car at the disposal of the applicant with a minimum of 47.3 cents per car.

If the railway cannot accept cars offered, it is under no liability on that account, but charges for car hire will not be levied.

Mikado Type Locomotives for the Erie Railroad.

The locomotive illustrated herewith, is one of five built by the Lima Locomotive Corporation for the Erie R. R. The design is in accordance with specifications prepared by Mr. Wm. Schlafge, general mechanical superintendent of the Erie Railroad, and represents a type of heavy Mikado engine which has been very successful for the fast and heavy freight traffic of this line.

While the details of design embody nothing radical, the engines are heavy and substantial and are built to obtain as far as possible, a maximum mileage between shoppings. The modern devices for fuel economy are of course included; the superheater being of the Schmidt top header type and the firebrick arch of Security sectional variety.



Mikado Type Locomotive for the Erie R. R.

The leading features of the design are indicated in the following table:

Type	2-8-2
Service	Freight
Cylinders	28x32 inches
Valves	16 inch Piston
Valve gear	Baker
Tractive power	57,500 lbs.
Boiler, type	Straight
Min. diameter	84 inches
Working pressure	170 lbs.
Firebox, size	84x120 inches
Grate area	70 sq. ft.
Kind of fuel.....	soft coal
Tubes, number	36 and 231
Diameter	5½ and 2¼
Length	21 ft. 0 in.
Heating surface, firebox.....	188 sq. ft.
Tubes	3936 sq. ft.
Total evaporative	4124 sq. ft.
Superheating surface	1050 sq. ft.
Driving wheels, diameter.....	63 inches
Journals, all	11x13 inches
Truck wheels, front, diameter.....	33 inches
Journals	6 by 12 inches
Back	42 inches
Journals	9 by 14 inches
Weight, on driving wheels.....	239,000 lbs.
Total engine	320,000 lbs.
Total engine and tender.....	483,000 lbs.
Wheel base, driving.....	16 feet, 6 inches
Total engine	35 feet, 0 inches
Total engine and tender.....	67 feet, 0 inches
Tender, wheels, diameter.....	33 inches
Journals	6 by 11 inches
Capacity, water	9,000 gals.
Capacity, coal	16 tons

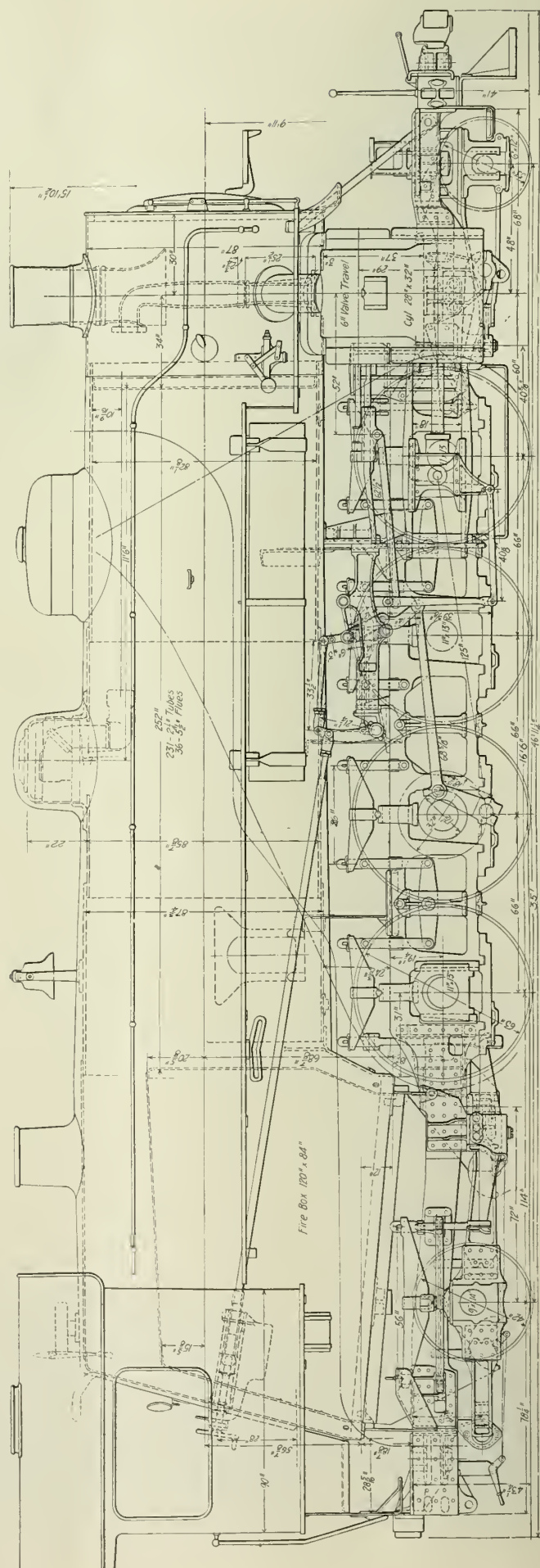
Convention of Wood Preservers' Association.

An account of Tuesday's and Wednesday's sessions of the tenth annual convention of the American Wood Preservers' Association, held in New Orleans, La., beginning January 20, was given in last week's issue of the Railway Review. Supplementing that account we present herewith a digest of the proceedings of the last day of the convention.

At Thursday morning's session a paper on "Air Pumps versus Hydraulic Pumps for Injecting Preservatives into Woods" was read by F. J. Angier. This seems to be a great improvement in the method of timber treating. The substituting of air pumps for the old style hydraulic pumps is a movement in the right direction. It is more cleanly and economical than the old-fashioned way of injecting the preservative into the wood.

Clyde H. Teesdale, of the Forest Products Laboratory, read a paper on "The Effect of Varying the Preliminary Air Pressure in Treating Ties, from the Absorption and Penetration of Creosote." This paper dealt with the manipulation of air in the retort and to some extent upholds the arguments of the promoters of the Rueping process that the withdrawal of oil from wood is influenced by the initial pressure applied previous to the injection of the preservative. However there was little discussion on the paper as it is a matter of secondary importance. The preparation of the ties and timbers before treatment in the way of seasoning is of more importance than the manipulation of the air in the retorts.

Lambert T. Ericson, assistant superintendent of the Port Reading Creosoting Co., presented a paper on the "Mechanical Handling of Railroad Cross Ties and Timbers at Timber Preservation Plants." The possibility of handling material



Elevation, Milkado Type Locomotive for the Erie R. R.

with derricks and locomotive cranes depends, to a large extent, upon the arrangement of the yard, and also upon the character of cars for loading the outgoing material. The cost of handling the material mechanically is generally considered to be lower than by hand labor. It is possible in using loco-

motive cranes to pile the material higher than with hand labor, but the question of insurance on the stock demands consideration. It was stated that the higher the ties are piled, the higher the rate of insurance. No figures were produced to substantiate this statement. A tie loader is used on the Chicago, Burlington & Quincy and the Baltimore & Ohio railroads to load treated ties into stock cars or box cars for shipment to destination.

A paper was presented by J. H. Grow on "Tram Cars and Their Construction." The paper describes various kinds of tram cars for the purpose of economical and efficient handling of ties and timber. The tendency is to use cars of heavier and better construction. These cars range in price from \$50 to \$100 each, according to their character and quality of construction.

A very interesting paper was then presented by E. T. Howson, engineering editor of the Railway Age Gazette on "Methods of Keeping Tie Records." The paper is very complete. Mr. Howson called attention to the fact that five of the 78 questions propounded recently by the Interstate Commerce Commission pertained to cross ties and impressed the importance of keeping complete and accurate records of the durability of cross ties on the railroads of this country; that most railroads were deficient in tie records. The continual increase in the price of ties is also the cause for serious study. The tendency has been to climb upwards rapidly. The importance of the expenditure for ties alone in the maintenance of our railways may be emphasized by quoting from the statistics of the Interstate Commerce Commission for the year ending June 30, 1911, in which the outlay for this one item alone, for one year, reached the enormous total of \$53,172,150, or 2.99 per cent of all railway expenditures. There are various methods of marking ties for identification. These methods vary with different railroads.

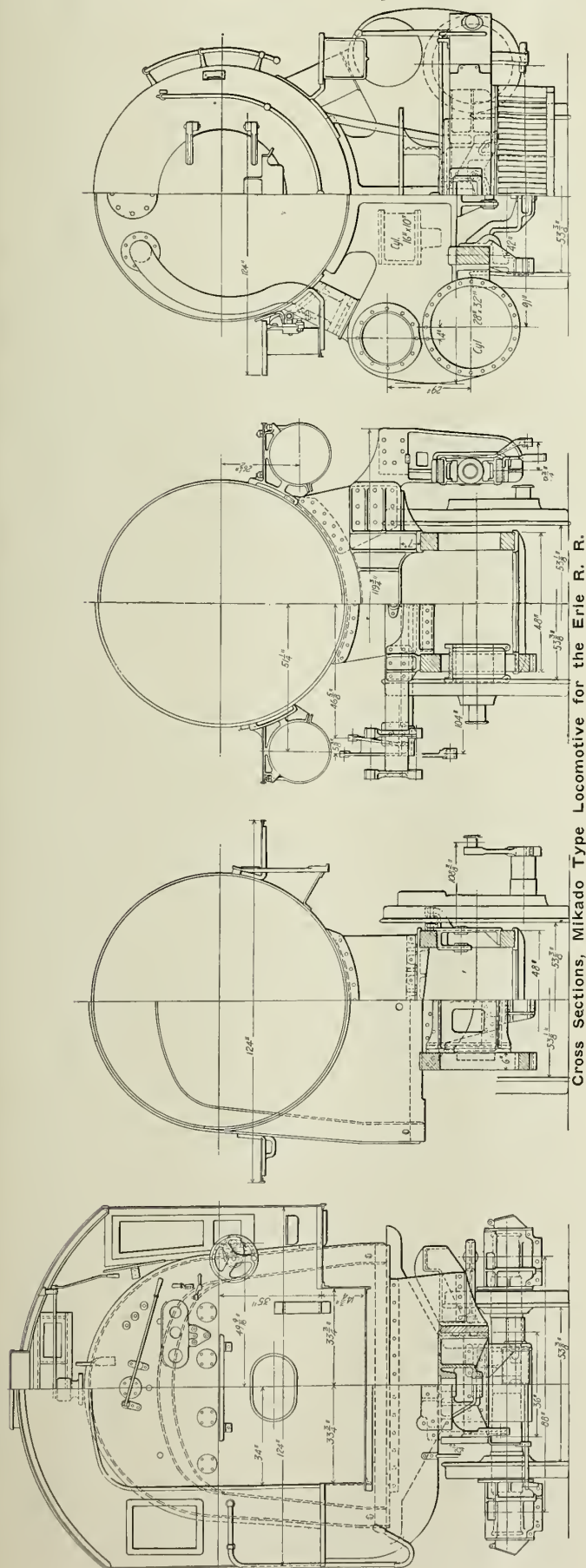
Professor S. J. Record, of Yale Forest School, presented a very interesting address on the Yale Forest School. It is not undertaken to train men specifically for the wood preservation industry. It does, however, give considerable attention to this and closely allied subjects, so that its graduates have a good knowledge of what is being accomplished in this line.

George S. Wood, manager of the Forest Products Exposition explained the purposes of the exposition which will be held in Chicago, April 30 to May 9, and in New York May 21 to 30, 1914, and urged the Wood Preservers' Association to take part in the exposition. The association gave enthusiastic endorsement to the exposition and expects to lend its support and influence to the undertaking.

A dozen or more resolutions were passed thanking the mayor and the press of New Orleans, the hotel and people of the city for their courteous treatment of the members and visitors of the association. A resolution favoring the proposed five per cent freight rate increase on the eastern railways, was adopted.

The election of officers followed with results as given in these columns last week; and it was decided, as also previously stated, that the next place of meeting will be in Chicago, the third week of January, 1915.

The Kentucky Court of Appeals has held, in the case of Allen vs. Louisville & Nashville R. R., that where a railroad furnished to a shipper transportation at less rates than it was allowed to charge, and afterwards sued the shipper to recover and did recover the difference between the rate that was charged and the rate that should have been charged, the judgment in that case was a bar to a subsequent action by the shipper to recover from the company the amount he paid under the judgment upon the ground that the company practiced a fraud upon him in charging him a less rate than it knew it had the right to charge, thereby inducing him to enter into contracts that he would not have entered into except for the deception practiced by the company in giving him a lower rate than he was entitled to.



RAILWAY REVIEW

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SATURDAY, JANUARY 31, 1914.

The general uplift in the iron and steel industry now in progress is only a return to normal conditions. The anticipations of a return to an output of 90 to 95 per cent of capacity are not unreasonable. Perhaps at no time in the history of steel has as much repair and readjustment of productive capacity been made as in the past three months. Tariff and currency issues have been adjusted. Peaceful adjustment of so-called trust problems is in sight. A favorable adjustment of freight rates can be discounted. Investment capital is fretful of restraint. A broadened vision has come to legislators and people. A cold and impartial survey of the outlook warrants confidence and assurance that the steel industry will grow beyond present calculations during 1914.

The Michigan "blue sky" law, which imposed stringent regulations upon the sale of securities within that state, has been declared unconstitutional in a decision handed down by the federal court sitting at Detroit. The decision is unanimous and very sweeping. The court in rendering its opinion said it is an act beyond the police power of the state, is in violation of interstate commerce and does not come within

the "due process of law" provision of the United States constitution.

The Michigan "blue sky" law became effective August 15, 1913, following the tide of similar legislation passed in sixteen other states. It was actively opposed by the Investment Bankers' Association of America on the ground that, while professedly aimed at the indiscriminate sale of fake stocks and bonds, it imposed unnecessary and unreasonable restraint upon the sale of the legitimate securities upon which the prosperity of the railroads and every other branch of industry depends. Under this law the state was given power to hold up sales of bonds for 30 days. One other objection was the power given the state to inspect the books of the bond house rather than those of the issuing corporation.

Upon the day the law became effective the association, through A. B. Leach & Co., N. W. Halsey & Co., Continental & Commercial Trust & Savings Bank and Lee, Higginson & Co., was granted a temporary injunction restraining the Michigan Securities Commission from proceeding with the enforcement of the law. The decision is far-reaching in its effect upon the bond business of the United States, and, it is stated, determines the right of a state to regulate the business of a bond house outside of a state to do business in the state.

After a sharp decline in the popularity of compound locomotives in England, France, Belgium and Italy, the attention of motive power officials in these countries is again turned to the advantages of the compound as developed in recent exhaustive trials on the lines of the Paris, Lyons & Mediterranean Ry. In 1900 this road had constructed a number of thoroughly modern four-cylinder simple Pacific type superheater locomotives whose performance has been matched against that of an otherwise similar design except that in the latter case the compounding principle was employed. The results of this protracted experiment are reported to have been favorable to the compound, both as regards economy and smartness of performance, to such marked extent that the above road now regards the four-cylinder simply as an obsolete type and is introducing the compounds in large numbers to take care of the service that the simples might otherwise have been expected to perform. The compounds are credited with a saving of upwards of twenty per cent in fuel while at the same time handling ten per cent heavier trains, and that at higher and more uniform rates of speed than is possible with the non-compounds.

While the indications are that renewed interest will be taken in compounding abroad because of the above mentioned demonstration of its possibilities, the value of the lesson to American locomotive designers under present conditions of American practice is largely lost for want of comparison as between two cylinder simples rather than with those of the four-

cylinder variety. While we are gradually introducing complications in locomotive design, mainly however as regards what may for the time being be regarded as accessories, and will doubtless in time learn to master others for the sake of the advantages which they may bring with them, we are justly chary of the multiplicity of parts characterizing French design, and are learning also to regard carefully the possibilities of excessive internal friction which are sure to accompany intricate design,—at least as we are now forced to practice it. That the French are able to make this venture successfully, employing, as they have, two complete sets of valves and valve gears with the many other refinements for which they are famous, in proportion, should serve to place them in an even more conspicuous position in the field of railway mechanical engineering than the one which they already hold.

The United States Supreme court rendered a decision, on January 26, upholding the Interstate Commerce Commission's order requiring transcontinental railroads to permit California orange shippers to pre-ice and pre-cool their fruit going to Eastern cities, and limiting the charge for the use of the cars during the pre-cooling stage to \$7.50. The history of this controversy goes back several years. With the development of the practice of pre-cooling fruit cars as a preliminary to transcontinental shipment, a controversy arose as to whether the railroads would permit shippers to ice the fruit cars, or whether the railroads could insist upon performing that service themselves as an incident to hauling the fruit. The Interstate Commerce Commission held that pre-cooling and pre-icing by the shippers was a matter of preparation and not transportation, and required the railroads to permit the shippers to perform that service if they so elected. The specific order in the case commands the Santa Fe and other transcontinental roads to restore to California fruit shippers the privilege of refrigerating fruit prior to its shipment. Justice Lamar read the present opinion of the Supreme court, which was unanimous. The record shows that the fruit shippers have a method of icing, or pre-cooling, carloads of fruit for shipment which would save them about \$54 on each car shipped across the continent. The record also shows that about 20,000 carloads of fruit, to which the order will apply, are annually shipped in the warm seasons.

The Industrial Tracks Decision, Precept and Example.

A decision rendered this week by the Interstate Commerce Commission in the matter of allowances, division of rates and other special privileges granted to industrial or plant lines, has received great publicity, because of certain comments in it relating to the pending five per cent rate increase case. The decision holds all such arrangements to be discrimination in favor of those industries which are big enough and so located as to be able to build these plant lines,

and against those industries not having such facilities. It therefore, holds them to be illegal and that railways parties to such methods (including the admission of industrial lines to the benefit of the modified per diem agreement) are dissipating their revenues. It rightly says, also, that railways should conserve all of the revenue to which they are justly entitled under existing rates, before seeking to obtain higher rates.

The decision estimates that about fifteen millions of dollars a year is wasted by railways on these contributions of money and service to favored shippers. We do not understand just what territory this estimate covers, or whether it is general or limited only to the iron and steel and related industries forming the subject of this investigation. It is definitely stated that the Pennsylvania road paid ten steel plants \$1,019,910; the New York Central paid twelve industrial railways \$660,057, and the Baltimore & Ohio paid \$530,317, during 1912.

Of this decision it may be said that it is a welcome relief to railway managements. They will be glad to be forced to discontinue the business and to conserve all the revenue due them for taking the traffic at "the reasonably convenient point of interchange between their rails and the tracks of industries". No one of them can voluntarily and by itself cut off such existing arrangements without losing enormous traffic which it cannot afford to spare. It will be remembered that insurance agents were not particularly unhappy over legislation which prevented them from sharing commissions with insured. It was not consideration for the manufacturer which perpetuated these practices, which are now for the first time declared to be rebates, but a feeling and knowledge that some other road was willing to take the business over at any time.

These practices were, as Commissioner Harlan says, built upon the theory that these industrial roads were, not simply part of the plants which owned them, but a part of the general transportation system and servants of the shipping public. When the arrangements now condemned began they were not illegal nor in fact were they criticised—seeing that it has taken the commission many years to get around to this action. They were, in fact, looked upon as good business. The industry secured better service and the railway company was considered also to be benefited by the prompt handling of large traffic and relief from building sidings at its own expense. Competitive influences came in, and shippers avail themselves to the utmost of every advantage of that kind. Traffic is the railway's most sensitive point. It must have it, and will yield "everything that the law allows," to get it.

Thus there grew up a system which developed into a parasitic growth, which it requires a surgical operation to prune off. The railways will be glad to have it thoroughly eradicated root and branch; and if this is done they will all be benefited except the owners

of the industrial lines which will then become simply shop facilities instead of being, additionally, large money makers.

Another welcome thing to the railways would be legislation giving the Commission power to put up rates; and its then getting a boosting lever under sugar, flour, packing house and smelter products, and any others that on account of complex conditions are too low compared to the general rate structure; and have defied every effort of the railways themselves to put them up. This would give the roads about as much more additional income as the abolition of industrial road privileges. But the two combined would not increase revenues above two per cent and on many roads not at all. The roads in the Central Freight Association District would receive mighty little relief, for instance.

The Commission may never have that power to put up rates. There is the possibility that their industrial track decision may help some roads about one per cent. That ought to have no bearing on the pending case for advance in rates. The five per cent asked for is insufficient. The roads need all the other help the Commission can give them, even if it comes with caustic criticism. If the scalpel can help them as much as better nutrition, they want both.

"Instead of granting an increase of rates to railroads in official classification territory, the Interstate Commerce Commission is preparing to give the railroads some kindly advice, to point out how they can meet their financial needs, whence they can increase their revenues, and in general how, by a different kind of business management, they can put their finances on a satisfactory basis without a general raise of rates."

The above statement heads an article on the decision in the industrial railways case sent out by a "news service" at Washington, and has the appearance of being an "inspired feeler." That is, it is put out by some one in close touch with the administration or connected with it to test public sentiment as manifested in newspaper or other comment. The practice was common during the Roosevelt administration and seems to have come into favor again.

The article itself states that Franklin K. Lane, secretary of the interior, who is known to be very close to the President, has been impressing the view indicated in the quotation upon the Interstate Commerce Commission. If it is true that the administration is endeavoring to influence the decision of the rate case, it is time for the business interests of the country to bring to the attention of the President their attitude on this subject at this time. Public sentiment is overwhelmingly in favor of granting the increase to the railways. We do not believe it can be influenced to change its position by the comments in the industrial railways case decision, the report of the investigation of the St. Louis & San Francisco case, nor anything else of the kind put out while the rate case is pending. The business public is too intelligent to be led to be-

lieve that the "Frisco" matter has anything whatever to do with the general railway situation; or that the industrial railways and tap line subject ought to have anything to do with the general rate case.

Since the above was written some facts made public by President Rea, of the Pennsylvania Railroad, put a very different aspect on the industrial railway case from that presented by the comments of Commissioner Harlan which have been published everywhere. The fact is that the whole matter was brought to the attention of the Commission *by the railways and the industries involved*, three years ago with the suggestion that, as they saw no method of solving the questions involved, the Commission should "abolish all allowances for the performance of this service." There was and had been no secrecy, the rates comprising these allowances had been published and were on file with the Commission. These facts cast considerable light upon the situation and certainly will not lead fair-minded men to believe the railways should be penalized by denying them just rates.

An ounce of example is worth a ton of precept. The government is professing to act as a schoolmaster to inculcate and enforce business honesty. When it condemns with scathing language the arrangements which permit large interests to absorb railway earnings, the minds of the knowing ones naturally revert to the Government's own actions in postal matters. It has been underpaying the railways for carrying the mails by about fifteen millions of dollars a year as compared to what the railways receive from other customers for equivalent service. This is a governmentally enforced discrimination—just such as the large industries have forced out of railways by their plant tracks or industrial roads. "What is sauce for the goose is sauce for the gander." The government should keep "clean hands" as well as requiring theme of the governed.

In addition to this the government is taking many more millions from the railways by refusing to pay them for carrying the parcels post. If the railways were dealt with justly by the government, there would be another increase of their revenues amounting to twice as much, "estimated conservatively," as the industrial roads have been absorbing under the power of competitive conditions. The Interstate Commerce Commission, protestingly, approved the increase of parcels to fifty pounds; and by the same token, will approve doubling this, when the Postmaster General gets ready to ask it. In other words, the government is doing just what it orders others not to do, and with less excuse.

The Private Car Line Inquiry.

Hearings in the inquiry which the Interstate Commerce Commission is making into private car lines, continued in

Chicago, this week. Representatives of Morris & Co. and Swift & Co., packing firms, freely offered testimony, taking a position in marked contrast to that of the Armour Car Lines, who the week before had refused to admit the jurisdiction of the commission. Harry L. Osman, superintendent of the car department of Morris & Co., said on the witness stand: "We earned only 4.71 per cent on our investment in refrigerator and other cars during 1912. If Morris & Co. could obtain anything like a fair sum for its private cars it would be glad to turn them over to the railroads." Charles M. Secrist, manager of the Pacific Fruit Express, which is owned by the Union Pacific and Southern Pacific railroads, told of profits amounting to \$1,500,000, during 1912. The immense profits were possible, Mr. Secrist said, because of the through transcontinental hauls and the fact that the company owns its own icing stations, which in themselves paid a profit of \$600,000. The big profit, he thought, would be reduced if the rate of depreciation was reduced from 8 to 6 per cent. The company owns 13,000 fruit refrigeration cars.

J. W. Archibald, of Jacksonville, Fla., president of the Dairy Shippers' Despatch, told the commission that his company, under its contracts with railroads, had been receiving a mileage rate and a commission of 12½ per cent on business solicited for the rail lines. He asserted that in his opinion such a dual system of payment was necessary. "It is an absolute impossibility for the short lines to own and operate their own refrigerator cars," said Mr. Archibald on direct examination by George P. Boyle, attorney for the commission. "We can show by our records that as a result of soliciting by our representatives the dairy products shipments have increased in Illinois, Indiana and Ohio more than two-fold in the last six years. We received the regular mileage rate for our 650 cars and also a commission of 12½ per cent for business we obtained. With this dual system we realized about 7 per cent on the investment."

J. A. McNaughton, traffic manager of the Cudahy Packing Co., testifying on Wednesday, asserted that the packing companies which own their own icing stations are able to save approximately \$2.50 on every car sent from Chicago to New York. He also stated that in his opinion the icing charges were at present too high and that the amount of ice charged to the shipper was never really put in the cars. "There can be no doubt but that the railroads should operate the icing stations as a matter of public policy," said Mr. McNaughton. "Under the present system, where the packing companies operate the icing plants and the railroads merely act as clearing houses through whom the shipper pays the charges, there are several things which are unfair. In the first place, the packer who owns the icing station is enabled to give his own shipments better icing than is given those of competitors. We believe that frequently the amount of ice charged to us was never really placed in the bunkers of our cars. Under the present system, however, there is no check to enable us to tell just how much ice was placed in our cars. For instance, at the Altoona icing station, which is owned by the Armour people, they do not even weigh the ice. The amount is estimated and we feel that the amount is estimated too high." Mr. McNaughton stated that his company owned 1476 refrigerator cars and 135 tank cars. These, he asserted, were operated at but a slight profit and that his firm would be willing to sell the equipment to the railroads, "for a fair price, provided they in turn will agree to furnish as many cars as may be needed."

Asked if he considered the plan to "pool" the ownership of refrigerator cars a good one, Mr. McNaughton said: "I do not. In order to form one large corporation to take over the refrigerator cars it would be necessary to organize an \$80,000,000 company. Men do not form concerns of this magnitude for nothing. It would also do away with competition among the railroads, and it would thus handicap the shipper. I think this move would be a bad one."

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Railway Employees Accountable to the Public.

"More and more is the public assuming the position that the railroad and certain other forms of business have a quasi-public character. The public is also waking up to the fact that if the owners and managers of those quasi-public service corporations are considered quasi-public servants and justly held to a rigid accountability for their every act, so must the great army of employees be considered quasi-public servants and be held to a rigid accountability for their every act. Society in due time must invent some plan that will put beyond all reasonable doubt the ability of the great public service corporations to do the work that they are expected to do, and society must say to labor, just as it has said to capital: 'You have certain responsibilities to the people as a whole that you cannot neglect, and, in some lawful and orderly manner, you must continue to serve society while any disagreements or misunderstandings are being thrashed out before the bar of public opinion.'—Howard Elliott, chairman N. Y., N. H. & H. R. R.

Interests Interwoven.

"Permit me to congratulate you upon the enlightened patriotism of your action of a few days ago as embodied in the Resolution passed by your distinguished and influential body and forwarded to the Interstate Commerce Commission approving and urging the granting to the railroads of the increase in rates for which they are asking. This reversal of your previous ac-

tion on the same subject is evidence of rare courage and farsightedness on your part. It was largely due to your effective protest that the previous application was denied. It would not be quite accurate to characterize your present attitude as entirely unselfish since you must have reached the conclusion, which is shared today by most of us who have studied the subject and want to be just, that unless rates are increased the railroads will have no sufficient basis of earnings to attract the capital that they need to maintain effective service and to meet the increasing demands for transportation facilities. You have doubtless become convinced, as have many of us, that the railroads are not a thing apart. Our industrial prosperity is so interwoven with theirs that the former cannot exist without the latter."—Samuel Untermyer in address to Illinois Manufacturers' Ass'n.

"Water, Water Everywhere, But Not a Drop to Drink," for the Railways.

"In every town and city of our land, and in every farming community, as well as in our mining sections, we have seen men grow rich, and yet no one yells water—water. We see our banks and manufacturing concerns growing rich, and we cry bravo—bravo, what excellent management to pay stockholders 12, 20 and even 60 per cent per annum. Yet we say to the man who invests his money in the railroad, which has to a very large extent created this wealth, 'It is true you put

your money into this property years ago with the hope of receiving handsome returns thereon; but we will not allow you to do so. You must be satisfied to earn not over 6 per cent upon your original investment. If you get any more you are receiving it from "water," which is unjust and robbery.'

"Let us be fair, and say what is good for the goose is good for the gander, or otherwise reduce all of our investments down to a basis of their original cost years ago, and be content to take 6 per cent thereon."—J. F. Holden, vice-president Kansas City Southern Ry.

Details of Operation Should Not be Subjects of Legislation.

"All my study of this question of public service control has increased my belief that legislation involving details of operation should be a matter of last resort. It is too inflexible and cannot allow sufficiently for the varying conditions of service. Regulation by a fair commission is much to be preferred, and such regulation should be founded upon as complete knowledge as possible and following constant efforts to obtain an understanding of the complex conditions involved."—James E. Sague, member New York Public Service Commission, Second District.

Industrial Railway Service Allowances.

PRESIDENT REA'S COMMENTS.

The Interstate Commerce Commission this week gave out a decision regarding allowances in the way of special services and other compensation made to plant or industrial railways. The decision was written by Commissioner Harlan, and direct allusion is made to the five per cent rate increase case. The gist of the decision which is very long is in the following summary:

"The service of line carriers beyond a reasonably convenient point of interchange, between their rails and the tracks of industrial plant railways, is a shippers' service, a part of the industrial operations of the plants, and not a service of transportation, and the performance of such service by the carriers without charge in addition to the rate, and the allowances made by them therefore to industries, or to their plant railways, for performing the services for themselves, are unlawful rebates, in fact, and in effect, and give overdue and unreasonable preferences and advantages to the industries so favored and work undue and unreasonable disadvantage and prejudice to shippers in the same line who do not receive such allowances or the benefit of such services."

As the decision connects itself with the rate case, considerable publicity has been given to clauses or phrases which are critical of the railways. In view of this fact the following statement made public by President Rea of the Pennsylvania, ought to be generally read:

"It should be clearly understood by the public that the decision of the Interstate Commerce Commission published today concerning allowances to short lines of railroad serving industries, does not contain any suggestion that the practices detailed therein constituted secret rebates. The rates covering the allowances by the railroads to these short industrial lines have been published and on file with the Interstate Commerce Commission, and were and are, therefore, a matter of public record.

"The commission itself, in the full opinion, makes this statement:

"It is proper to say that the whole matter was voluntarily brought to our attention by certain of these industries and the line railways which serve them. The demands of plant railways for larger allowances, the increasing number of industries that were incorporating railroad companies to take over the operation of their plant tracks and locomotives with a view to demanding allowances, and the growing volume of complaint against the discriminations arising out of these relations between the line carriers and the industries so favored, together

with certain formal and informal rulings by the commission in other cases, had combined to raise a doubt on the part of the carriers and the industries as to the legality of these allowances and free service.'

"The entire situation was laid before the commission by the railroads and industries involved three years ago, no method of solving the peculiarly complicated questions involved having been worked out by the carriers and the industries, who had for many years previously recognized that a more definite and systematic treatment of the whole problem was necessary.

"In the briefs filed on this subject on behalf of the Pennsylvania, the New York Central, the Baltimore & Ohio, and the Erie Railroad Systems, the following suggestion was made by the railroads themselves: 'The payment of any allowance for the performance of this service inevitably creates suspicion, gives rise to complaints, and the only way to effectually deal with the problem is to abolish all allowances for the performance of this service either by the industry itself, or the industrial railroad.'

"There was no secrecy about any phase of the subject. The effort of all concerned was solely to obtain the assistance of the commission in removing an honest doubt on the part of the railroads and the industries affected as to the proper policy to be pursued."

Senate Passes Alaskan Railroad Bill.

The United States senate passed, on January 24, by a vote of 46 to 16, the Alaskan railway bill, which authorizes President Wilson to purchase or construct 1000 miles of railroad in Alaska, at a cost not to exceed \$40,000,000. The bill confers upon the president the broadest powers, in this regard. It places upon the chief executive responsibility for the selection of the route from tidewater to the interior of Alaska and the construction, equipment and operation or leasing of such lines as he may construct or buy to constitute this route.

The bill appropriates \$1,000,000 outright to start the work and provides that the secretary of the treasury may borrow on the credit of the United States the \$40,000,000 necessary to construct the railroad lines, the government's obligations being issued therefor in denominations from \$20 upward, redeemable in gold at the pleasure of the government after ten years, but payable thirty years from date, with interest at 3 per cent, payable quarterly in gold. Any bonds or other obligations issued under the act are to be open to public subscription and when issued are to be free from taxation at any time. The bill provides for a redemption fund into which shall be paid 75 per cent of all moneys derived from the sale of public lands in Alaska or of the coal or mineral contents thereof. Machinery utilized in the construction of the Panama canal is made available for the construction work.

Fifteen Republicans and Senator Poindexter, Progressive, voted for the bill. Senators Bacon, Hoke Smith and Williams, Democrats, voted against it. Unavailing efforts to reduce the \$40,000,000 appropriation authorized for the work were made during the closing hours of the debate. Senator Hoke Smith sought to have the appropriation reduced to \$25,000,000 and Senator Smoot to \$35,000,000. Among other amendments defeated were the Norris amendment for government steamships to Alaska; the Poindexter amendment for the sale of Alaska coal at cost to Pacific coast points, and the Cummins substitute, limiting the construction to one main line. With the consent of the territorial committee the bill was amended before passage to require the senate's approval of the appointment of civil engineers receiving over \$3000 per annum, to forbid any payment for the good will of existing railways, giving injured employees the right to sue the government and limiting the

government's defenses to those provided for in the federal employers' liability law of 1908. A similar bill is pending in the house.

Development of Young Men for Railroad Work.

By GEORGE M. BASFORD.

In this paper, presented before New England Railroad Club, at Boston, on Tuesday, January 13, the author takes occasion to draw attention to what he conceives to be ruinous neglect on the part of most roads, of the apprenticeship problem. Because of this neglect, he points out that the mechanical departments of our railways have been relegated to positions of lesser importance by those coming into official positions through the operating or other departments, to the very great detriment both of the railways as organizations and their mechanical officers as individuals.

My subject is the "Development of young men for railroad service." To this should be added the same words in reverse order—"Development of railroad service for young men." If the best people of any kind are wanted anywhere the surroundings must be made attractive and kept so. Ask yourselves what are the inducements for your sons to go into railroad service. Do you wish them to go into it? Are you doing what you may to make it attractive for them? Are you doing the right thing by the young men you now have in service? If you were to start over again, as a young man would you take up railroad work? These are pertinent questions, all of which will be readily and satisfactorily answered when the complete significance of the word "training" is understood and its principle is grasped and acted upon by the management of railroads.

It is impossible to understand how the railroads of this country could have shamefully neglected apprenticeship as they have done. This is the industrial equivalent of ceasing to propagate the human race, and leaving the earth to beasts and vegetation. It will leave the mechanical trades to those who have been properly called "wreckers and rag-time mechanics." You are paying a ruinous price for this neglect today, and with worse to come if you do not wake up to the situation facing you. The few roads which are alive to it are like the taper light you carry in the Roman catacombs which makes the darkness the more impressive. What is a paltry group of twenty-five hundred boys provided with modern apprenticeship among seventeen hundred thousand men on our railroads! And yet you all take apprentices and solemnly swear that you will faithfully teach them the trades of your shops. You do not do it. You are actually dishonest with the boys. You do not even provide means of selecting them or ascertaining whether or not they are adapted to the work you have undertaken to teach them. When they have served their time, if you give them full mechanics' wages you do it too late or too grudgingly and you promptly and properly lose the boys. The management then concludes that apprenticeship is a failure and it lapses into a dead letter. Materials, methods and engineering receive incessant attention, while the recruiting and training of men are all but forgotten.

What training does the shop man receive today? What do the fireman, the engineer, the roundhouseman, the despatcher, the yard man, the clerk and all the rest receive? I recently asked a railroad official how, in the absence of apprenticeship, he trained machinists. He replied—"We make them overnight from anything with two hands that come along." It is no wonder that difficulty is found to put up a crosshead fit for a piston rod properly, or even to take down without injuring it. It is no wonder that our locomotives carry around tons of unnecessary weight, because it is impossible for the shops to take advantage of the best engineering design. Is it possible for this railroad official to make mechanics overnight to take

the places of his best men who have gone to the automobile industry? It is not and he knows it.

Every department is suffering because of neglect of this problem. A few years ago everything was small, trains were light and traffic thin, rates were reasonable and there was no such tension as exists now that transportation has become a business. To show what has happened let me refer to the fact that a locomotive soon to be built, will exert a tractive effort of 160,000 lbs., and will weigh 820,000 lbs. This great power in one unit presents great problems. Large units of power are more difficult to use efficiently than were their smaller predecessors. It is more difficult to make them earn the proper rate upon the capital invested. The closest possible approximation to continuous service is absolutely necessary. Terminal service at the roundhouse and the shop must be accelerated. Despatching now assumes an importance that it never had before and that few people give it today. In spite of all this every department is neglecting the training of the men who are dealing with these problems.

No matter how efficient or how well managed the mechanical department may be, no matter how well designed or how well maintained your locomotives are—the power must be used to best advantage and herein lies the field of most promise for effective training. Why not make common cause of a common problem and work it out together? Here is the greatest possible opportunity for co-operation, for a getting together, for co-ordination of effort.

Efficiency experts have criticised the mechanical departments severely, but they have not even aimed at the operation of the units of power. They ask the mechanical department to account for every minute a locomotive is in its hands. Is it proper to do so? But they never ask the despatcher to account for the use he makes of the potential capacity of every locomotive while in the hands of the operating department. Despatchers might be trained to figure out the tractive power hours available for every engine and to know the cost of every hour, whether moving or on sidings. If they were required to explain their use of every hour as the mechanical department is obliged to do, the two departments would understand each other better and would be brought into closer co-operation.

Mechanical and operating officials have everything in common as a problem. Each knows much that the other needs to know. They are too far apart. I believe they may be brought together through training which will produce railroad men and not department men. What a field does the railroad present for progressive advancement and for a study of men to assure absolute certainty of advancing the men most capable of dealing with greater responsibilities! But the promotion is not properly balanced. Who ever looks to the motive power department today for a division superintendent, a general superintendent, a purchasing officer or a general manager? The few exceptions on record simply prove the rule. Why should a mechanical department position disqualify a good man for promotion? But it does.

If recruits had been trained in past years these conditions would not now exist. If railroads had established real apprenticeship twenty years ago the motive power department would now be the source from which to obtain many of the best high officials of every road as it ought to be. This department is overlooked today and largely because of its own fault. The department has not asserted itself and it has neglected its recruiting system. If you had trained boys in the shops some of them would have become firemen, then engineers, then trainmasters, then divisions superintendents and from there an occasional one would have gone to the very top of the organization as president. This would have left plenty of room for other lines of advancement from train and station service. What has happened? The door is closed against the mo-

tive power department. But, it may be opened again. If this department does not heave the anchor of apprenticeship it will soon be on the rocks to stay.

This is the department that brings in the money, because the locomotive earns every dollar that comes into the treasury. Furthermore, if your power is always ready for 100 per cent service, the rest of the operating problem is relatively easy. It must also be admitted that roundhouse, shop and locomotive service offer opportunities to prepare most thoroughly and most admirably for operating responsibilities. It seems fair to assume that an operating officer who first thoroughly understands the possibilities and the limitations of locomotive service and then acquires operating experience will have certain advantages over an operating officer who has grown up only in the operating line from the telegraph key or from train or yard service. To illustrate—a general superintendent who had sometime been a roundhouse foreman would fully understand what it means and what it costs for a despatcher to hold locomotives in the yard, sending them to the ash pit and roundhouse in bunches when he could send them directly from their trains and one at a time. An operating officer who had fired a locomotive would not permit of locating a side track switch or a water tank at the foot of a grade. If despatchers, or the men they report to, knew from experience what a locomotive can properly be called upon to do they would hesitate to put two or three too many cars on trains, overloading the power to the detriment of the service; yet there would be as many cars as the engine ought to haul. A lazy engineer or fireman could not deceive a division superintendent who had first hand knowledge as to what service may properly be expected.

I contend that the efficient service of a master mechanic should be considered as the basis for promotion not only inside but outside of the department. In other fields a man who could maintain and operate 200 locomotives making 2,000 turntable movements every week with but a small per cent of engine failures in winter storms, would be recognized and rewarded. He has 200 individual complete power plants on wheels and scattered, to care for and keep in perfect condition. These 200 locomotives represent perhaps a \$4,000,000 investment, not to mention investment in shops, coaling stations and roundhouses, and they aggregate 300,000 h. p., which is a greater aggregation of power than is concentrated in the New York Edison Water-side electric power station in New York city, the largest power plant in the world, and yet this master mechanic is likely to receive less compensation than a locomotive engineer who has a favorable run and, furthermore, he is not sufficiently encouraged by the prospect of promotion. The development of men for railroad service would be much easier if this man could be so encouraged, because it would render mechanical positions more attractive. It would cost the railroads and the public nothing to open the door for these men. A little prospect for advancement would go a long way to lead them to overlook deficiency in compensation, if compensation may not be increased.

Consider how roundhouse foremanship is misunderstood, how it is misused. Too little consideration is given to this important official, yet if he is a good one and can keep his locomotives moving under adverse conditions, for example in cold weather, he must necessarily exercise qualities of the character that make a general manager. If there is a position on the road that ought to be considered as a stepping stone to a better one it is that of the roundhouse foreman. Ask yourselves whether you would like to be a roundhouse foreman under conditions prevailing on most railroads today, with machinery, men and facilities lacking. Ask yourselves the reason. If you have ever seen a motive power officer promoted to the position of general manager you have seen roundhouses built and equipped so that men could do efficient work in them with money made thereby and you have seen good roundhouse foremen promoted. You have also seen these men give a good account of themselves. The

roundhouse foreman can never have his job sweetened enough to be comfortable because of its inherent hardships, but if effective service should be recognized as a basis for promotion and the roundhouse made a stepping stone in a system of training for something better, an important part of this paper need not be written. Training must not stop with so-called young men. Training, as I see it, involves the use of one position as preparation for a better one, and therefore should be an established principle in promotion.

We often hear how difficult it is to find foremen of high quality for various shops. Apprenticeship is the remedy, but not until foremanship is understood, not until the foreman is paid at least as much as an active pieceworker in the shop. Foremanship does not attract the best shop men today. Much complaint is heard of the difficulty in securing good firemen. Whom do you try to secure and who selects them? It was surprising to hear a railroad official make this statement before the Western Railroad Club recently: "It is too bad that in some cases men have been hired as firemen by the clerk of the road foreman. In other words, a man untrained has been permitted to select the man on whom you must depend to pull your fast trains 15 or 20 years hence." Of course this is exceptional, but that it ever occurs is important in this discussion.

An occasional strong, ambitious lad who had served his apprenticeship in the shop, would seem to be the very best candidate for this service. You would have known him for several years. The pay would attract him and he would take up the work with thorough knowledge of the locomotive which few young firemen now possess. An apprenticeship for firemen, however, is needed to take care of the other recruits for this service because comparatively few could be had from the shop boys. It is easy to imagine that a shop apprentice who becomes a fireman and then an engineman might reveal executive ability justifying his promotion to the position of traveling engineer or roundhouse foreman—but can he afford to be promoted after running an engine? We therefore see that progress here is blocked as it is for shop men as to foremanship. No one can doubt that here is something to be changed before improved methods of recruiting and training will be effective.

To return for a moment to the shop and directly to apprenticeship, ask yourselves where the boiler maker foreman and the boiler makers of the future are to be had. How many real boiler makers are you training? Boiler work constitutes the larger part of locomotive repair expense, and yet who has any boiler shop apprentices? Even the roads having the best apprenticeship schemes have very few of them. What are you doing about this to attract boys of the right sort to this vitally important trade? The right sort of boys will not take their chances in a boiler shop today. You yourself would not. For the best of reasons you would not willingly allow your sons to do so. Then look a moment at the office clerks. Poorly paid armies of clerks might perhaps be replaced by a smaller number of better paid ones if they were trained in their work, but who ever seriously considered the training of clerks? This field offers an opportunity that is going to waste.

Someone may ask what apprenticeship should be. The apprentice problem is very simple. For the shop it should be the old time apprenticeship brought down to date, changed and improved to meet present conditions. Several essentials must be provided:

First is the training of the hand, eye and judgment in the shop by men who have no other duties. The course should be short, active and thorough to render the boys good, quick, accurate and intelligent workmen, and good citizens, in the shortest possible time. Three years of intensive training is sufficient for the course itself. The shop training must replace the "master" of the past by a bright shop instructor who will personally teach the progress of the trade he himself commands and who will see to it that the boys of other trades are properly and con-

sistently taught by competent men and methods. The boys must be taught direct and correct methods and they must understand the value of time and material.

Second is mental training coincident with the manual development. This means night schools or day schools conducted by men who understand the shops and who can show the boys how to educate themselves. These schools are to unfold the reasons for everything done in the shop and to lead the boys to look back at preceding processes and ahead to the processes which are to follow and to enable them to understand the materials, processes and forces with which they are dealing and to conduct their work without waste of energy, of time, or of material. Few men in the shop think of the cost of the work they do. If they did they would effect great savings. This is an important part of the school work. Boys in a year may know many things that their foreman required many years to learn and which some foremen have never learned. For instance, our boiler shop apprentice will know how to design boiler seams. I know of a capable foreman who recently reduced the strength of a joint below safe limits believing that by putting in a surplus of rivets he had made a strong repair job.

Third and most important is the personal responsibility over the boys centering in one man, the apprentice supervisor, whose duty is to know and understand them. He must know the boys intimately, thoroughly understanding their capabilities and their personalities. He must know them better than parents usually know their boys and be able to guide them in all the affairs of young manhood. He must know them well enough to guide them into the right work, and he must have natural ability as an educator so that he can deal with each personality in accordance with its peculiar needs and its own peculiar possibilities. This man must know the essentials of the makeup of a machinist, boiler maker, pipe fitter, millwright, pattern maker, carpenter, fireman, clerk and all the rest. With this knowledge and with great care he must help the boys select their work and guide them in such changes as may be necessary. He must be able to adjust misfits which are sure to be found and must interest all the foremen in the boys. He must also be a man of high moral character, one with a personality that will enable him to influence the boys and lead them to be honorable, upright men. He must have that enthusiasm that makes work of any kind successful. He must reveal to the lads their duty to themselves and to the country. A good citizen is likely to be a good workman, and a good workman is likely to be a good citizen. You will say that these specifications are very severe and that it is difficult to find such men. The answer is that the fact that it is so difficult to find such men in itself reveals the weakness of present methods and the need for an awakening. The man who can do such work properly and who can exert this influence continuously will prove to be one of the most important subordinate officials of the whole railroad organization. A few such men are available and more are coming along.

Is your organization qualified to receive and retain apprentices when through their time? If not, as I have endeavored to show, you have a great work to do before you begin to talk about training young men for railroad service. Do you encourage capable young men and do you have automatic means whereby able men will reveal their qualifications for promotion? Do you promote men and thereby encourage your subordinates or do you import strangers when you have good places to fill? If you can not answer these questions look up the plan for studying and recording the characteristics of men, which was so successfully introduced on the Lake Shore & Michigan Southern Railway (see *American Engineer*, December, 1908) about five years ago by Mr. Le Grand Parish. Does your president give it out as a basic principle of organization that every officer on the road must train and otherwise educate his own successor? Progressive promotion presents a problem, but until it is solved or partially solved it is fruitless to consider recruiting systems. The best possible recruiting and training

methods will fail if recruits, however well trained, are brought up against continual discouragement.

Your office is not what it should be, neither is your shop or your drawing room if it leads to blind alleys from which there is no promotion and no outlook. You must find outlets, or the equivalent, for capable men in every department. If not outlets then you must find ways in which able men may so improve their work that they will not cease to grow, expand and become more able, more valuable to the company and to themselves. Railroads and industrial concerns are not thinking of this today!

It is high time the truth were told concerning the railroad motive power situation in this connection. I hope to live to see the day when railroads will offer the attraction of happy conditions to induce good, strong, capable mechanical men to be willing to spend their lives in preparation for leading positions in this department. I know many railroad officials. I know very few heads of mechanical departments who are happy in their work, happy because their problems and conditions are understood and appreciated, and because they see anything but trouble ahead of them. One of the very best of them is about to quit because he is not understood by his superiors. Of course he ought to make himself understood as a railroad officer and he is to blame to a large extent because of taking too small a view of his own position. When he goes not only that road but all the roads in the country will suffer the loss of the experience, knowledge and good judgment that that man spent twenty-four years to accumulate. Where will that road look for his successor? That management will follow the usual custom and seek a man who will be a stranger to the management, the men and to the conditions of the road.

This motive power officer told me that he was sick of being considered as a necessary evil. He was tired of unintelligent "rawhiding." He was tired of trying to educate the chief clerk of his superior officer in locomotive matters. He told me he had written the equivalent of a library of books constituting a liberal education in locomotive design, maintenance and operation in answer to the proverbial "Please explain" letters of this chief clerk. He was tired of having the management ignore him and of having questions involving his department decided by men who did not understand the department and who would not take the trouble to consult him. Do you blame him? There are many others who feel as he does. This man, however, does not need your sympathy. A vice-president's title and salary in a big concern are waiting for him. Pity the railroads that they should lose such men when they are in the prime of knowledge, ability and experience, and from the department where these qualities are today so vital.

We must take a leaf from the book of English roads. English motive power men do not quit as ours do to double their salaries in the service of industrial concerns, in positions where they are not worried to death by troubles that they know how to prevent, but are not allowed to guard against. On the larger English roads the chief mechanical officers receive salaries approximately twice as large as the largest in this country. On some English roads the chief mechanical superintendents deal not with officers who do not understand them and their problems, but with committees of the directors of the roads. No wonder those mechanical officials remain in the service until relieved upon retirement. No wonder subordinate officials are willing to spend their lives hoping to succeed to such positions.

Today the locomotive and its operation offer greater possibilities for improvements in net earnings than ever before in the history of railroads. Today the locomotive presents problems as well as possibilities requiring knowledge, experience and good judgment that were never required before. Today is the day for improvements in the use of fuel, for fuel saving devices and capacity increasing factors in locomotive design, for improvement in service and for improvement in equipment

and methods for maintenance, and for the training of the men of the future. Will the railroads measure up to their opportunity? An entire evening would be required to tell of the accomplishments in improving locomotive service in spite of unfavorable conditions. What would the results have been with favorable conditions!

Apprenticeship has made good where it has had half a chance, and it has had a chance on a few progressive railroads. It is not a failure. Its value is established beyond a question. The only failure has been a lack of backing. The only trouble has been in educating the managements to what they ought themselves to know to be their duty. It is fruitless to start apprenticeship unless the very head of the organization plants himself squarely for it, insisting that every one get in line and stay there. If he does this no subordinate will dare ignore it, simply because he is looking only for the things of today. The world will not long excuse neglect of apprenticeship and that which goes with it, and this applies to every department.

A great weight must be taken off the mechanical department from within and from without. Because years will be required to accomplish this there is no time to be lost. These arguments are supported by proof that the underlying thought of this appeal is possible of accomplishment. The United States navy has proved it in its personnel plan whereby line officers are compelled by education and experience to know first hand and to understand their motive power problems. Some of our railroads will soon prove the rest of my argument if they persist in their uphill fight for real recruiting and real apprenticeship. Not until railroads provide proper methods of recruiting for all departments and not until adequate methods of training these recruits, and not then until the organizations are prepared to receive and properly provide for retaining competent, able and ambitious young men, will the railroads begin to climb out of the personnel difficulties in which they are now submerged.

Boat Lines Must Provide Refrigerated Service.

The Interstate Commerce Commission has rendered a decision in a case in which certain steamship companies operating boats on the great lakes between Buffalo, N. Y., and their western termini, recently issued supplements to their tariffs adding to the list of commodities not accepted by them for shipment, butter, eggs, fresh meats, and live or dressed poultry. Such supplements were suspended by the commission pending investigation as to the reasonableness of these prohibitions. The commission now holds that the request, made upon the respondents to provide transportation for butter, eggs and dressed poultry is reasonable, and that their refusal to provide such transportation in the past for such articles was unduly prejudicial and disadvantageous. Incidental to consideration of the question, the commission in the decision, offers the following discussion:

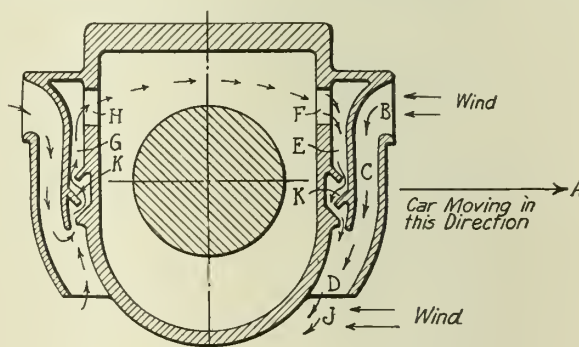
"The people of the United States have expended many millions of dollars in improving and safeguarding navigation on the great lakes. The railroads should not be permitted to make it useless nor the boat lines allowed to shirk the public duty which their use and enjoyment of these improvements impose upon them. While there doubtless are articles which these respondents should not be forced to carry, butter, eggs, and poultry do not fall within that class. The possible volume of traffic may not justify the installation of proper refrigeration equipment on all boats. We believe it fully justifies the experimental equipment of some of them. It has been suggested that such experiment might be made with the three passenger boats of the Anchor line, which now operate regularly on published schedule. It would also seem possible that experiment might be made by equipping a few of the boats of each of the lines serving Lake Superior and Lake Michigan ports to operate under an arrangement of regular

alternate sailings from ports of each lake so as to permit of the service of one boat on as many consecutive days, or with as brief intervals between sailings, as possible. We shall not attempt to lay down a definite plan, believing that this may better be left for consultation and arrangement between the operating officers of the lines concerned in conference with the other interested parties. Such plans may be submitted to the commission. There is good reason to believe that the boats equipped will find the business more profitable than what they now carry in the same space. A careful record should be kept in order that definite knowledge may be had with respect to the future extension of the proposed facilities."

A Ventilated Journal Box.

The form of journal box depicted in the cross-sectional illustration herewith was developed as a result of observing the practice of an experienced engineer in slightly blocking open the journal box lids on his locomotive tender journals for the purpose of lessening the liability to hot boxes through keeping them well ventilated. An explanation of the method by which the ventilation of the box is brought about is as follows:

If the car or box is moving in the direction as shown by the arrow A the draft caused by train movement or otherwise will enter the opening B, pass down through the outer port C and discharge at bottom of port D. This in turn causes a partial vacuum in inner port E and through vent F, creates the partial vacuum inside of the box. As nozzles



Ventilated Box to Prevent Hot Journals.

are located on both sides of the box the heavier atmosphere pressure on the outside of box causes a moderate flow of cool air into box through port G and the vent H on the rear side of the box. The draft past the opening at J tends to increase the vacuum in inner port E. The baffles K are inverted in inner ports to act as a check or stop to any foreign matter such as cinders, etc., which may tend to enter the passages E or G. It is the purpose of this system of air vents when the train is running to cause a continuous flow of air to pass through the box and directly around the journal and bearing, keeping same cool and at the same time preventing the ingress of dirt and other foreign substances.

The patentee of this device is G. E. Crist, Sparrows Point, Md.

The Interstate Commerce Commission has asked congress for an appropriation of \$2,000,000 to be used in the division of valuation, for the purpose of expediting the work and continuing it through the coming year.

The South Dakota law making railroads liable for double the amount of loss sustained by property owners through fires originating from locomotives, unless the loss was paid in full in sixty days, was annulled on January 26 by the

United States supreme court as violating the fourteenth amendment.

Railway and Engineering Literature.

The November, 1913, issue of The Safety Heating & Lighting News, the house organ of the Safety Car Heating & Lighting Co., 2602 Rector street, New York, contains a complete index of the three volumes of this attractive publication that have been issued since its inception in 1910. The firm retains a limited supply of back numbers of this periodical and announces its willingness to supply missing numbers from its files to patrons upon request. A study of the index discloses many articles of real value both to the operating officer and to the car lighting engineer.

* * *

Beginning with the Jan., 1914, number, the Journal of the American Society of Mechanical Engineers will be enlarged to the popular trade journal size, 9 by 14 ins. and the practice of publishing papers in advance will be discontinued. Instead they will be published immediately after presentation, together with the complete discussions that may have been offered thereon.

* * *

The Q. & C. Co. has just issued a handsome catalog in colors, of its "\$5.00 Deraill." This deraill consists of one steel casting and two eye-bolts. It is made in lefts and rights and may be connected to interlocker, switch stand, or thrown by hand. It is economical, and the illustration in the catalog show its effectiveness and just how it works.

* * *

The Track Supply Association has published a neat little pamphlet giving the addresses made at the dinner of the Roadmaster and Maintenance of Way Association of America, in Chicago, on the occasion of the annual convention, September 11, 1913. These talks are worthy of preservation in their permanent form. There is also given a list of exhibitors and members, and of the officers of the association. The next convention will be held at the Auditorium Hotel, Chicago, September 7-12, 1914.

* * *

"The Carnegie Pocket Companion" is too well known among users of structural steel to demand any very extended notice. It is sufficient to say that the present edition represents fully the present status and the most approved methods in the art of steel construction. The first edition, issued in 1876 in connection with the Centennial Exposition, was gotten out by Carnegie Brothers & Co., then proprietors of the Union Iron Mills at Pittsburgh, which is now one of the units of the present organization

and the first of the mills rolling structural shapes. It dealt exclusively with iron. The last previous edition of the Carnegie Pocket Companion was issued in 1903, or, roughly, ten years ago, and represented the status of the art at that date. It had a very large distribution, some hundred thousand copies, and was generally found in the offices of engineers and architects. This book contained profiles of practically all the shapes then manufactured by that company. In the ten years which have elapsed the company has turned its attention to the manufacture of a diversified line of products, and it is no longer practicable to include in one publication all of the various shapes now made. In the present publication, therefore, only those rolled shapes are illustrated which are deemed most suitable for bridge, building, car and ship construction, and the tables given are intended for users of material entering into such constructions only.

The book has been re-written from beginning to end, and users of the fifteenth edition, 1903, will note many changes, the principal of which may be indicated briefly as follows: The inclusion of the American Society for Testing Materials' standard specifications for structural and other steels and the American Bridge Co.'s specifications for workmanship. The insertion of a line of light weight beam sections from 8 to 27 inches, inclusive. The addition of tables and data on concrete reinforcing bars. The extension of the tables and formulas on elements of sections. New treatment of the subject of stresses in beams. New flexure formulas and the computing of the safe loads of beams, channels, angles and tees on a basis of 1000 pounds instead of tons. The addition of tension value tables for angles and bars, and new treatment of grillage foundations. New tables for beam and plate girders, columns and struts, the latter including beam columns, channel columns and plate and angle columns, with the omission of the zee bar column which is no longer in extensive use in building construction. The data on floor construction is new and covers terra cotta arches as well as reinforced concrete. The data on roofs and roofing has been extended to cover various forms of trusses in current use, and is followed by tables giving safe loads and unit stresses for timber beams and columns. Especially complete are the pages covering weights and measures, which include convenient metric conversion tables on a new basis.

While as compared with the 1903 edition this book contains only some 80 pages additional, owing to the omission of certain profile pages, the increase in the size of the page, and the condensation of the material, the amount of engineering data contained in the book has been practically doubled. The present publication is printed on a thin, opaque paper of a carefully selected tint, and reflects a great deal of credit from a typographical standpoint. Copies may be had by draftsmen, engineers and others at the price of \$1.00 per copy on application through any of the offices of the company.

The Railway Supply Man's Point of View

The Current News of the Industry.

Railway supply salesmen should be posted. If the railway officer finds he is talking to a man who doesn't know what is going on in the railway and manufacturing world, he is not open to conviction by that man's talk. Many railway supply men seem to read everything but what appertains to their own business. They are surprised constantly by "news" that is really old. The slight investment of time required to read promptly the railway papers, will yield large returns.

The salesman of today makes a success not only because of his ability to present sales arguments pleasantly, but because he has a knowledge whereof he speaks.

The old type of salesman was a man who, because of natural disposition, was enabled to meet his fellow men in a way that was pleasing and entertaining. Any one of us could easily call to mind a salesman of a quarter century ago who had a smile for every one and a story for every occasion. Knowledge of what he sold was not necessary. It was personality and persuasiveness, and not expert knowledge of the thing sold, nor of the conditions under

which the thing sold was to be used. True, such salesmen are with us today, and there are certain manufacturers who make it a point to hire men who know absolutely nothing about the thing they are to sell, with the idea that their natural ability will take care of them. Undoubtedly a pleasing personality influences sales to a certain extent, and the manufacturer who employs such a man is right to a limited degree.

However, the buyer of today is looking for something besides persuasiveness and suavity on the part of a salesman who presents a product to him. He is looking for some one with an expert knowledge in that particular industry, who can help him solve his problems. The man who knows is the man who sells. This is right, and it should be.

With this change in salesmen, from a matter of personality to one of knowledge, has come also the salesman with a pleasing personality and with a narrow knowledge—a knowledge limited exclusively to his own particular line—so limited in fact that it is impossible for him to see or appreciate the attitude of the man on the other side of the desk, who wants to buy what he wants to sell. This latter

salesman is not much better than the old type. The modern buyer buys not only from the man with a pleasing personality—not only from the man who knows his own narrow line, but from the man who is broadly informed as to problems and conditions in the broad business field in which the buyer is operating.

This brings us to "The Current News of the Industry." Nothing is of any greater importance to the railway supply man than a thorough knowledge and understanding of current events, current problems, current practices, and current news of his own industry and the industry of the man to whom he sells. To be able to sit down and talk intelligently with a railroad official, not only of one's own product, but of his product in relation to other equipment that is used by a railroad; to know generally how such equipment is handled and used—this is what interests the man who specifies or buys railroad appliances. More than this, a knowledge of the problems which confront the railway officer is peculiarly advantageous to the railway supply man. Between the railroads and the manufacturers of railway equipment there exists naturally and necessarily a community of interests, and the railway officer finding a railway supply man well informed on all the topics of the day pertaining to railroading is very naturally inclined to discuss them with him. This leads to a better understanding; leads to friendship; leads to the railway officer placing more implicit confidence in what the railway supply man may have to say, and also what he may have to say about his own manufactured product.

There are many ways in which railway supply men can keep posted as to the current news of their own and of the railway industry. Getting out and mingling among other manufacturers and railway officers; attending club meetings, conventions, and exhibitions—are all of them a big help in this special direction.

There is, however, a very sure and certain way of keeping in touch with things as they happen, which is oftentimes overlooked by the railway supply man, and is overlooked by him more often than by his good friend, the railway official. Railway officers as a general rule are pretty well interested in the railway papers to which they subscribe. If they do not have time to go over them personally, the work is delegated to some subordinate who reads and marks for their personal perusal, matters of importance as they are published from week to week in the leading railway journals. This is not so true of the railway supply man. We might just as well admit it. We do not as a class read the publications in our own trade as carefully and as regularly as we should. In them is collected and condensed all the important news of the day, and everything of value and interest to railroads generally is found in their pages some time during the year. The subscription price to a trade publication or to a number of them is not a large item in the expense account of the railway supply manufacturer; the time consumed in perusing them from week to week would not cut into his unoccupied hours to any very great extent, and the value to be derived from the regular reading of any railroad paper is very apparent, and its results would be felt directly in its effect upon his own business.

Of course success in any field of endeavor is possible without reading—that is, with very little reading. There are ways of getting along, and getting information and keeping posted without reading anything—not even a daily paper. It was not very many years ago that the printing press was introduced, and it has only been within the last few hundred years that the average man has had the ability to read, let alone the opportunity of getting something to read. In the days of Homer, information was passed along by word of mouth from one town to another, or from one generation to another. It was a clumsy and awkward way of doing, and civilization proceeded slowly at that time. It was

only with the introduction of the printing press that civilization began to move by leaps and bounds. We moved from picture painting to the alphabet, from laborious writing to the printing press, and from the slow-going ox cart to the modern railroad train. No man thinks of conveying his thoughts by drawing pictures to illustrate them. A railway supply man certainly does not travel by means of an ox cart. Why ignore the printing press and what it gives us?

Proposed Standard Sizes of Catalogs.

A MOVEMENT TO SECURE UNIFORMITY IN ADVERTISING MATTER.

By Arthur Haller, Secretary, Technical Publicity Association.

Most catalogs at the present day are valuable and are supplied to a carefully selected list of men to whom their contents will be of practical assistance. In the mechanical field particularly great reliance is placed on the file of catalogs maintained, which in effect becomes a reference library.

In full recognition of this condition many of the larger firms have their high salaried engineers devote considerable time to provide the most valuable information in a lasting form. An attractive booklet reaching the desk of the general manager or purchasing official is much appreciated, and after examination is placed on file.

The files of a busy man are carefully maintained and arranged for prompt reference. If the attractive catalog of the manufacturer is of the size generally favored its filing is a matter of routine and a place is ready to receive it. If, however, it is larger than the other books in the file there is no specified place that it will fit and the chances of its being thrown away are greatly increased. It may be thrown into a pile with similar odds and ends where it soon becomes frayed and is destroyed at the next cleaning up.

When one considers the multiplicity of sizes of catalogs in use today, the advantage of a standard size is at once demonstrated. A committee appointed by the Technical Publicity Association to investigate and recommend standard sizes for catalogs, recently measured 927 catalogs and found 147 different sizes, ranging from 3x5 to 11x14¼ ins. An example of the varied number of sizes is presented in the accompanying illustration, which shows a selection made at random from the files of a large publishing house, with a 2-ft. rule in the center to show the relative size.

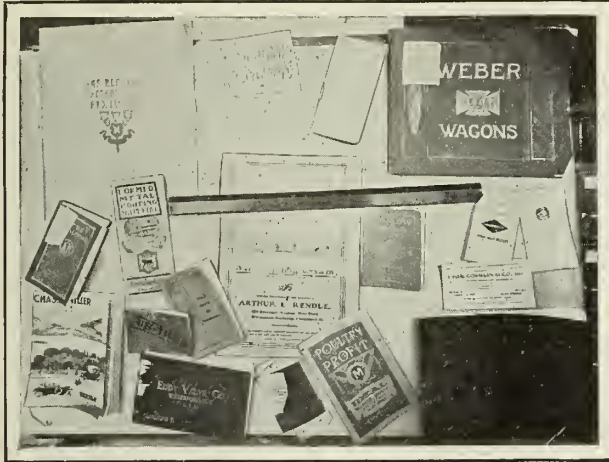
An argument advanced against uniform sizes of catalogs is that individuality would be sacrificed if all catalogs were uniform. A freak size does not tend toward individuality, but lessens the chance of the catalog being retained by the recipient. If individuality is desired this can be provided on the inside pages and the cover. A catalog is not for the purpose of exhibiting the individuality of the house publishing it, but to give such information to customers as will be most useful to them.

This matter has been under investigation by the committee of the Technical Publicity Association for the past eighteen months, and its investigations have led to the recommendation of 6x9 and 8½x11 ins. for standards for all purposes. Both of these sizes will cut to very good advantage with a minimum of waste from catalog papers now carried in stock by paper manufacturers. Another advantage of the larger size is that catalogs of these dimensions can conveniently be filed with correspondence, as this size will very nicely fit standard filing cabinets.

For paper-bound catalogs, the cover should be trimmed to the exact size of the inside pages. Deckle edges and overlapping edges make catalogs less convenient to handle, and should be discouraged. For catalogs with stiff covers the inside pages should be trimmed to the sizes recommended, i. e., 6x9 and 8½x11 ins., with an overlap of ¼ in.

This committee also recommended 8x10½ ins. for bulletins, and this size was accepted by the Technical Publicity

Association, at its meeting on October 9, 1913, because a large number of companies are now using a letterhead of this size and because bulletins frequently accompany letters and are filed with correspondence. This size is also the one that has been recommended by the Master Car Builders'



Various Sizes of Catalogs in a Selection Made at Random From the Files of a Large Publishing House.

Association as a standard for letter paper and specifications.

When binders are furnished for bulletins, they should be $8\frac{1}{2} \times 11$ ins. In this way they will be uniform with the $8\frac{1}{2} \times 11$ in. catalog and can be filed with them.

While the 9×12 in. size has been recommended by the Technical Publicity Association for technical and trade journals, it is not recommended as a standard for catalogs.

The report of the Technical Publicity Association is the same in all respects as the report of similar committees appointed by the American Society of Mechanical Engineers and the American Institute of Architects, except that these committees recommended the $8\frac{1}{2} \times 11$ in. size for both bulletins and catalogs.

It is to be hoped that all manufacturers will appreciate the importance of this subject and for the benefit of their customers and prospective customers will adopt these standards for all future catalogs and bulletins.

Railway Service as a Training School for Railway Supply Business—IV.

GUILFORD S. WOOD.

Guilford S. Wood jumped over the right-of-way fence a good many years ago. In fact, it was just about the time that iron, steel and cement began to take the place of wood in railway construction and equipment and he thought to keep in line with the prevailing tendency. He still kept in the railway zone, however. His card reads "Railway Necessities," which may mean a good many things. There are tons of statistical documents on file with the Interstate Commerce Commission just now—all relating to the necessities of the roads. But Wood's supplies don't need that kind of defence. He has always kept in mind as a proposition he must demonstrate that wood rhymes with good. He is popularly supposed to wear rubber hose, from his insistence on pure Para and fair treatment for it. Even hole-proof hosiery will succumb to a protuberant peg; and air-brake hose can not retain its integrity if baked in the storehouse, painted in the shops or punched by chisels. Good hose mechanically protected and not abused by human negligence or cussedness will be as nearly hole-proof as is in the nature of things.

But Mr. Wood handles other rubber goods, and steel in the shape of tie-plates, baggage trucks, etc., so that he comes in

contact with the mechanical, track, operating and traffic departments with his ideas of quality and standardization.

He began his business career as a messenger in a bank in 1871; but longing for the open took him into a job as rodman with George C. Morgan, C. E., in a preliminary survey in central Illinois. He next was engaged with the engineering corps re-surveying the Milwaukee & Northern, then under construction; and after four or five months engaged on the old Chicago Danville & Vincennes, now Chicago & Eastern Ill. While in this position the road was finished into Danville, with a branch under construction to Brazil. In the winter of '74 he had service and a different sort of experience as brakeman and switchman; and in the spring went out again as rodman on the same road.

Toward the latter part of 1875 they made a preliminary survey around Dalton, South Chicago and Irondale, with a view of building a road from Dalton to Chicago for the Chicago,



Guilford S. Wood.

Dalton & Vincennes Railroad, to secure an entrance into Chicago. There was some other preliminary work in regard to a branch line running from Chicago to Blue Island by way of Thornton Junction. This work was taken up and construction commenced under the direction of J. B. Brown & Company; Mr. Geo. Bidwell, the engineer in charge, having been with the C. & N. W. at Missouri Valley and Omaha. In 1876 construction work was again taken up for the Chicago, Dalton & Vincennes Ry. to construct and build a line from Dalton to Chicago. This work was gone into very thoroughly, and from that time on until 1882, he was with the engineering corps surveying and constructing what is now the Chicago & Western Indiana Belt Line Railroad. In the latter part of 1876, President Brown made him assistant purchasing agent of the road.

In 1882 Mr. Wood left the railway service; and after a few months with the Pettibone-Mulliken Railway Supply Co., went with W. A. Salisbury, where he handled rubber goods for railway use for 18 years. In December, 1900, he went into business for himself; with a combined railway and selling experience which proved an excellent capital.

CHARLES H. SCHLACKS.

Another railway official who has had a long and excellent record, has "gone over to the enemy," or rather to another

branch of the same general service. Mr. Charles H. Schlacks has resigned the vice-presidency of the Colorado Midland, to become president of the Hale & Kilburn Co., manufacturers of passenger car seats and metallic finish and fittings; in which position he succeeds Mr. D. W. Call, resigned.

Charles Henry Schlacks was born November 12, 1865, at Chicago. His father was the late Henry Schlacks, former superintendent of machinery of the Denver & Rio Grande. The son entered railway service as an office boy with the Illinois Central R. R. in 1879, since which he was consecutively to 1891. machinist's apprentice, machinist, mechanical draftsman, chief clerk to superintendent of machinery and chief clerk to the general superintendent of the Illinois Central. Mr. Schlacks was for a time in 1891 associated with the Grant Locomotive Works at Chicago; then, from November 1, 1891, to November



Charles H. Schlacks, President, Hale & Kilburn Co.

1894, with the Denver & Rio Grande. On November 1, 1894, he was appointed assistant manager of that road and in July, 1900, he was made general manager of the Colorado Midland Ry. Mr. Schlacks was elected vice-president of the Denver & Rio Grande June 1, 1904, and has also since served as vice-president of the Western Pacific Ry. and Utah Fuel Co. and president of the Globe Express Co. He resigned the vice-presidency of the Denver & Rio Grande and Western Pacific in July, 1913. He has five brothers: Henry J., an architect in Chicago; Joseph T., vice-president of the McCord Manufacturing Co., Detroit, Mich.; William J., with McCord & Co., Chicago; Edward L., in the coal business in Nebraska, and Robert J., manufacturers' agent in Denver.

In a paper to be read before the American Society of Mechanical Engineers in New York, on February 10, by Mr. S. W. Dudley, of the Westinghouse Air Brake Co., Pittsburgh, Pa., important improvements in the braking of heavy passenger cars will be described. The tests forming the basis of Mr. Dudley's paper referred to were conducted jointly by the Pennsylvania R. R. and the Westinghouse Air Brake Co., and the results are considered the most important of the recent contributions to literature on the subject of air brakes. The improvements center mainly in the electric control of the brake, giving quick and simultaneous action throughout the train. The tests

also constituted a progressive development of the clasp type of brake, of brake rigging, and of brake shoes on connection with the scientific study of the air brakes as a whole. The society is extending to all persons interested, a general invitation to attend this meeting.

SUPPLY TRADE NOTES.

—The Hancock-Bragg Railway Supply Co., Chicago, has been incorporated by William Bragg, David D. Kagy and R. W. Vanier.

—A. Reiche, formerly general manager of the Orenstein Arthur Koppel Co. plant and general offices, Koppel, Pa., sailed for Germany, January 14, and has been succeeded by Erich Joseph, formerly New York manager of the company. Mr. Reiche resigned from the firm to assume the position of managing director of a large German concern, manufacturers of locomobiles and agricultural machinery. His successor, Mr. E. Joseph, has been connected with the Orenstein Arthur Koppel Co. for many years.

—A. E. Schafer, who has been general sales manager of the Sherwin-Williams Co., has accepted a position with the Flint Varnish Works, Flint, Mich. He will assist President W. W. Mountain in the management and will have full charge of the railroad department.

—William Cooper, director of buildings and equipment of the East Pittsburgh works of the Westinghouse Electric & Mfg. Co., died from peritonitis at his home in Wilkesburg, Pa., Friday, January 23, aged 52 years. Mr. Cooper entered the employ of the Westinghouse Electric & Mfg. Co., in 1904 in the railway engineering department. His first work was his investigation of the unit switch control which the company was then exploiting. His work on this system led to the development of the type of control now being used by the Westinghouse company. Previous to going with the Westinghouse company he was master mechanic and chief engineer of the Twin City Rapid Transit Co., Minneapolis, Minn. His later work in the railway field consisted of an active participation in the design and manufacture of the equipment furnished the New York, New Haven & Hartford R. R., the St. Clair Tunnel, the Pennsylvania, and other roads which have been electrified by the Westinghouse company.

—The Pressed Steel Car Co. has resumed dividends on the common stock. Directors have declared a dividend of 3 per cent for the year 1914, to be paid out of the earnings of the year 1913. The outstanding common stock of the company amounts to \$12,500,000, which means that the junior shareholders this year will receive \$375,000. The dividends will be paid in quarterly installments. Dividends on the preferred stock are at the rate of 7 per cent.

—The Simplex Airbrake & Manufacturing Co. held its first annual meeting in its offices in Pittsburgh, Pa., January 20. The following officers were elected: President, Milton D. Hays; vice-president, Nicholas Herbick; secretary, Elmer E. Stewart; treasurer, William H. Giob; assistant to president, A. P. Hays; mechanical engineer, Peter Wertz. These with William J. Maloney, were elected directors.

RAILWAY NEWS.

Arizona Eastern.—The Arizona Eastern R. R. has been granted permission by the Arizona state corporation commission to issue \$1,696,102 of first mortgage bonds for improvements. The Buckeye line extending from Phoenix, Ariz., westward to the Hasayampa river, 50 miles, will be the first to receive attention, the sum of \$678,029 being set aside for betterments on this line. The remainder of the bond issue will be expended on the Phoenix & Eastern, extending from Phoenix to Winkelman, and on the Globe branch from Bowie, on the main line of the Southern Pacific Co.

Atlantic Coast Line.—The Atlantic Coast Line R. R. has received bids and contract will soon be let for 62 miles of second track between Parkton and Selma, N. C., for which the masonry is completed.

Boston & Maine.—Holders of over \$8,000,000 of the \$10,000,000 of notes of the Boston & Maine R. R., which are payable February 3, have agreed to an extension of time until June 2. In consideration of this the company will pay an additional three-fourths of 1 per cent, making 6¾ per

cent for the notes. The extension, it is said, is primarily to allow Samuel Carr, recently elected a director of the road, time to prepare a comprehensive financial system for the company.

Chicago & Alton.—Announcement has been made by Chicago & Alton R. R. officials that double-tracking in the vicinity of Atlanta, Ill., which was suspended December 1, because of slack business, is now being resumed.

Chicago, Milwaukee & St. Paul.—See Railway News under Idaho & Washington Northern R. R.

Cleveland, Cincinnati, Chicago & St. Louis.—The Cleveland, Cincinnati, Chicago & St. Louis Ry. has filed a petition with the Indiana public utilities commission asking permission to merge the Cincinnati & Southern Ohio, the Fairland, Franklin & Martinsville, and the Cincinnati, Wabash & Michigan railroads with the Big Four. The Big Four owns all of the capital stock.

Idaho & Washington Northern.—The Chicago, Milwaukee & St. Paul Ry. has formally taken over the Idaho & Washington R. R. The name will be retained but the road will be operated under the direction of officials of the Columbia division of the Milwaukee.

Kansas City, Mexico & Orient.—Dissolution of the receivership of the Kansas City, Mexico & Orient Ry. and the sale of the road will be consummated January 31, according to announcement made January 27, in the Federal Court in Kansas City, Kan., by Judge John C. Pollock, who, on March 12, 1912, appointed receivers for the company. Plans for a reorganized company have been under way for months, final disposition having been held up by conflicting claims of creditors. Further arguments concerning priority of claims were heard by Judge Pollock this week. More than \$158,000 in claims purporting to have been held prior to the receivership were presented. The court announced that such debts should be satisfied before those that have come up since the receivership and that all conflicting claims must be settled before he would allow the company to be reorganized.

Lehigh & New England.—The Lehigh & New England R. R. will build 1.25 miles of track on its Chestnut Ridge branch and install automatic signals to protect the junction of the same with the main line. Other work authorized in 1913 which is to be completed this year includes the construction of 2.74 miles of track on the Catasaqua branch. During the last calendar year 2.66 miles of track was laid on the Catasaqua branch and various sidings amounting to 0.84 mile were constructed.

Pennsylvania Railroad.—Notice to stockholders of the annual meeting of the Pennsylvania Railroad company, to be held in Philadelphia March 10, announces that the stockholders will be asked to authorize "a mortgage to secure bonds to be issued from time to time when and as approved by the stockholders to an amount not in excess at any time of the then outstanding capital stock." This is official confirmation of the general understanding that the Pennsylvania Railroad would create a large refunding and improvement mortgage. The terms above quoted would at the present time authorize a mortgage under which a possible maximum of \$600,000,000 bonds on the presnet capital stock could be issued. It is said that the company has no intention of issuing bonds under the new mortgage immediately, and in fact the formalities to be gone through with will probably not be completed until some time after the annual meeting.

St. Louis & San Francisco.—It is reported that the St. Louis & San Francisco R. R. will extend the use of telephones and will immediately spend \$60,000 in equipping the line between Amory, Miss., and Memphis, Tenn., a distance of about 125 miles.

Wabash Railroad.—Application for the dissolution of the receivership of the Wabash Railroad and for a decree for foreclosure was made to Elmer R. Adams, United States Circuit judge, at St. Louis, Mo., January 29, by attorneys representing the bondholders, the Equitable Trust Co., of New York, trustee, and the receivers. Attorney George W. Murray, in explaining the tentative foreclosure decree to the court, said it took into consideration the reorganization of the Wabash and the securities that would have to be issued after the property is sold to satisfy the mortgage. Judge Adams intimated that he would announce a final foreclosure decree within ten days.

PERSONALS.

Robert Morrison, Jr., has been elected secretary of the San Francisco-Oakland Terminal Rys., at Oakland, Cal.,

succeeding F. W. Frost, secretary and treasurer, assigned to other duties.

A. W. McLimont has been appointed general manager of the San Francisco-Oakland Terminal Rys., with office at Oakland, Cal., succeeding W. R. Alberger.

Frank B. Whipple has been elected a vice-president of the San Francisco-Oakland Terminal Rys., with office at Oakland, Cal., succeeding J. K. Moffit, resigned.

P. L. Overman, special accountant of the Virginian Railway, has been appointed freight auditor of the Western Maryland Ry., with headquarters at Baltimore, Md., succeeding J. F. Shea, resigned.

B. Haggard has been appointed trainmaster of the Northern Alabama Ry., at Sheffield, Ala., succeeding Charles Chandler, transferred.

J. J. Turner, second vice-president of the Pennsylvania Lines West of Pittsburg, has been elected first vice-president, to succeed Joseph Wood, resigned.

C. E. Carson, whose appointment as superintendent of the Fort Dodge, Des Moines & Southern R. R. was recently noted in these columns, was born at Portsmouth, Ohio, on January 9, 1866. After attending common school he entered Carlton college, Ohio, graduating in 1882. He entered the railroad service of the Kansas, Ft. Scott & Memphis Ry. at Kansas City, Mo., in 1883, as a switchman and



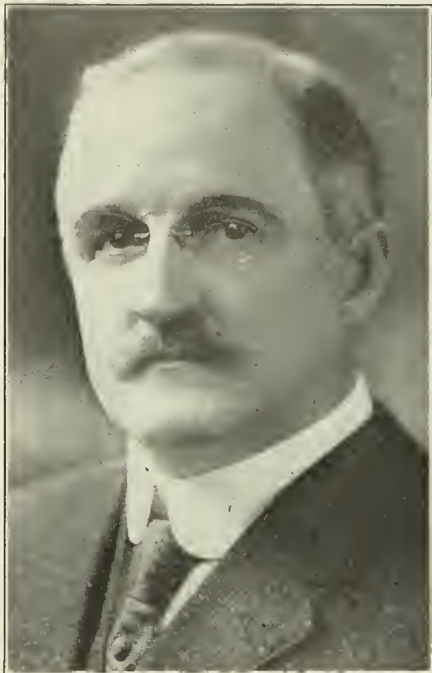
C. E. Carson, Recently Appointed Superintendent of the Fort Dodge, Des Moines & Southern.

filled successively the positions of conductor, chief clerk to division superintendent, and general yard master. In 1893 he was appointed chief clerk and assistant superintendent of Terminal Railroad Association of St. Louis, Mo., serving in this position until 1897, when he was appointed superintendent of the Missouri Pacific Ry. at Kansas City, Mo. In 1902 he was transferred to the Missouri Pacific-Iron Mountain as division superintendent with headquarters at St. Louis, Mo. In 1903 he was appointed superintendent of the Northern division of the Colorado & Southern Ry. and served in this capacity to June 1, 1906, when he accepted a position as superintendent of the Kansas City division of the Missouri Pacific with headquarters at Kansas City. On April 1, 1908, Mr. Carson was appointed superintendent of the Mexican Central Ry. and National Lines of Mexico, with headquarters at Tampico, Mexico, serving as such to January 1, 1910, when he was appointed manager of the Mexican Fuel Co. at Tampico. On February 15, 1911, he was appointed superintendent of the Chicago Great Western R. R., Western division, with headquarters at Clarion, Iowa. He was transferred to the Northern division as superintendent with headquarters at St. Paul, Minn., on August 1, 1911, and served in that capacity until October 15, 1913. Mr. Carson's appointment as superintendent of the Fort Dodge, Des Moines & Southern was effective January 1, 1914.

C. E. Fultz, general manager of the Kanawha & West Virginia R. R., with headquarters at Charleston, W. Va., has resigned.

Howard Elliott, chairman of the board of the New York, New Haven & Hartford R. R., resigned January 24 as chairman and as a member of the board of directors of the Boston & Maine R. R. It is stated that Mr. Elliott wished to retire in view of negotiations existing between Attorney General McReynolds and the New Haven company concerning the so-called dissolution of the New Haven system.

H. W. Rives has been appointed superintendent of the Deering Southwestern Ry., with headquarters at Caruthersville, Mo., succeeding as superintendent W. I. Converse,



E. E. Calvin, Appointed Vice-President and General Manager of the Oregon Short Line.

formerly secretary, treasurer and superintendent, who has been transferred from Caruthersville to Chicago.

Edwin Pearson has been appointed assistant to president and assistant secretary of the Spokane, Portland & Seattle Ry., with office at Portland, Ore., succeeding Frank A. Peil, resigned.

A. J. Davidson has been appointed superintendent of the Spokane, Portland & Seattle Ry., lines west of Willbridge, with headquarters at Portland, Ore. Mr. Davidson retains jurisdiction over the Oregon Electric Ry. and United Railways Co.

James M. Kurn, general superintendent of Atchison, Topeka & Santa Fe Ry., Northern district, Western lines, with headquarters at La Junta, Colo., has resigned. Mr. Kurn will become president of the Detroit, Toledo & Ironton Ry.

W. J. Bell, superintendent of the Columbus division of the Southern Railway, with headquarters at Williamson, Ga., has been granted leave of absence on account of ill health. **H. G. Farrar** trainmaster at Birmingham, Ala., succeeds Mr. Bell.

Charles Chandler, trainmaster on the Northern Alabama Ry., at Sheffield, Ala., has been appointed trainmaster of the Southern Railway at Birmingham, Ala., succeeding H. G. Farrar, transferred.

W. R. Alberger, vice-president and general manager of the San Francisco-Oakland Terminal Rys., has resigned the latter office, but will continue as vice-president of the company.

Kirke Lathrop has been elected treasurer of the San Francisco-Oakland Terminal Rys., with office at Oakland, Cal., to succeed F. W. Frost.

A. M. Schoyer, general manager of the Vandalia Railroad, with office at St. Louis, Mo., has been elected a vice-president of the Pennsylvania Railroad. Mr. Schoyer will have his headquarters in Chicago.

S. C. Scott, assistant to first vice-president of the Penn-

sylvania Lines West of Pittsburgh, at a recent meeting of the directors of the Pennsylvania Company, was elected vice-presidents' assistant.

William Fleming, chief clerk to the second vice-president of the Pennsylvania Lines West of Pittsburgh, has been appointed assistant to first vice-president.

B. A. Worthington, it is said, although no official announcement has yet been made, is about to retire from the presidency of the Chicago & Alton R. R. and will be succeeded by **W. G. Bied**, vice-president and general manager of the Minneapolis & St. Louis R. R. It is stated that **C. W. Huntington**, general superintendent of the Central R. R. of New Jersey, will take the position to be vacated by Mr. Bied.

E. E. Calvin, vice-president of the Southern Pacific Co. at San Francisco, Cal., has been appointed vice-president and general manager of the Oregon Short Line R. R., with office at Salt Lake City, Utah, effective February 1, 1914. He succeeds **W. H. Bancroft**, whose resignation was announced in the Railway Review of January 24. Mr. Calvin was born October 16, 1858, in Indianapolis, Ind. He began his railroad career in 1873 and for two years was telegraph operator for the Indianapolis, Cincinnati & Lafayette Ry. He then went back to school for a year. From April, 1877, to March, 1882, he was telegraph operator and station agent for the Union Pacific R. R. From then until June 1, 1887, he held the positions of train dispatcher, conductor and trainmaster. June 1, 1887, he was made division superintendent of the Missouri Pacific Ry. On February 22, 1891, he accepted service with the Oregon Short Line R. R., as superintendent of the Idaho division, remaining in that capacity until 1895. He then became general superintendent of the International & Great Northern Ry. with headquarters at Tyler, Tex., but in March, 1897, he returned to the Oregon Short Line as general superintendent, with headquarters at Salt Lake City, Utah. From May 15, 1903, until April 1, 1904,



W. H. Bancroft, Vice-President of the San Pedro, Los Angeles & Salt Lake and the Oregon Short Line.

he was assistant general manager of the Oregon Short Line. Mr. Calvin went to Portland in 1904 to take charge of the Oregon-Washington Railroad & Navigation Co., as vice-president and general manager of the road. Until July 15, 1912, he was general manager of the Southern Pacific company with headquarters in San Francisco. He was then made vice-president in general charge of construction and operation, the position he will leave February 1 to accept the general managership of the Oregon Short Line.

W. H. Bancroft, who has requested to be relieved of the duties of vice-president and general manager of the Oregon Short Line R. R., will retain his present office as president of the Utah Light & Railway Co., and first vice-president of the San Pedro, Los Angeles & Salt Lake R. R., and he will also continue as a vice-president of the Oregon Short Line, but with only such duties as to the latter company as

shall be assigned him by the board of directors, the executive committee or the chairman. Mr. Bancroft was born October 20, 1840, at Newberg, Ohio. He began his railroad career as a telegraph operator and ticket clerk with the Michigan Southern Ry. in 1856. In January, 1890, he became general superintendent of the Mountain division of the Union Pacific R. R.; from March, 1897, to January 15, 1904, vice-president and general manager of the Oregon Short Line R. R.; January 15, to April, 1904, general manager of the Union Pacific, and since April, 1904, vice-president and general manager of the Oregon Short Line. Mr. Bancroft has also been acting general manager of the Southern Pacific Co., November, 1904, to February, 1905; first vice-president of the San Pedro, Los Angeles & Salt Lake R. R., since March, 1905, and also, November, 1906, to date, president of the Utah Light & Railway Co. President Mohler, of the Union Pacific System, in commenting on his service with the Oregon Short Line, said: "Mr. Bancroft is entitled to much credit for his development of transportation facilities in Utah and Idaho and also for his very active interest in developing all irrigating projects which have had so much to do with the prosperity of these states. It does not often come into the lifetime of any one man to show his good citizenship in such a patriotic manner, as many of these extensions were made in advance of their profitable return, but the future of the country was what he always had in mind."

Previous to going with the Union Pacific Mr. Bancroft had been operator and dispatcher on the Erie Railroad, and on the Kansas Pacific R. R., assistant superintendent of the Atchison, Topeka & Santa Fe Ry., superintendent on various divisions of the Denver & Rio Grande R. R., receiver of the Denver & Rio Grande and then general superintendent of that road.

TRAFFIC.

D. W. Cooke, general traffic manager of the Erie Railroad, with office at New York City, has been elected also a vice-president of the company.

H. W. Wheeler, traveling freight agent of the Belt Railway of Chicago, has been promoted to assistant general freight agent at Chicago.

C. E. Gordy has been appointed traveling freight agent of the Western Maryland Ry., with headquarters at Baltimore, Md.

R. W. Drew, district freight agent of the Canadian Pacific Ry., at Nelson, B. C., has been transferred to Regina, Sask., succeeding D. C. MacDonald, promoted.

F. H. Clendenning has been appointed division freight agent of the Canadian Pacific Ry. at Vancouver, B. C., in charge of the steamship traffic including coast and trans-Pacific steamers.

F. W. Sterling has been appointed district freight agent of the Canadian Pacific Ry. at Nelson, B. C., succeeding R. W. Drew, transferred.

E. W. Trott has been appointed commercial agent of the Missouri & North Arkansas R. R., with headquarters at Joplin, Mo. The position of traveling freight agent, formerly held by Mr. Trott, has been abolished.

C. L. Kennedy has been appointed commercial agent of the Chicago, Milwaukee & St. Paul Ry. at St. Paul, Minn., in place of Frank E. Otis, promoted.

A. L. Geylin has been appointed freight solicitor of the Pennsylvania Railroad at Harrisburg, Pa.

Robert Charlton has been appointed commercial agent of the Minneapolis & St. Louis R. R., with office at Duluth, Minn.

B. H. Wallace, soliciting agent of the Louisville & Nashville R. R., at Memphis, Tenn., has been appointed traveling freight agent, with headquarters at Buffalo, N. Y.

John N. Cornatzar, assistant general passenger agent of the St. Louis & San Francisco R. R. at Memphis, Tenn., effective February 1, is promoted to the position of general passenger agent. Mr. Cornatzar will retain his headquarters at Memphis and succeeds to the position made vacant by the promotion of A. Hilton to passenger traffic manager.

ENGINEERING.

R. W. Willis, district engineer of the Chicago, Burlington & Quincy R. R., at St. Louis, Mo., who has been appointed engineer of the Illinois district of that road, with headquarters at Chicago, to succeed G. H. Bremner, resigned.

F. M. Patterson has been appointed engineer of the Missouri district of the Chicago, Burlington & Quincy R. R., with headquarters at St. Louis, Mo., succeeding R. W. Willis, promoted.

H. Bortin, who resigned as engineer in charge of valuation of the Union Pacific R. R. and as member of its valuation committee December 31, 1914, has been appointed assistant to Thomas W. Hulme, general secretary of the presidents' conference committee in the valuation of railroads in the United States, with headquarters at Philadelphia. Prior to entering the service of the Union Pacific valuation work, Mr. Bortin had worked with the Isthmian Canal commission in Panama for two and a half years on municipal engineering, on the hydraulics of the canal, and in connection with the excavation work at Culebra.

J. A. Griffin, assistant engineer of the Southern Railway at Norcross, Ga., has been appointed engineer of maintenance of way and structures of the Georgia Southern & Florida Ry., with headquarters at Macon, Ga.

MECHANICAL.

E. B. Hall, whose appointment as assistant to the general superintendent of motive power and car departments of the Chicago & North Western Ry., was announced in our issue of January 17, entered railway service with the Chicago & North Western at Hawarden, Iowa, in July, 1889, as machinist helper. He worked there until August, 1892, and then became a fireman on the North Iowa and Western Iowa divisions of the same road. From October, 1893, to September, 1907, he was an engineer. September, 1907, Mr. Hall was promoted to road foreman of engines, Sioux City division, and in March, 1910, was made master mechanic of the Northern Iowa and Sioux City divisions, Eagle Grove, Ia. He has served in a similar capacity on the Wisconsin division, at Chicago, since May, 1912. Mr. Hall became assistant to general superintendent motive power and car departments at Chicago on January 15.

C. D. Ashmore, who has been appointed master mechanic of the Chicago & North Western Ry. at Pekin, Ill., as noted in our issue of January 17, began his railway career with the Chicago & North Western at Boone, Iowa, as an engine crew caller. He became a machinist apprentice at the same place in 1890 and later worked as machinist and also as brakeman on the Union Pacific, Atchison Topeka & Santa Fe and Denver & Rio Grand railroads. He returned to the Chicago & North-Western in 1902, as machinist and foreman at Council Bluffs, Iowa; from 1908 to 1909 was roundhouse foreman at Antigo, Wis., and from 1909 to 1911, division foreman at Fond du Lac Wis., and Antigo, Wis. Since 1911, until his recent promotion, Mr. Ashmore has been general foreman of the Chicago & North-Western at Clinton, Iowa.

F. S. Anthony, mechanical superintendent of the Texas & Pacific Ry., with headquarters at Marshall, Tex., has tendered his resignation.

D. J. Mullen, division master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis Ry., with headquarters at Mattoon, Ill., has been appointed assistant superintendent of motive power, with headquarters at Indianapolis, Ind.

OBITUARY.

Daniel Byrnes, attorney for the Minneapolis, St. Paul & Sault Ste. Marie Ry. at Chicago, died in that city January 25, aged 50 years.

Albert W. Martin, formerly superintendent of the Boston division of the New York, New Haven & Hartford R. R., with headquarters at Boston, Mass., died on January 12, in that city, aged 62 years.

Edward W. Chadwick, superintendent of the Carolina Railroad, died at his home in Kinston, N. C., January 20, at the age of 43.

Neil W. Snow, former division superintendent and assistant to the general superintendent of the Michigan Central R. R., died suddenly in Detroit, January 10, aged 39 years. Mr. Snow retired from railroad work about four years ago.

NEW ROADS AND PROJECTS.

Alabama.—J. E. Hurd, chief engineer of the Tennessee & Alabama R. R., has presented a proposition to the chamber of commerce of Huntsville, Ala., for the building of a new railroad between Fayetteville, Tenn., and Huntsville. The proposed line will be an independent steam railroad of low grade, and will cost about \$700,000. Mr. Hurd is quoted as saying that Chicago capital will build the road if 20 per cent of the stock is taken in the territory through which it will pass.

British Columbia.—Work on the Coquahalla section of the Kettle Valley Ry., which is to be used jointly by the Kettle

Valley, and the Victoria, Vancouver & Eastern Ry. & Navigation Co. is being actively prosecuted, according to reports from Hope, B. C. More than a thousand men are engaged in grading operations along 28 miles of the 38-mile section and the exceptionally propitious weather conditions for this season of the year is also accelerating the progress of construction. Work was started on the joint section of the Hope Mountain line about four months ago.

California.—Contract for the construction of the line of the Terminal Railway Co. between San José, Cal., and Port San José has been awarded to Mahoney Bros. of San Francisco.

Georgia.—Reports state that the Rome & Northern R. R. Co. is preparing to build an extension of its line from Gore to Subigna, Ia., a distance of about eight miles.

Kentucky.—At a meeting of the newly incorporated Tug River & Kentucky R. R., January 23, at Ashland, Ky., the following were elected officials: L. E. Johnson, of Roanoke, president; N. D. Maher, Roanoke, vice-president; A. C. Needles, Roanoke, general manager; W. J. Jenks, Bluefield, general superintendent; Joseph W. Cox, Roanoke, comptroller; J. B. Lacey, Roanoke, secretary; Jos. W. Crawford, Roanoke, acting chief engineer; Jos. R. Rufin, Roanoke, traffic manager; W. A. Ginn, Ashland, resident agent. The stockholders directed that the building of a bridge across Tug river and the construction of 17 miles of road now provided for be taken up at once. The new company is a subsidiary of the Norfolk & Western Ry.

Louisiana.—The W. P. Pickering Lumber Co., it is said, has awarded contract to J. N. George & Sons, for the construction of a 40-mile railroad in Sabine county, Louisiana.

Minnesota.—The Cuyuna & Northern Ry. recently awarded contract to Dale & Baumgardner, Scandanavian-American Bank building, St. Paul, Minn., for constructing its Kennedy Mine spur, including 100,000 cu. yd. of earth embankment.

Mississippi.—The Pensacola & Missouri Valley R. R. is reported organized. W. G. Seaver, Pascagoula, Miss., is president; Geo. B. Chapman, vice-president and general manager, and W. S. Cartter, superintendent of construction. The office of the company is in the People's Bank building, Pascagoula. The first section of railroad to be constructed will be from Pascagoula to Black Warrior coal fields, an extension of the Pascagoula Northern R. R. The purchase of this line is contemplated by the new company.

Missouri.—The Chicago, Burlington & Quincy R. R., it is said, contemplates building a cut-off line from Mexico to Carrollton, Mo., a distance of about 90 miles.

Montana.—The Minneapolis, St. Paul & Sault Ste. Marie Ry. has filed notice with the secretary of state of Montana of its intention of extending its line 66 miles westward.

New Mexico.—The Gulf, New Mexico & Pacific Ry. is reported incorporated with \$12,000,000 capital stock, to acquire the present line of the New Mexico Central R. R., now running from Torrance to Santa Fe, N. M., and to extend it 150 miles from Santa Fe to Farmington in the northwest and 90 miles from Torrance to Roswell in the southwest.

North Carolina.—The commissioners of Caswell county, North Carolina, have ordered a special election February 17 in Dan River, Anderson, Yanceyville and Stony Creek townships on bonds to aid construction of the proposed Greensboro, Northern & Atlantic R. R., which will connect Purley, Yanceyville and Locust Hill. T. O. Troy, Greensboro, N. C., is president of the proposed road. J. W. Fry, Greensboro, vice-president, and Walter Washabaugh, Charlottesville, Va., is chief engineer.

North Dakota.—See New Roads and Projects under Montana.

Oklahoma.—The Southwestern Construction Co., says a report, has begun survey for a railroad from Beaver, Okla., to connect with the Wichita Falls & Northwestern Ry. at Forgan, Okla., about 5 miles. Citizens of Beaver are chiefly interested. J. G. Trindle of Liberal, Kan. is chief engineer.

South Carolina.—The Georgetown & Western R. R., says a report, has commenced construction of a branch line from Johnsonville to Lake City, S. C., a distance of about 20 miles.

Texas.—The route of the proposed Texas, Kansas & Omaha R. R. is from Amarillo, Tex., north through Dumas and Stratford, Tex., and Garden City, Kans., to Omaha, Neb., about 600 miles. F. T. Burnham, Dwight building, Kansas City, Mo., promoter, has been quoted as saying arrangements have been made with New York contractors and construction will begin about March 1.

The construction of a 60-mile railroad from Yoakum, Tex., to New Braunfels, Tex., is under consideration. D. C. Im-

boden, secretary of the Yoakum Commercial club, is interested.

West Virginia.—The Weston & Glenville Ry. has been organized for the purpose of constructing a railroad 27 miles long, from Weston to Glenville, W. Va., via Camden, Alum Bridge and Linn, W. Va.

Electric Railways.

The Piedmont & Northern Ry. has filed application to increase its capital stock from \$5,000,000 to \$15,000,000, according to action of stockholders at recent meeting. The company contemplates further extensions.

The Cape Girardeau & Jackson Interurban Ry. is reported to have applied to the Missouri public service commission for authority to build its line to Jackson, Mo., 5½ miles. W. H. Harrison, Cape Girardeau, Mo., is president and general manager.

The Ephrata & Lebanon Ry., which connects Ephrata and Lebanon, Pa., is nearing completion and will be finished by the middle of April. At present passenger cars are being operated on the line from Ephrata to Hopeland, a distance of 6½ miles, and from Lebanon to Reistville, a stretch of about seven miles.

The Young Men's Business league, of Waco, Tex., and the chamber of commerce, Meridian, Tex., are reported working on a plan for construction of an interurban electric railway from Waco to Cleburne, Tex., about 80 miles, via China Springs, Valley Mills, Clifton, Meridian, Walnut Springs and Glen Rose, Tex. J. J. Powers, Waco, Tex., is reported interested.

Official announcement has been made by the officers of the Salt Lake & Utah R. R. that the road will be in operation as far as American Fork, Utah, on February 1, and that for the present time the intersection of Third South and First West streets will be the terminal in Salt Lake City, Utah. The remainder of the line will be placed in operation as soon thereafter as possible. Inasmuch as the electric equipment for the new line to the southern part of the state is not yet completed, a gas motor car will be used for the initial operation, and with the completion of the entire line to Provo, the electric equipment will be installed.

The interurban that was planned between Paducah and Hickman, Ky., about two years ago, and which was dropped last year, will again be taken up, and the road may yet be built. The promoters and stockholders of the Kentucky Southwestern Electric Railway, Light & Power Co., which proposed to build this road that when completed would extend from Hopkinsville to Hickman, through Paducah, are to meet in Paducah on February 12. At that time directors will be elected and reports of the officers will be received, and the plans of further construction will be looked into. Their business manager, Fred M. Smith, is now in Europe making arrangements to raise funds to build this line on through from Paducah to Hickman.

The Shelbyville, Petersburg & Decatur Ry., which proposes to build a line about 75 miles long from Shelbyville, Tenn., to Decatur and Athens, Ala., has organized by electing S. P. Kirkpatrick president and general manager; H. H. Nelson, vice-president; R. W. Clark, treasurer; and T. G. Cunningham, secretary. S. F. Howard has begun survey.

A company has recently been formed in Nashville, Tenn., which proposes to build an interurban railway from Nashville to Franklin, Ky., with possibly branch lines to Springfield, Ky., and Glasgow, Ky. The name of the new line will be the Tennessee & Kentucky Interurban R. R., and application for a charter has been filed with the state. The line will operate in Nashville over the tracks of the Nashville Railway & Light Co. to the terminus of the North First street car line, thence tracks will be laid along the Dickerson pike through Goodlettsville, White House, Cross Plains, Orinda and Lamont to Adairville, Ky. Further extension to Franklin, Springfield and Glasgow is expected.

Contracts for materials for the construction and equipment of the new lines to be built by the city of San Francisco this year for the Geary Street Municipal Ry. were awarded recently by the board of public works as follows: The United States Steel Products Co., contract for steel rails, rail joints, fastenings and rail spikes; the Payne Bolt Works, contract for steel tie rods and nuts; the Eccles & Smith Co., the contract for tie plates, brace plates and rail braces, and the Caspar Lumber Co., redwood cross ties.

Foreign Railways.

Argentina.—The Corrientes legislature has approved the bill for a railway concession from Mercedes to Paso Claro, Argentina.

Plans and specifications for constructing a state line from San Juan to Jachal, Argentina, are completed and the minister of public works will shortly call for tenders for the construction. Eight contractors are to be invited to tender.

Belgium.—After five years' work the Belgian town of Stavelot and the German town of Malmédy were connected last week by rail and another strategic line has been formed. The distance from Stavelot to Malmédy by the high road, which is admirably constructed on both sides of the frontier, is nine kilometers, or a little over $5\frac{1}{2}$ miles. What is called the old road, now disused, was somewhat shorter, but the gradient was less favorable. The new line has necessitated a slight but unimportant alteration in the point outside Stavelot where the Malmédy road branches off from that to Spa. In Belgium the railway is for more than half its distance parallel with this high road, but in Germany it follows a track at some distance from it in order to save the wide curve as it makes the ascent to the Belgian boundary.

France.—Public subscription is to be opened on January 31 for \$40,000,000 of 4 per cent bonds, forming part of an issue of \$360,000,000 guaranteed by the French government for the improvement of the Western State Railroad system.

Germany.—See Foreign Railways under Belgium.

Greece.—Within 18 months western Europe will have direct railroad communication with Greece by means of a projected new line connecting the Piræus, Athens & Larissa railroad with the Oriental railroad. The contract for the construction of this line was signed by the Greek minister and French contractors at Paris on January 25.

India.—The South Indian Ry. has received sanction of the central government of India to construct an additional 40-mile meter-gauge railway in the State of Travancore, on the southwest coast of India. The line is to extend from the important port of Quilon to Trevandrum, capital and largest town of the state. Construction of the new road is being undertaken in behalf of the Travancore Durbar, and will be known as the Quilon-Trevandrum extension of the Tinnevely-Quilon Travancore Ry.

Russia.—A Daily Consular and Trade Report says that the Lena Gold Fields Co. has applied for the right to build a 670-mile railroad in Asiatic Russia, from Irkutsk to Bodaibo. As the application for construction of this line is connected with a request for certain exceptional privileges, the question will be discussed by the Council of Ministers.

Switzerland.—The number of concessions granted by the Swiss parliament for the constructions of railways indicates that the next few years will see a very rapid railway development. Switzerland now has over 3,000 miles of railway, which, in proportion to area and population, is more than any other country. One of the new lines which will be of particular convenience to tourists is to run from Stalden, in the Zermatt valley, to Saas Fee. Against this line, be it observed, strong protest has already been raised by the Swiss, who consider a railway of this description as a piece of wholly unwarrantable vandalism and an inexcusable desecration of beautiful natural scenery. The Saas Fee valley is, indeed, one of the very few still remaining wild and little exploited parts of Switzerland. Of much more general interest, however, is the question of running the railway from Visp to Zermatt in winter, a discussion on which also took place during the parliamentary session just ended. The running of this line in winter obviously means the opening of Zermatt as a winter resort, which, it is safe to say, would entail a considerable redistribution of winter visitors to Switzerland. The Valaisans, however, are not politically powerful enough in Switzerland to induce the state railways, which now run the Visp-Zermatt line to face the difficulties and also the expense of running the line in winter. Had this railway been within the territory of certain cantons, Berne, for instance, Zermatt would probably years ago have been opened to tourists in winter.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Boston, Revere Beach & Lynn R. R. has ordered 3 Forney type (2-4-4-T) locomotives from the American Locomotive Co. These engines will have cylinders 14x18 ins.; driving wheels, 49½ ins., and will weigh 91,000 lbs. in working order.

—The Delaware, Lackawanna & Western R. R. has ordered materials for 6 ten-wheel switching locomotives to be built in the company's shops.

—The St. Paul Bridge & Terminal Ry. has ordered 1 Mogul freight locomotive (2-6-0) from the American Locomotive Co. This engine will have cylinders 20x26 ins.; driving wheel, 51 ins., and will weigh 156,000 lbs., in working order.

—The Richmond, Fredericksburg & Potomac Ry. has ordered 2 115-ton eight-wheel (0-8-0-S) locomotives, with 24x28 in. cylinders and 51 in. driving wheels, from the American Locomotive Co.

—The Brooklyn Cooperage Co. has ordered 1 locomotive from the Davenport Locomotive Works.

—The Chesapeake & Ohio Ry. has ordered 14 locomotives from the American Locomotive Co.

—The Transcontinental Railroad of Australia has ordered 8 locomotives from the Baldwin Locomotive Works.

Freight Cars.

—The Wheeling & Lake Erie R. R., it is said, is in the market for 20 cabooses.

—The Gastineau Mining Co. has ordered 100 freight cars from the American Car and Foundry Co. for use in Alaska.

—The Chicago & North Western Ry. is reported in the market for 500 underframes.

—The New Jersey, Indiana & Illinois R. R. has ordered 100 freight cars from the Western Steel Car & Foundry Co.

—The Atchison, Topeka & Santa Fe Ry. is reported as about to purchase additional freight cars.

—The Union Pacific R. R. system has placed orders for 5000 freight cars. The American Car & Foundry Co. will build 2000 box cars and the Pressed Steel Car Co., 2000 box cars, 600 automobile cars and 400 stock cars.

—It is reported that the Anaconda Copper Co., Butte, Mont., has placed an order of 157 steel ore cars. This has not been verified.

Passenger Cars.

—The New York Central & Hudson River R. R. is reported building a number of steel dining cars at the company's shops, West Albany, N. Y.

—The Denver & Rio Grande R. R. is taking bids on 10 passenger and baggage cars. It is understood that this inquiry was sent out from the offices of the Missouri Pacific system at St. Louis and is in addition to the 85 to 100 cars for which the Missouri Pacific recently issued inquiries.

—The Delaware, Lackawanna & Western R. R., reported in the Railway Review of January 24 as having ordered 10 passenger cars, has ordered 12 coaches from the Pullman Company.

Signals and Interlocking.

—The Chicago & North Western Ry. has installed new automatic electric bridge signals on its Wisconsin division, between Clybourn and Hunting Avenue stations, a distance of about $4\frac{1}{2}$ miles. This work included the installation of 32 signals, supplanting the disc signals heretofore in use, and the construction and operation of two mechanical interlocking plants. One of the latter, with 36 levers, is located at Wood street; the other, with 28 levers, at Hunting avenue.

—See Railway News under Lehigh & New England R. R.

Machinery and Tools.

—The Lake Shore & Michigan Southern Ry. is receiving bids this week for a small lot of machinery equipment for its new car shops at Air Line Junction near Toledo, Ohio.

Iron and Steel.

—The Delaware & Hudson Co. has ordered 4000 tons of light rails from the Lackawanna Steel Co.

—The Pennsylvania R. R. and Pennsylvania Lines West of Pittsburg, it is expected, will place orders this week for 1914 rails, about 160,000 tons.

—A report says that the New York Central Lines have increased recent contracts for rails to about 140,000 tons.

Bridges.

—The Central New England Ry. is reported taking bids on 100 tons of bridge steel.

—The New York, New Haven & Hartford R. R. has awarded 700 tons of steel for several small bridges in Rhode Island to the Boston Bridge Works.

—Steel for a bridge over the Connecticut river for the Boston & Albany R. R. has been awarded to McClintic-Marshall Co.

—Contract for 14,500 tons of steel for elevated extensions

for the New York Municipal Rys. is reported awarded to the Phoenix Iron Co.

—Contract for the steel superstructure on the Broadway and Victoria Drive bridges for the Great Northern Ry. at Vancouver, B. C., is reported awarded to the Canadian Northwest Steel Co. The bridges will be 70 and 60 ft. in width, respectively.

—The Cleveland city council has passed an ordinance providing for the issue of \$100,000 bonds for abolishing grade crossings at 105th street and the Lake Shore & Michigan Southern Ry., and at Ivanhoe Road and the New York, Chicago & St. Louis R. R.

—The Cleveland & Youngstown R. R. is reported to have awarded contract for about 2000 tons of bridge steel to the American Bridge Co.

—It is reported that plans are being prepared by the Chicago & North Western Ry. for the reconstruction of the bridge across Milwaukee river on Jefferson street, Milwaukee, Wis.

—Tentative plans have been prepared and are now being considered by the New Jersey board of public utility commissioners for elimination of three grade crossings on the West Jersey & Seashore and Philadelphia & Reading railroads at Cape May, N. J.

—Condemnation suits have been filed in the county court at Paducah, Ky., by the Paducah & Illinois R. R. which would indicate that construction of the proposed bridge over the Ohio river will be begun soon. The new structure will connect Paducah, Ky., and Metropolis, Ill.

—Preliminary surveys for the purpose of determining the best and most desirable location for the combination railroad and county bridge to be built by the Houston & Brazos Valley R. R. and Brazoria county across the Brazos river connecting Velasco and Freeport, Tex., was started last week. The proposed structure will cost about \$120,000.

Buildings, Terminals, Etc.

—The Chicago Junction Ry. is building a one-story blacksmith shop on West Thirty-ninth street, Chicago, to cost about \$3000.

—The Philadelphia & Reading Ry. is having plans prepared for a two-story machine shop to be erected in connection with its roundhouse and engine yard at Ninth and Brown streets, Philadelphia.

—The Illinois Central R. R., the Central of Georgia Ry. and the St. Louis & San Francisco R. R. will, it is reported, improve and extend their joint terminal facilities at Birmingham, Ala.

—The Louisville & Nashville R. R. is building a roundhouse at Irvine, Ky. It is stated that shops will also be constructed.

—The Illinois Terminal R. R. will spend approximately \$60,000 in the enlargement of its repair shops at Alton, Ill.

—The Atlantic Southern Ry. is constructing a small machine shop at Atlantic, Iowa.

—The Cincinnati, New Orleans & Texas Pacific Ry. will construct an additional shop building at Chattanooga, Tenn. A reinforced concrete building will be erected on the present shop grounds, which will have a capacity for 12 passenger cars.

—The Houston & Texas Central R. R. will establish a water station at Giddings, Tex.

—Plans have been drawn and an appropriation made by the Pittsburgh & Lake Erie R. R. for a new passenger station at New Castle, Pa., to cost about \$100,000. It is expected that work will be begun early this spring. The station is but part of the program of general improvement undertaken by the railroad at New Castle some time ago. The new freight house, a part of the plan, has been completed. The building is 275 feet long and 50 feet wide. It contains a floor space of 13,750 square feet, and is of modern fireproof construction.

—The Gulf, Florida & Alabama Ry. will lay double track, it is stated, to its two wharves in Pensacola, Fla., and will also construct storage yards on 32 acres of filled-in land between DeVillier and Barcelona street.

—The Florida railroad commission has issued orders and the Jacksonville Terminal Co. will build new union station on Myrtle avenue, Jacksonville, Fla., starting construction not later than July 15.

—It is stated that the Southern Railway contemplates utilizing land recently acquired in North Birmingham, Ala., for shops and extensive yards but work will probably be deferred for some time.

—The Atlantic Coast Line R. R., it is said, will immediately rebuild its partially destroyed by fire export terminals, docks and warehouses at Jacksonville, Fla.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, JAN. 20, 1914.

Blow-off valve, 1,084,601—Lambert J. Bordo, Philadelphia, Pa.
Car roof, 1,084,694—Lewis T. Sanfield, Chicago, Ill.

Railway signaling system, 1,084,610—William J. Cook, Denver, Colo., and Simon Deutsch, Chicago, Ill., assignors to The Cook Railway Signal Co., Denver, Colo.

Rail fastening to ties, 1,083,619—Thomas Huntley Elliott, Vancouver, British Columbia.

Car roof construction, 1,084,638—Frank Jager, Chicago, Ill.

Injector, 1,084,640—Leonard Kassander, New York, N. Y. assignor to The Nathan Manufacturing Co., New York, N. Y.

Device for Manipulating coupling pins, 1,084,649—Fred Mathews, Chicago, Ill., assignor to Clinton C. Murphy, Chicago, Ill.

Weather strip device for car doors, 1,084,650—Fred Mathews, Chicago, Ill., assignor to Clinton C. Murphy, Chicago, Ill.

Railroad car, 1,084,653—Frank J. McNulty, Kansas City, Mo.
Cushioning device for independently movable car bodies, 1,084,690—William P. Bettendorf, Bettendorf, Iowa.

Car door operating mechanism, 1,084,728 and 1,084,729—George Case Cherbonnier, Ferguson, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Railway switch, 1,084,730—Samuel A. Craig and Benjamin F. Darbyshire, El Paso, Tex.

Electric car lighting system, 1,084,741—Robert C. Hull, Philadelphia, Pa., assignor to The Electric Storage Battery Co., Philadelphia, Pa.

Track gage, 1,084,760—Peter M. Stavdal, Nicolaus, Cal.

Combined locomotive headlight and signal, 1,084,763—Justen Stoddard, Stillwater, Minn.

Signaling system for railways, 1,084,765—John D. Taylor, Edgewood, Pa., assignor to The Union Switch and Signal Co., Swissvale, Pa.

Automatic fluid brake, 1,084,779—Louis H. Albers, Albany, N. Y.

Box car loader, 1,084,788—Joseph M. Christy, Des Moines, Iowa.

Brake mechanism, 1,084,791 and 1,084,792—William P. Collins, Boston, Mass., assignor to Automatic Air Brake Co., Boston, Mass.

Vapor heating system for railway cars, 1,084,797—Egbert H. Gold, Chicago, Ill.

Rail spike, 1,084,804—Julius Kruttschnitt, New York, N. Y.

Railroad rail, 1,084,812—Richard Deward Moore, Galesburg, Ill.

Slack adjuster, 1,084,834—Charles O. Anderson, Omaha, Nebr.

Arrangement for moving and holding car windows, 1,084,862—Alfred Kurth, assignor to Automatische Wagenfenster Gesellschaft, Berlin Germany.

Insulated rail joint, 1,084,903—Edwards F. Schermerhorn, Brooklyn, N. Y., assignor to The Rail Joint Co., New York, N. Y.

Pressure reducing valve, 1,084,940—Frederick L. Jahn, Philadelphia, Pa., assignor to Watson & McDaniel Co., Philadelphia, Pa.

Railway car, 1,084,950—Francis X. Mudd, Chicago, Ill., assignor to International Equipment Co., Portland, Me.

Automatic air brake coupling, 1,084,955—Dorcie R. Nugen, Auburn, Ind.

Mail bag catching and delivering apparatus, 1,084,984—Strother Watson, Gallatin, Tenn.

Rail joint support, 1,084,989—George H. Williams, Mount Carmel, Pa.

Equipment for locomotives, 1,085,011—Clinton L. Bopp, Waterloo, Iowa.

Railway track, 1,085,015—Lee Brewster, Tupelo, Miss.

Dresser for boiler cap seats, 1,085,025—Sigurd Dieseth, Carteret, N. J.

Rail joint, 1,085,033—Charles E. Goodrich, Birdsboro, Pa.

Car loading device, 1,085,040—Clarence Conway Hatfield, Duquoin, Ill.

Railway switch, 1,085,047—James Warren Hubbard, Eau Claire, Wis.

Rail brace, 1,085,049—Rade Javorina, Rembrandt, Iowa.

Metal railroad tie, 1,085,057—William W. Mechling, Munhall, and Jacob E. Smith, Homestead, Pa.

Rail joint, 1,085,059—George W. Mims, Sr., Thorsby, Ala.

Adjustable tie plate, 1,085,062—Joseph Odien, Buffalo, N. Y.

Self-regulating water feeder for boilers, 1,085,092—Amerigo Pinacchiotti, Hancock, Mich.

RAILWAY REVIEW

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Lord Strathcona's Bequest to Yale for Instruction in Transportation.

The will of Lord Strathcona, who died recently in London, contains among other large bequests for educational and philanthropic objects, a gift of \$500,000 to Yale University. It is an expression of his appreciation of the benefits he gained from investments in the United States, particularly from the St. Paul, Minneapolis & Manitoba and Great Northern railways. And it is learned upon publication of the text of the will, that the sum is to be directed specifically toward instruction in transportation branches. The will reads: "It being my special desire to have the said sum expended so far as may be deemed advisable for instruction in civil and mechanical engineering, with special reference to the construction, equipment and operation of transportation of passengers and freight, whether by land or water, and the financial and legislative questions involved." The university is empowered to equip buildings or to endow chairs for the promotion of these ends, and instructions are given that scholarships in the scientific or graduate departments be provided for sons of officials or employees of the two railway companies.

Arbitration of Wage Dispute on C. B. & Q. R. R.

The board of arbitration which is passing upon the controversy of the Chicago, Burlington & Quincy R. R. with its employees, concluded more than two months of hearings of arguments, February 5, when rebuttal arguments of A. F. Whitney, vice-president of the Brotherhood of Railway Trainmen, were completed. Executive sessions of the six commissioners appointed to decide the demands of the employees will be held daily until February 20, when an opinion will be given. The railroad's conductors and trainmen are asking for shorter hours and more pay. The board of arbitration is composed of Henry S. Boutell, Washington, D. C., and Congressman G. J. Diekema, Holland, Mich., government representatives; P. H. Morrissey, Chicago; Pierce Butler, St. Paul, Minn., representing the railroad, and E. L. Curtis, Houston, Tex., and H. L. Harrigan, Minneapolis, Minn., representing the employees.

Annual Report on Railway Accidents.

The annual report of the Interstate Commerce Commission on railway accidents, for the year ending June 30, 1913, shows that during that period 403 passengers, 3715 employees and 6846 other persons (including trespassers) were killed, an increase of 85 passengers, 80 employees, and 214 "other persons" over the record for the year previously. Of the employees killed 414 met death in "industrial" accidents, which cover accidents to employees other than trainmen, on railway premises, not involved in train operation. The number of passengers injured was 16,539, the number of employees injured was 171,417 and the number of "other persons" injured was 12,352. In train accidents there were 6477 collisions and 9049 derailments during the year, involving an expense of \$13,049,214 for damage to roadway and equipment and cost of clearing wrecks. Defective roadway and equipment together caused 69.8 per cent of the derailments. Broken rails caused 17.4 per cent of all the de-

railments due defective roadway and defective wheels 28 per cent of all derailments due to defective equipment. Of the derailments due to defective wheels nearly half were caused by broken flanges.

Canadian Government Also Refuses Parcel Post Compensation.

Announcement has been made in Canada that a parcel post system will be inaugurated in that country, effective February 10. The postmaster general has refused the request of the Canadian railroads for extra compensation for handling the additional mail matter. His statement in this connection is as follows: "After long negotiations, in which the railways were most insistent for an increase of about \$4,000,000 as extra compensation for carrying the parcel post, no special or additional compensation was allowed. A car-mile instead of a track-mile basis was agreed upon, however. Under this plan the railways will get about \$786,000 a year more than now. This was only a readjustment of the existing arrangement and is in no sense additional payment for the parcel post system."

New Express Rates in Effect.

The express companies put into effect, on February 1, the reduced schedule of rates as ordered by the Interstate Commerce Commission some time ago. The new rates are on the average, about 16 per cent, lower than those formerly prevailing. They are based upon a block system, the country being divided into 826 blocks formed by the intersections of the meridians of longitude and parallels of latitude. The first and second class charges are based upon rates per 100 pounds. Third-class rates are 1 cent for each two ounces, not to exceed first-class rates. An important feature is that every express office in the United States is able to determine and quote a rate to every other express office in the United States. Officials of five of the largest express companies held a meeting in New York City, February 2, at which the new rates were under consideration. At the close of the meeting the following official statement was given out: "The companies felt that the adoption of such greatly reduced rates must be viewed with the gravest apprehension as to the outcome. They were, however, confronted with three alternatives: first, an appeal to the courts; second, the dissolution of the companies through liquidation; or the giving of a fair trial to the low rates. But with a realization that the express service is essential to the commercial interests of the country, and that the shipping public was entitled to the protection afforded by the continuation of the express service provided the new conditions would afford a just remuneration to the express companies, they decided upon an earnest effort to make a success of the new rates for which they hope to have the good will and support of the public to the end that the express service may be preserved and expanded in mutual interest."

The Pennsylvania Railroad's Pension Roll.

In announcing, on January 31, the names of its employees who have been placed upon the company's pension roll, having reached the age of seventy years, the Pennsylvania Railroad made public the fact that during the past thirteen years it has paid out in pensions the sum of \$9,500,500. During that time 7800 men have been placed on the pension roll. Of that number 3765 have died, and as of Jan. 1, 1914, there were 4037 employees still on the roll. Of the \$9,500,500 paid out by the Pennsylvania Railroad system in pensions, \$7,174,129 had been expended by the lines east of Pittsburgh, and \$2,326,370 by the lines west of Pitts-

burgh. Among those retired on January 1st, was Margaret Ferguson, an employe on the New York division, who had served the company 30 years and four months. Twenty-seven women are now on the roll of honor of the company. Their average length of active service was twenty-eight years and one month.

Rules for Marking Freight in Texas.

The Texas railroad commission has formulated and adopted a new code of rules governing the marking of freight tendered railroads for transportation in the state. It gives in detail the requirements and specifications with which the marking of less than carload freights must conform, the design being to eliminate losses due to illegible or improper marking or tagging. Goods of which the marking does not conform to the specifications are not to be accepted as freight.

Courtesy Appreciated.

Several hundred passengers on trains of the Southern Pacific were marooned at San Luis Obispo and Santa Barbara, Cal., during the recent floods. They joined in a round robin which they sent to Passenger Traffic Manager Chas. S. Fee, thanking the company for its prompt efforts to expedite their journey by chartering the steamer Santa Clara, and providing space on the steamer Bear, to allow them to complete their trips. During the delay they were cared for by the railroad, which had a personal representative in charge. It is estimated that something like six thousand meals were provided at the railroad's expense. Passengers were hurried onward in automobiles in some cases and by boat in others. One of the letters received to-day reads: "We, the undersigned passengers on Southern Pacific train, Sunset Express, which left Los Angeles, Saturday night, January 24, 1914, and which has been detained at Santa Barbara since early Sunday morning on account of floods, do now, on Wednesday following, desire to express and make known to you our sincere appreciation of the care that has been taken of us and the uniform courtesy that has been extended to us by the employees of your company, and the Pullman company. The men with whom we have come in immediate contact are: our train conductor, Mr. Robinson; and Pullman conductor, I. I. Davis; and dining car conductor, G. P. Everett; the Santa Barbara agents, J. E. Sloan and W. F. McGregor. We commend them as courteous and efficient; and in this connection it may not be out of place when danger threatens, to tell you that we are deeply appreciative of all the steps that have heretofore been taken by you for the safety of your passengers, and next only to safety, we enjoy the courtesies that go to make travel attractive." Other letters are in like vein and bear a long list of signatures from travelers from all parts of the globe.

Good Record in Handling Baggage.

The Southern Pacific Co., handling millions of pieces of baggage a year, has established an enviable record, according to figures compiled by E. B. Carson, general baggage agent, with headquarters at San Francisco. In 1910, the Southern Pacific, on the Pacific system alone, handled about 6½ million pieces of baggage; in 1911, it handled 6¼ million; and in 1912, it handled almost 7¼ million. Altogether, for the three years, the total was just 19,831,248. Out of this tremendous number, only 180 pieces went astray—an average of just sixty pieces a year. And in many cases, baggage would not have gone astray had passengers themselves checked their belongings, had them re-checked when necessary, or changed the checking when they changed their own

destination en route. This record speaks well for the efficiency of the men in whose care is the handling of baggage. It is interesting to note that the San Francisco and Los Angeles depots handle the greatest amount of baggage on the system. In round figures, the San Francisco ferry depot, handling in and out, averages 40,000 pieces a month; the Third and Townsend depot in San Francisco, 20,000, and the Arcade station in Los Angeles, 70,000. In unclaimed baggage there were 7373 pieces in 1910; 6695 in 1911; and 5930 in 1912, these figures showing a decrease in the face of an increasing total handled, thus indicating greater care on the part of the public.

Shakespeare at Washington.

Interstate Commerce Commission to Brandeis:

"You are thought here to be the most senseless and fit man for the constable of the watch; therefore bear you the lantern." *Much Ado About Nothing*.

Brandeis to Railways:

"Pry thee, take the cork out of thy mouth." *As You Like It*.

Railways, loquiter:

"What kind of catechising call you this?" *Much Ado About Nothing*.

Of the 50 youngest officers of the Pennsylvania Railroad 78 per cent, are college men. Of the 100 next youngest set of junior officers of the same road, 60 per cent, are college graduates. These figures seem to indicate a strong tendency of railroad managements to select young men of college education for positions from which are drafted superintendents, general managers, vice presidents and presidents.

Great Engineering Work to Solve Flood Problem for China.

It has been officially announced by the American Red Cross that the Chinese government has authorized the issue of \$20,000,000 of bonds for the future prevention of floods in the Huai River Valley in China, and that the J. G. White Engineering Corporation, of New York city, has been designated to undertake the construction of the Huai River works. The project is probably one of the greatest humanitarian and engineering enterprises ever known, and its completion, it is estimated, will save thousands of lives and millions of dollars annually. The whole enterprise depends upon the ability of the Chinese government to find a market for the proposed bond issue. It is anticipated that there will be no difficulty in this connection, and the prospect is that American money, as well as American engineers, will be largely involved. Dr. Chen Chin-Tao is now on his way to America to represent his country in the negotiations, and five distinguished engineers will be assigned to confer with the J. G. White Engineering Corporation and Dr. Chen Chin-Tao, and proceed to China in time to observe the next overflow of the Huai river, which generally occurs in July.

The Red Cross suggested about three years ago that the Chinese government, instead of spending millions to relieve the suffering caused by the periodical floods which devastated thousands of square miles, should take the necessary steps to make the river keep within its banks. The Chinese thought well of the plan, but on account of the international difficulties involved in raising the money and granting concessions, they would not authorize the work unless the Red Cross would take a general supervising interest. The predominance of the humanitarian feature enabled the government to turn the entire project over to the Red Cross.

At the earliest possible moment the development work will proceed, and the J. G. White Engineering Corporation will take charge. The project includes the reclamation of about 17,000 square miles. The work will require approxi-

mately six years to complete, and employment will be given to about 100,000 men. The project will involve dredging to deepen the channel of the river and the Grand Canal; also the construction of dams and reservoirs to keep the Huai in its proper course, and to impound its surplus water and divert the streams flowing into the Huai, which, at the time of floods, greatly increase its overflow. The Huai river, for the greater part of its length, flows between banks that

are elevated above the surrounding country, and in times past the river in overflowing its banks, has changed the geography of an entire province over night. During one of the flood periods, the Yellow river, which is a tributary of the Huai, switched the location of its mouth a distance of about 700 miles. Government records show that floods in this district have reduced the average number of crops from two in one year to two in five years.

Improving the Locomotive Fuel Record

Pursuing further the study of the expense of locomotive fuel, we are now able to give the figures for the fiscal year 1913, ended June 30th. In a table given last year we made a ten year comparison, 1902 to 1912. We now give these figures with the addition of those for 1913. During the ten years the price of fuel increased an average of over 30 per cent. Owing to this fact and the greater train loads, the expense per train mile increased 52.4 per cent.; but owing to improvements in fuel consumption and the greater train tonnage, the expense per ton-mile increased only 19.5 per cent. This showed good work on the part of the railways in keeping expense down.

The cost of fuel in 1912 and 1913 was about the same, but the improvement in results continued. The expense per train mile increased owing to greater train tonnage—but less than one per cent. The expense per ton mile, however, decreased 8.5 per cent; which must be allowed to be a creditable record.

The average tractive power of locomotives continues to

increase, being 5.59 per cent. greater in 1913 than in 1912. The result appears in a less ton mile fuel cost; and if fuel prices remain stationary or go back toward the 1902 level, the good work of decreasing the fuel expense per unit of work done will continue to show up clearly.

The following figures show the fuel costs for 1913 on five additional roads—the figures for comparing them with previous years not being available at this writing:

Fiscal Year Ended June 30th, 1913

	Cost of Loco. Fuel. Per Train Mile in Cents.	Per Ton Mile in Mills.	Average Tractive Power, Tons.
Lake Shore & Michigan Southern	19.338	.5315	17.59
Louisville & Nashville.....	11.752	.6155	14.76
Missouri Pacific	17.905	1.0498	14.42
Michigan Central	23.387	.9624	15.10
Southern Pacific	17.523	1.1861	16.11

Expense of Fuel for Locomotives.

COMPARISON OF YEARS 1902-1912-1913.

	Per Ton Mile, in Mills			Per Train Mile, in Cts.			Aver. Tract. Pwr. Loco. in Tons		
	1902.	1912.	1913.	1902.	1912.	1913.	1902.	1912.	1913.
A., T. & S. F.....	.7660	1.1231	1.0369	11.403	18.109	17.961	10.92	16.55	16.76
Atlantic Coast Line.....	1.2820	1.4908	1.4113	11.560	16.210	16.525	7.74	10.66	10.98
Baltimore & Ohio.....	.3888	.4307	.4459	9.696	14.063	16.275	13.32	17.44	17.83
Boston & Maine	2.2050	1.9745	1.9937	19.048	22.738	25.064	8.31	11.49	12.22
Central R. R. of N. J.....	.6698	.9393	.8400	13.610	23.305	22.849	9.58	12.68	13.01
Chesapeake & Ohio.....	.2284	.2771	.2695	7.812	13.432	13.885	12.52	17.50	18.97
Chicago & Alton .....	.5295	.7148	.6809	8.463	16.119	16.939	11.71	15.68	16.53
Chicago & Northwestern .....	.8902	1.5509	1.3115	12.631	21.635	21.858	8.96	12.57	13.08
Chicago, Burlington & Quincy.....	.8642	.8984	.7802	10.749	19.717	19.241	8.89	13.57	14.63
Chicago, Milwaukee & St. Paul.....	.8145	1.3633	1.0727	12.525	21.807	21.313	8.16	11.61	14.50
Chicago, Rock Island & Pacific.....	1.1174	1.5147	1.4397	11.640	19.900	20.512	9.88	13.87	14.33
Delaware, Lackawanna & Western..	.6444	.7200	.6559	12.648	21.416	21.986	11.02	14.33	15.12
Erie .....	.5810	.5886	.5491	12.922	17.234	17.998	11.21	12.58	16.55
Great Northern	1.1255	.8754	.8424	26.638	24.800	26.649	12.33	16.96	18.26
Illinois Central .....	.5437	.6818	.6320	9.061	13.618	14.678	10.63	13.55	14.31
Minneapolis & St. Louis.....	1.1901	1.5972	1.1511	14.376	22.118	20.906	8.83	12.01	12.53
Lehigh Valley .....	.5642	.6750	.6363	16.612	24.338	25.482	11.41	14.24	15.31
N. Y. C. & H. R.....	.7325	.8962	.7704	11.196	17.489	17.573	10.67	16.20	16.52
N. Y., N. H. & H.....	2.4677	2.3094	2.2123	16.715	22.212	.....	8.79	11.44	11.90
Norfolk & Western .....	.2568	.3049	.3081	8.925	15.612	17.371	12.84	17.74	18.79
Northern Pacific .....	.7058	1.2636	1.1691	15.093	30.007	31.507	10.87	15.50	16.72
Pennsylvania .....	.4744	.5168	.4904	13.547	18.155	18.477	11.98	16.53	16.90
Philadelphia & Reading .....	.6853	.6721	.6876	11.996	19.923	22.149	†	14.26	14.65
St. Louis & San Francisco.....	.8656	1.1613	1.0859	10.246	15.149	16.314	9.20	13.87	14.00
Southern .....	.9066	.9258	.9186	9.532	11.571	11.989	†	15.52	15.89
Toledo, St. Louis & Western.....	.6138	.5846	.5331	10.430	15.476	16.685	9.83	13.54	13.54
Union Pacific .....	.7705	1.1604	1.0606	13.325	22.123	22.908	12.78	15.67	16.51
Wabash .....	.6162	.8842	.7442	8.248	16.400	16.498	8.97	13.14	13.79
Averages .....	.8392	1.0033	.9189	12.523	19.095	18.985	9.69	14.31	15.11
Per cent increase over 1902.....		19.5	9.5		52.4	51.6		47.7	55.9
Per cent increase from 1912.....			8.5			.73			5.59

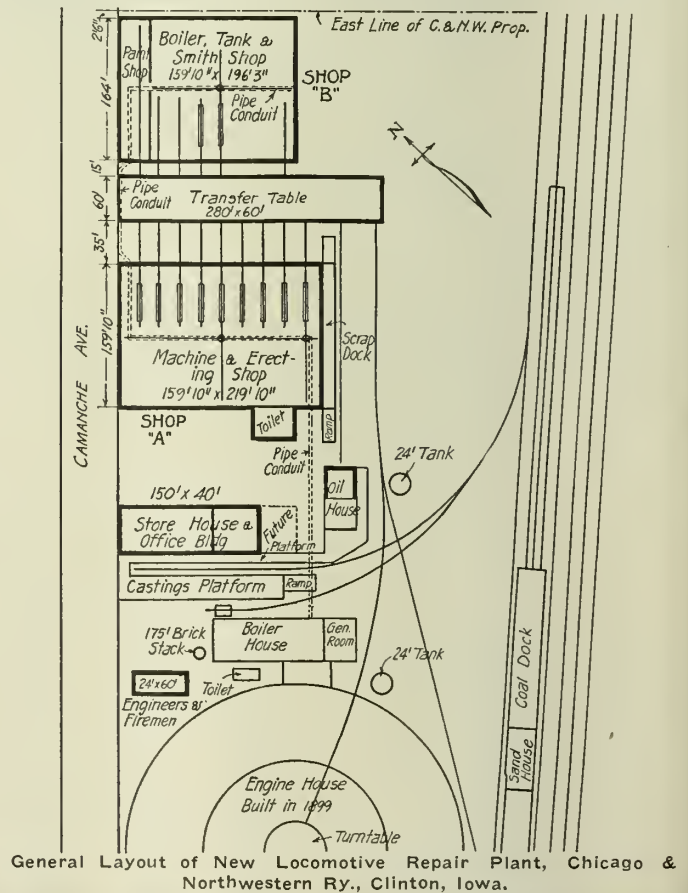
New Locomotive Repair Plant, Chicago and Northwestern Ry., Clinton, Iowa

The new locomotive repair plant forming the subject of this article, constitutes an important element in the series of shop and terminal improvements which the Chicago & Northwestern Ry. is providing in and about Clinton to facilitate the operation of the East Iowa division of the main line and the branch lines in this vicinity. The shops in question are a notable example of what can be accomplished in the way of placing extensive facilities in restricted space, at the same time allowing room for liberal expansion. The system of handling locomotives by means of an electric screw hoist and transfer table, instead of lifting direct by means of cranes, makes possible the use of cranes of only ten tons capacity each, and materially lessens the amount of overhead space required in the erecting shop.

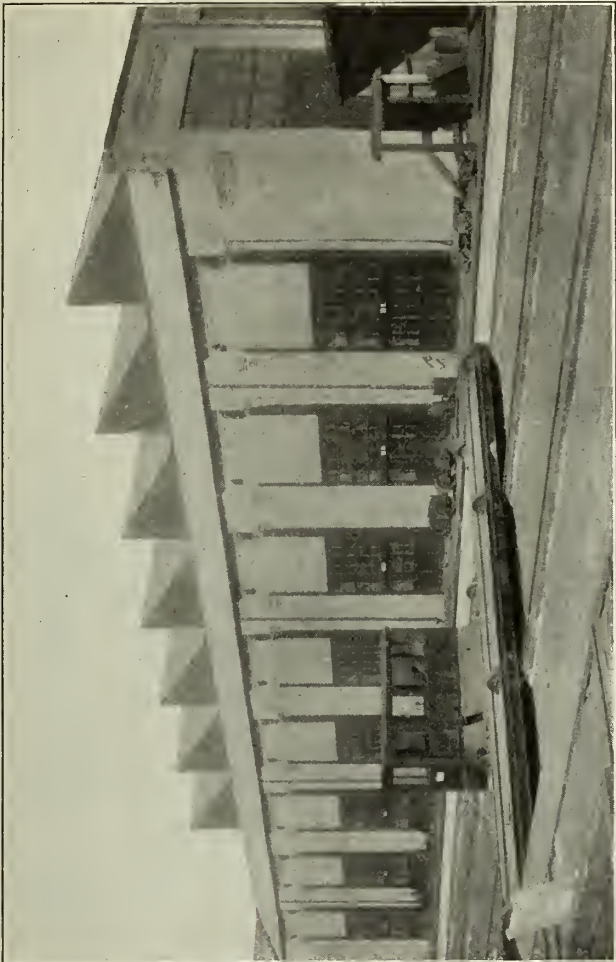
The Chicago & Northwestern Ry. began about twelve years ago to expand its repair and terminal facilities at Clinton, Iowa, by constructing a 48-stall passenger locomotive round-house about three-fourths of a mile west of the then main shop group located in the central district of the city. More recently, owing to rapidly expanding business, it was found advisable to establish a large freight yard in the vicinity of Clinton, and for want of a suitable site on the Iowa side of the Mississippi river, this yard was located on the Illinois side, establishing a center that has since been known as East Clinton. In connection with this yard, a complete new freight engine terminal, constructed in accordance with the road's established practice for terminals of this kind, was built, same consisting of a 58-stall engine house with its accompanying coaling dock, store house, combination power-house and repair shop, etc. A full description of this improvement will be found in the Railway Review for June 15, 1912. These improvements removed from the original site at Clinton both the freight and passenger terminals which have always been important features of this division point.

Coincident with the need for new engine terminals, there arose the need of improved facilities for attending to the repairs to the rolling stock equipment operating on the East Iowa division of the main line, and on the several branch lines in this immediate territory. The need of shops in which to house the locomotive repair department being the most pressing, the construction and equipment of the new shops was accordingly carried out as a part of the 1913 program, and since December 15 of last year, these shops have been available for repair purposes. There not being sufficient space on which to locate a plant of the desired

size with reasonable allowances for expansion on the old shop location, a site adjacent to the passenger locomotive terminal previously mentioned was determined upon. The new improvements were made to combine with the passenger engine round-house already located at this point in such manner as to form a single plant. This consisted mainly in modifying the existing combination machine-shop, power and store house so as to make it available as a structure in which to house the enlarged and newly equipped power house; the store house and machine-shop facilities being absorbed with those made available with the completion of the new plant. The buildings provided then, consist



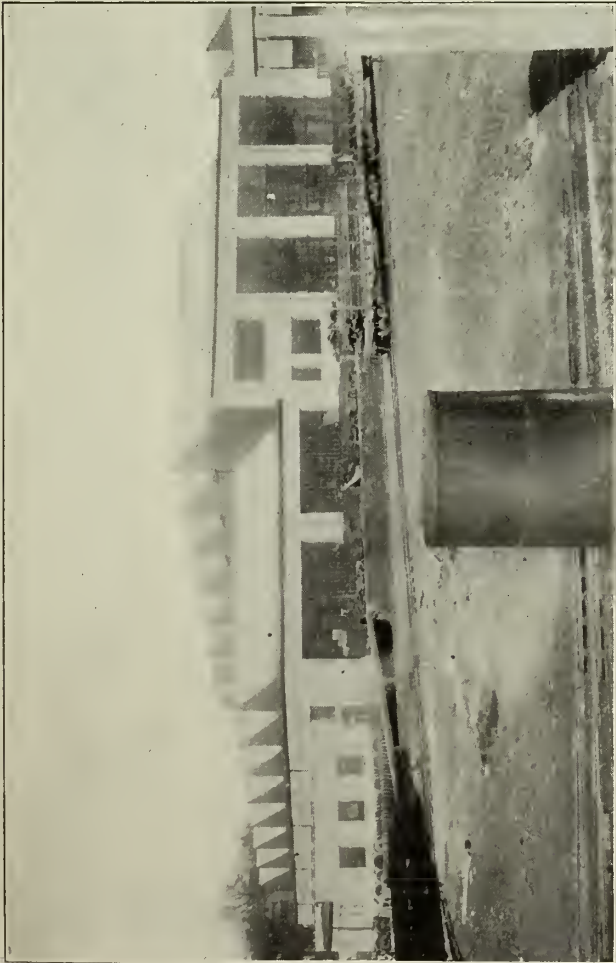
General View of New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Iowa.



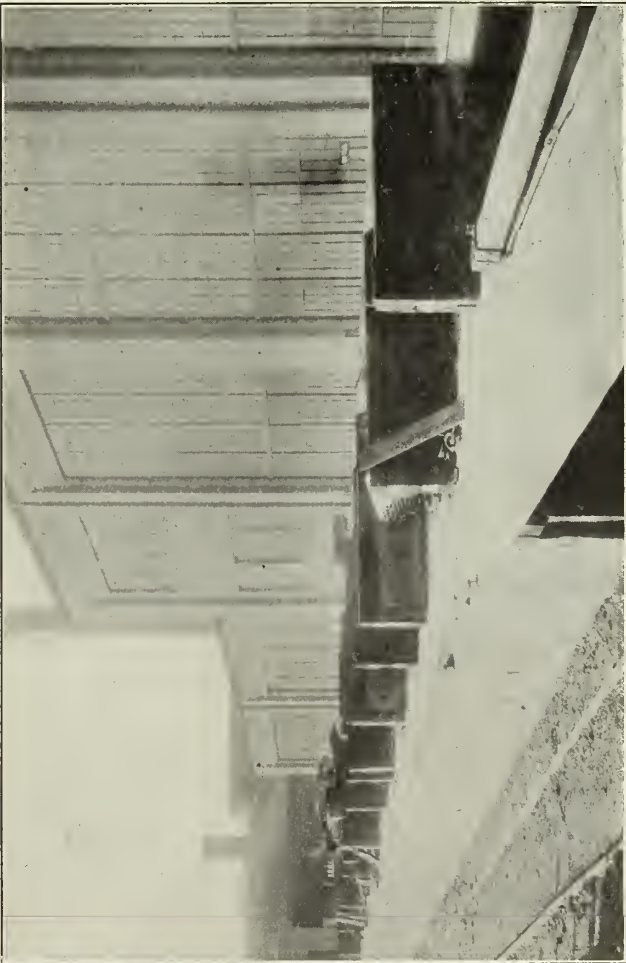
West Side of Shop "B" Looking Across Transfer Table.



Store-House and Office Building, New Locomotive Repair Plant, Clinton, Iowa.

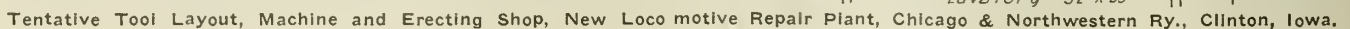


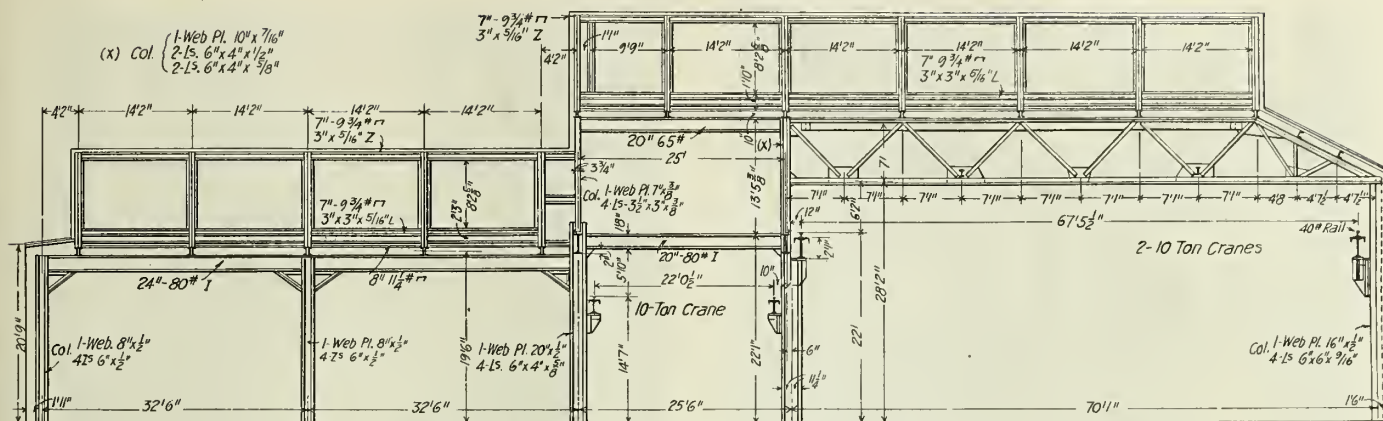
Machine and Erecting Shop, New Locomotive Repair Plant, Clinton, Iowa.



Scrap Dock at South End of Machine and Erecting Shop, Clinton, Iowa.

Machine and Erecting Shop: The machine and erecting shop, designated as shop "A," is 160 feet wide and 220





Cross Section of Machine and Erecting Shop, New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Iowa.

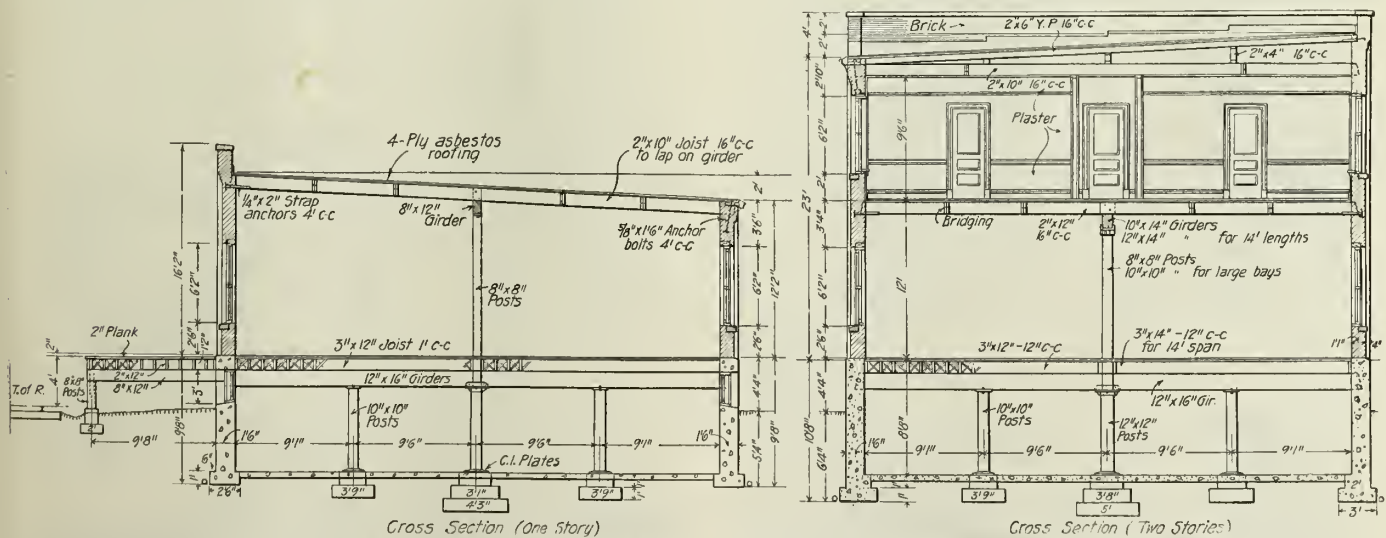
feet long. Longitudinally, there are four bays, two of which, the 70-foot erecting bay and the 25-foot service bay, are provided with crane service, which necessitated the placing of the roof over this portion of the building at a higher level than over the two machine bays which are each $32\frac{1}{2}$ feet in width. The roof is constructed on the saw-tooth principle, admitting light to the building from a northwesterly direction. The roof-trusses in the erecting bay are so placed that a clear height of 28 feet 2 inches to the bottom chords is allowed, giving room for a crane runway at a height of 22 feet. Crane service in this bay is provided by means of two 10-ton Pawling & Harnishfeger cranes, having a span of 67 feet $5\frac{1}{2}$ inches. That higher capacity cranes are not required is due to the fact that at the southern-most of the nine pits in this bay, there is provided an electric screw lift of 200 tons capacity, for the purpose of unwheeling locomotives; this lift being similar to the one provided for the Boone, Iowa, shops of this road by the Whiting Foundry Equipment Co., and likewise manufactured by that firm. Reference to this device with illustrations, will be found in connection with a description of the above shops which appeared in the Railway Review on August 3, 1912. The engines being un wheeled, are mounted on specially devised trucks for the purpose and are placed on their respective pits via the transfer-table route. This arrangement obviates both the need of high crane capacity and makes possible a considerable saving in the cost of the building because of the fact that much less head-room on the erecting shop is required.

The 25-foot service bay is served by means of a ten-ton capacity Pawling & Harnishfeger electric crane, operated from the floor level. Space in this bay is also available for

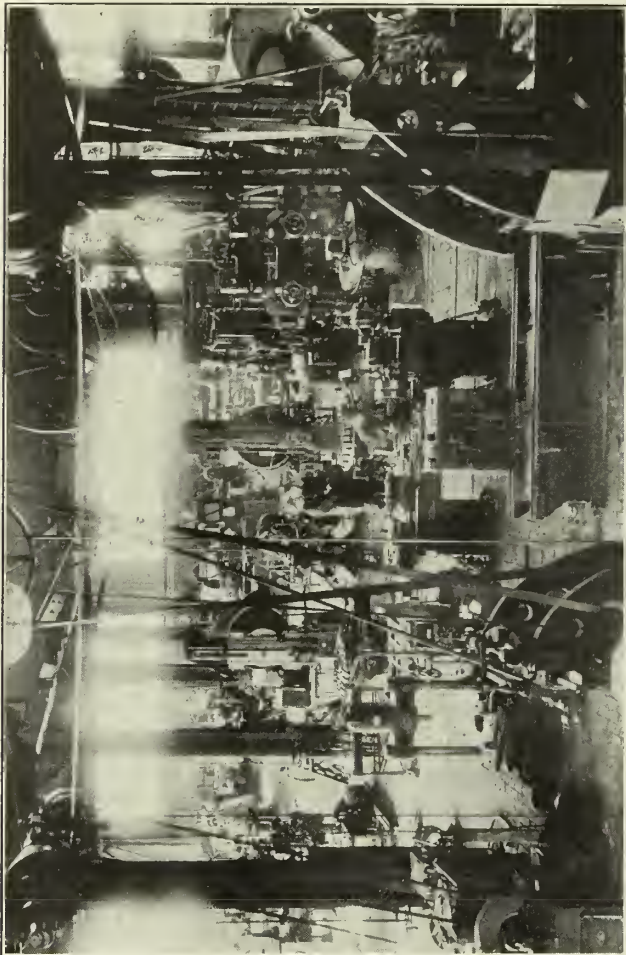
a gallery, although for the present it is not being utilized for that purpose, other than to accommodate a platform on which are mounted the transformers for the lighting circuits. The concrete conduit in which are carried the water, air, steam, and power lines, runs lengthwise of the shop down the center of this bay, as does also a standard gage industrial track which latter connects by means of turntables with transverse service tracks in line with the first and fifth pits of the shop.

On the machine-shop side of the building are located the facilities for taking care of all work not properly belonging to boiler, tank, forge, and painting departments. This includes, besides the wheel, axle, rod, and miscellaneous machine work, the tin, pipe, and wood shops and the air-brake department, these being located at the north end of the building where remoteness from the stripping pit results in least inconvenience. Similarly, the heavy work, such as on wheels, axles, rods and frames, is provided for either in the immediate vicinity of the stripping pit at the south end of the shop, or adjacent to crane facilities communicating therewith. The tool room, over which is the office of the general foreman, is located, as is the stripping pit, at the south end of the building, the idea being that subsequent expansion to the south will give these features a more central location with respect to the enlarged shop as a whole. Machine tools are driven both by the line shaft and by the individual motor method, the distinction being mainly as between new machine tool equipment and the older belt-driven tools, some of the latter having been transferred to the new shop from the old shop, in central Clinton.

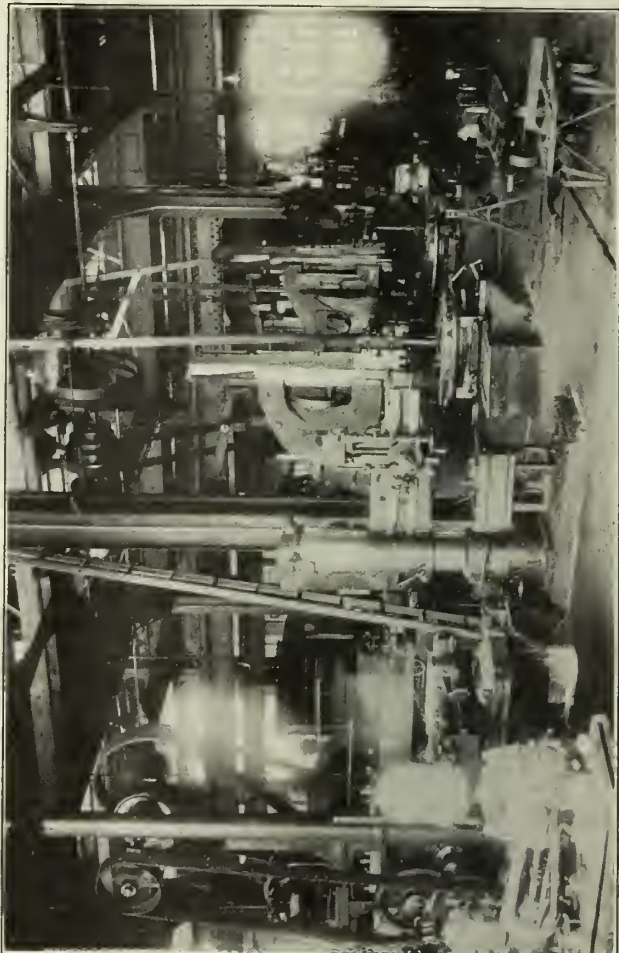
Boiler, Tank, Forge and Paint Shop: This shop, referred to as shop "B," is almost identical in construction with shop



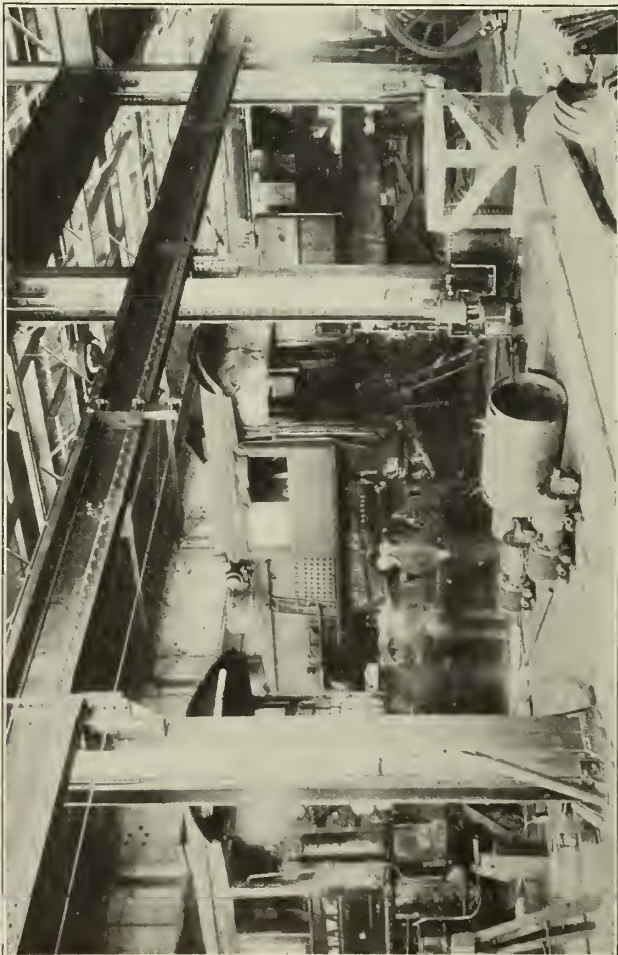
Transverse Sections of Store-House and Office Building, New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Ia.



General View of Machine Shop, Locomotive Repair Plant, Clinton, Iowa.



View in Machine Bay, New Locomotive Repair Plant, Clinton, Iowa.



View in Erecting Bay, New Locomotive Repair Plant, Clinton, Iowa.



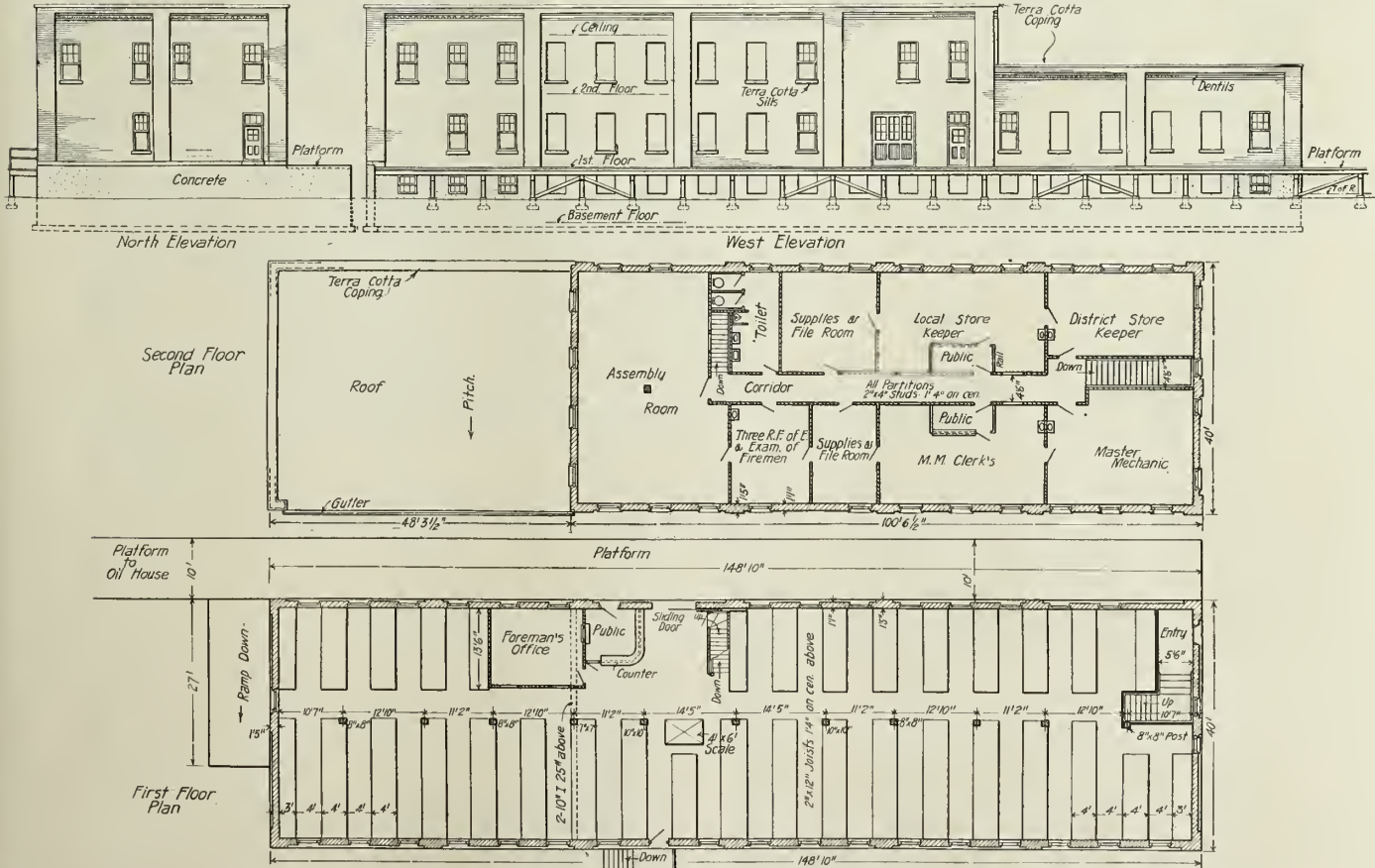
Service Bay of Machine and Erecting Shop, New Locomotive Repair Plant, Clinton, Iowa.

"A" in reverse, this arrangement having been adopted in order to bring the erecting and the boiler shop bays of the two buildings respectively, adjacent to the 60-foot transfer table which operates in the 110-foot space between them. The building, however, is 23 feet, or the width of one transverse bay, shorter than shop "A." The extreme north bay in this building, comprising a space 31½ feet wide, is partitioned off from the rest of the shop to serve as a paint shop. Tank and boiler work is taken care of in the west half of the remaining portion of the shop, crane service being provided by means of a 40-ton electric crane having a span of 67 feet 3½ inches. For the present neither crane service nor gallery space is provided in the central longitudinal service bay of this building, although the construction is such that these facilities can readily be installed should occasion therefor arise. Two of the tracks in the boiler shop side are provided with pits, which in case of need, can be used in supplementing the erecting shop space in shop "A." As in the case of shop "A," an industrial track runs longitudinally of the building in the service bay, as does the concrete pipe tunnel, which latter communicates with the tunnel in shop "A" around the north end of the transfer table runway. The service track above mentioned is intersected at about the center of the shop, or in line with the fourth transverse bay, by a second track running at right angles to the first and which, on the east side of the building serves to define the spaces devoted to forge and to flue and plate work respectively. The various machines in the flange and plate shop are independently motor driven. An important feature of the forge shop is the blower and exhaust system by means of which blast is furnished for the forges and the building is kept free from smoke. Numerous jib cranes with chain and power hoists serve to facilitate the handling of materials and parts in both these departments.

Power House: As mentioned at the beginning of this article, the power house building consists of what formerly

was the machine shop and store-room of the engine-house. The present enlarged equipment consists, in the boiler room, of a battery of four 250-horsepower Hawkes boilers fired by means of Continental chain grate stokers. The Webster system of feed-water heating is used and the water supplied the boilers is measured by means of a venturi meter. Coal is supplied the stokers and ashes are removed from underneath the grates, by means of a bucket conveyor installed by the Link Belt Machinery Co. The engine room equipment includes one Allis-Chalmers 500 k. w. generating set consisting of a cross compound engine driving a three phase, 60 cycle, 440 volt generator, a standby set of 150 k. w. capacity, and a Chicago Pneumatic Tool Co.'s 1400 cu. ft. capacity steam-driven cross-compound air compressor. The usual boiler-feed and underwriters pumps are likewise installed. The various motors about the plant are of the induction type and take current direct from the generators without transformation. The lighting system, however, operates at 110 volts, requiring step-down transformers which are located in the gallery space of the machine and erecting shop as previously referred to. The route followed by the 5 by 7-foot concrete pipe conduit by means of which the power and other lines are led to shops "A" and "B," is shown in the general layout of the plant.

Lighting and Heating: General artificial lighting of the shops is effected by means of "Star-Delta" clusters located in the roof trusses of the shops. Each of these clusters consists of four 100-watt tungsten lamps taking current at 110 volts. Receptacles are also located convenient to each of the machines so that extension cords may be used for individual lighting, in addition to which, between pits and elsewhere where needed, there are columns on top of which are turrets providing receptacles for seven extension cords each. These same columns also afford two receptacles each from which current at 440 volts may be obtained for operating portable electrically driven tools and machinery. These turrets were devised by the roads electrical engineering staff,



Plans and Elevation of Store-House and Office Building, New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Iowa.

which, incidentally, acted as contractor for the complete installation of the lighting and power equipment. Heating is effected by means of the Webster exhaust steam system, ample radiation therefore being provided around the outside walls of the buildings.

The locomotive repair department under normal conditions, employs about 200 men, the car department, 275 men, and the locomotive terminals at Clinton and at East Clinton approximately 300, making a total of between 750 and 800 men when all departments are fully occupied. Mr. W. H. Bradley is division master mechanic at this point, and as such, has general supervision over these several shops and terminals. Others to whom acknowledgment is due for courtesies extended in the preparation of this article include Mr. George Logan, general foreman, and Mr. E. W. Pratt, assistant superintendent of motive power, and Mr. H. H. Decker, engineer of maintenance of way, recently resigned, who maintained general supervision over the construction of the plant for the mechanical and engineering departments respectively.

Publications of the Master Car Builders' Association.

The distribution of the proceedings of the 1913 convention of the Master Car Builders' Association is now being made. The proceedings have become so voluminous that it has been decided to issue them in two parts. Copies will be furnished to non-members at \$10 per set (two volumes), f.o.b. Chicago. Copies of the rules of interchange have likewise been distributed at the following rates:

100 or more copies	\$3.60
50 copies	2.60
25 copies	1.15
Single copies .....	.05

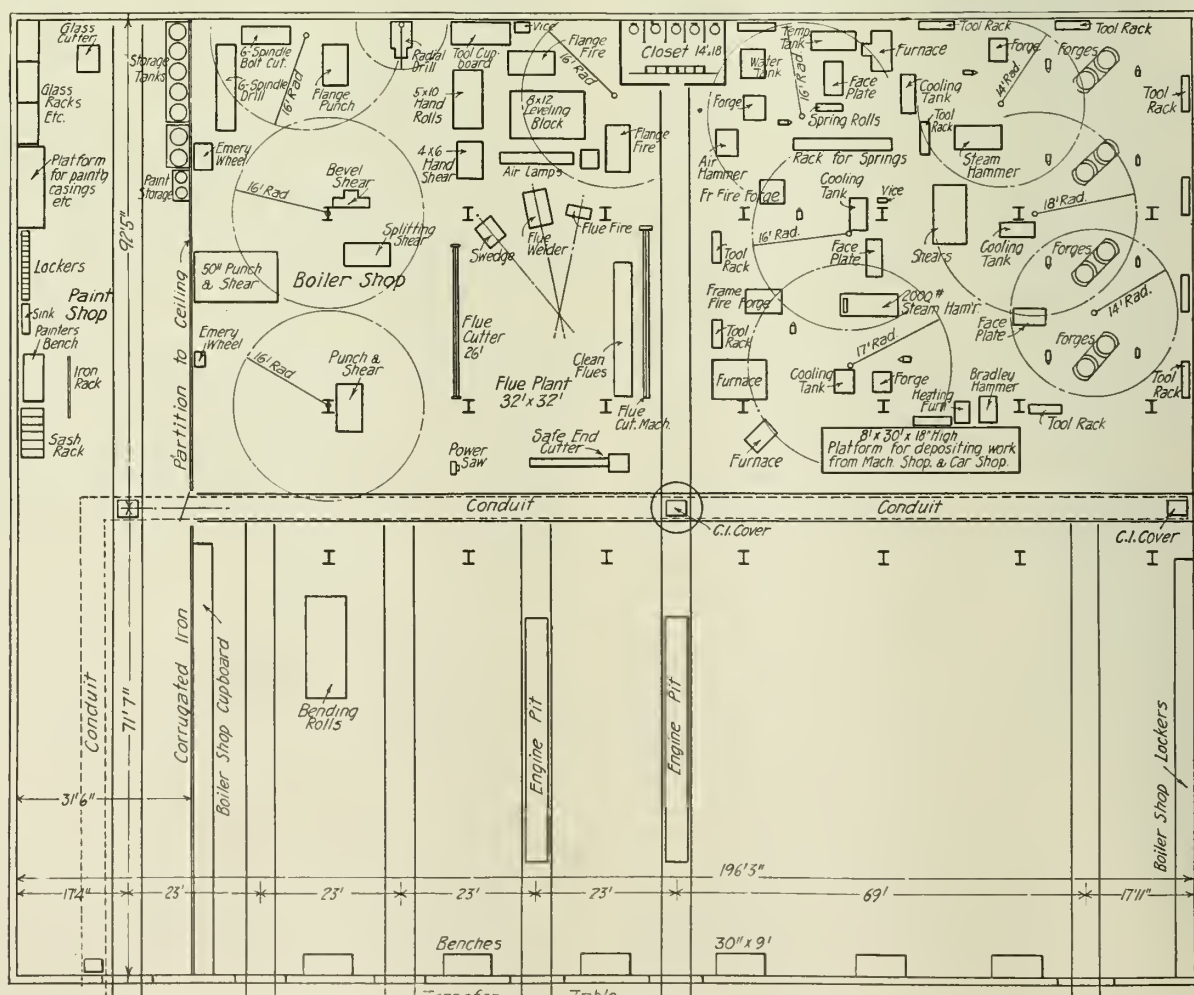
Postage to be added when sent by mail. Additional printing at cost.

The issuance of the pamphlet containing the standards and recommended practice has been discontinued. Hereafter the standards and recommended practice will appear only in the report of proceedings. The loading rules have been modified and revised, and the requirements of those interested will be filled promptly on receipt of order by the secretary of the association. They are sold at the same rates as the rules of interchange. The air brake and train air signal instructions were not modified, the association still has a supply on hand and can furnish them in such quantities as may be required. The specifications for tank cars were revised and rearranged and can be furnished in whatever numbers may be required. They are sold at the same rates as the rules of interchange. Owing to the small demand for the large illustrations of the standards and recommended practice, their issuance has been discontinued.

The supply of the bound volumes of the decisions of the arbitration committee, cases 1 to 603, inclusive, is exhausted. There is in preparation a volume containing an abstract of cases 1 to 603, inclusive, and a reprint of cases 604 to date. This will shortly be ready for delivery. A paper-bound edition containing cases 604 to 788, inclusive, can be had from the secretary at 50 cents per copy. Cases 789 to 943 are in pamphlet form and are furnished free of charge. Inquiries should be addressed to Jos. W. Taylor, secretary, 1112 Karpen building, Chicago.

Supplementary Hearings on Free Services.

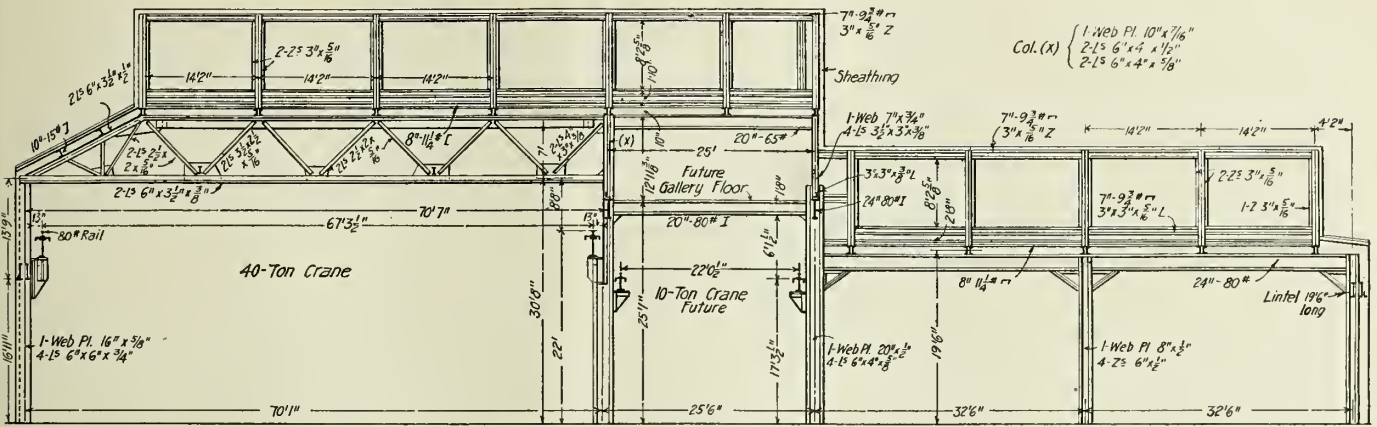
The Interstate Commerce Commission has announced that it will hold a series of hearings supplementary to its recent



Tentative Tool Layout, Boiler, Tank and Forge Shop, New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Iowa.

inquiry which resulted in the decision in the industrial rail-ways case. The investigation will cover the broad question of fixing reasonable charges for the free services which railroads now perform for large industrial plants. It will not be limited to Official Classification territory, as were the

What is the extent of the service they render upon such spurs?
Give the number of cars spotted.
Such figures as the railroad company has on the cost of that service.



Cross Section of Boiler, Tank and Forge Shop, New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Iowa.

questions previously at issue. The hearings will be held at the New Willard hotel, Washington, D. C., February 12, 13 and 14, and Commissioner Harlan will preside. The announcement specifies the following subjects of inquiry:
Nature and extent of the trap and ferry car service. The situation in Chicago in regard to these services may be taken as illustrative.
What is the cost and value of such service, and the propriety of the existing charges?
What facilities are offered by the Chicago tunnel, and to what extent is the tunnel service paid for by the carrier?
What is the nature and extent of the lighterage and drayage privileges allowed in Chicago?
What is the cost and value of such lighterage and drayage services and the propriety of the charges therefor, if any?
Under what circumstances, and upon what terms, do the carriers construct, maintain, and operate industrial spurs?

Of what benefit to the shippers is the service of spotting cars?
What may be said of the propriety of imposing a charge for the service so rendered, in addition to the rate for the road haul?
If such a charge may with propriety be imposed, shall it be uniform or shall the spurs be classified? If so, on what basis?
Under what circumstances and terms are reconsignments and diversions in transit permitted?
What is the extent of the service imposed upon the carrier by the reconsignment privileges?
Are the charges, if any, now made for these reconsignment or diversion services adequate? If not, what should they be?
Of what benefit to the shipper is the service of reconsignment or diversion?

Brake Efficiency, Chilled Iron vs. Steel Wheels

By F. K. VIAL, CHIEF ENGINEER, GRIFFIN WHEEL CO.

This article constitutes a critical analysis of the extensive tests made during recent years at Purdue University and at the Mahwah, N. J., plant of the American Brake Shoe & Foundry Co. for the Master Car Builders' Association and for the Association of Manufacturers of Chilled Car Wheels. A study of the effect of different kinds of brake shoes on steel and on chilled iron wheels is made and the general conclusion is drawn that under normal conditions of operation, the coefficient of friction is 25 per cent greater on the chilled iron than it is on the steel wheels.
The coefficient of friction between the brake shoe and the moving wheel, which is the measure of brake efficiency, is a variable quantity depending upon the speed and kind of wheel; the shoe pressure, the length of time the shoe is applied; the kind of shoe; whether plain, chilled or with inserts; the kind and shape of inserts; condition of shoe, etc. The coefficients of friction for a large variety of brake shoes under varying conditions have been determined at Purdue University in a series

of tests conducted for the Master Car Builders' Association and reported in the proceedings of that association for the year 1910-1911. Supplementary tests were also made for the association of Manufacturers of Chilled Car Wheels.
For the original test, 28 brake shoes were selected from different kinds, each kind in duplicate. One set of 14 shoes was submitted for test at the laboratory of Purdue University, and the other set was tested on the brake shoe testing machine of the American Brake Shoe & Foundry Co. at Mahwah, N. J. The coefficients of friction were determined on a chilled iron wheel in effecting stops from an initial speed of 40 miles per hour under three brake shoe pressures, viz., 2808, 4152 and 6840 lbs. On the steel wheel the coefficients of friction were determined at pressure of 2808, 4152, 6840, 10,000, 12,000, 15,000 and 18,000 lbs. effecting stops from an initial speed of 65 miles per hour. The results of these tests are shown in Table 1.
The tests at Purdue, reported in the Master Car Builders' proceedings in 1911, were conducted on seven shoes effecting

Table 1.

Shoe Number.	Laboratory at which test was made.	Brake Shoe.	Mean coefficient in per cent initial speed of 40 m. p.h. chilled iron wheel.			Mean coefficient in per cent stops from an initial speed of 65 m.p.h. Steel tired wheel.						
			Shoe pressure, lbs.			Shoe pressure, lbs.						
281	A. B. S. & F. Co.	Plain cast iron, (C. & N. W.)	2808	4152	6840	2808	4152	6840	10000	12000	15000	18000
282	Purdue	Plain cast iron, (C. & N. W.)	26.3	21.7	21.	16.3	13.1	11.0	...	...	...	...
283	A. B. S. & F. Co.	Plain cast iron (without re-inf.)	22.1	21.6	20.4	16.	...	12.4	...	10.4	...	...
284	Purdue	Plain cast iron (without re-inf.)	25.1	23.5	20.6	...	...	11.7	...	...	...	...
285	A. B. S. & F. Co.	Congdon, seven wrought inserts,	30.3	27.7	24.5	16.3	...	13.5	...	11.6	...	...
286	Purdue	Congdon, five wrought inserts	26.8	19.0	15.3	19.7	17.7	12.4	8.9	9.4	8.2	7.7
287	A. B. S. & F. Co.	Congdon, five wrought inserts	22.2	19.8	16.4	20.6	...	14.0	...	11.3	...	...
288	Purdue	Congdon, five wrought inserts	25.0	18.3	17.2	20.3	18.0	11.8	9.5	9.8	8.5	7.6
289	A. B. S. & F. Co.	Streeter, two hard iron inserts	24.4	22.6	19.1	15.1	...	11.9	...	11.7	...	...
290	Purdue	Streeter, two hard iron inserts	24.5	22.6	19.0	16.9	14.9	11.2	11.7	10.4	9.5	9.1
291	A. B. S. & F. Co.	Lappin, chilled ends (A. B. S. & F.)	21.3	20.6	16.4	13.6	...	10.8	...	10.7	...	...
292	Purdue	Lappin, chilled ends (A. B. S. & F.)	18.2	16.8	16.1	15.0	13.4	10.1	8.8	8.6	8.8	6.8
293	A. B. S. & F. Co.	Lappin, chilled ends (A. B. S.)	20.5	19.6	18.9	17.0	...	13.0	...	11.1	...	...
294	Purdue	Lappin, chilled ends (A. B. S.)	20.5	18.4	14.3	16.3	15.1	11.6	9.1	9.3	7.9	6.6
295	A. B. S. & F. Co.	Plain cast iron (A. B. S. & C.)	18.4	17.8	17.5	16.9	...	12.7	...	12.2	...	...
296	Purdue	Plain cast iron (A. B. S. & C.)	27.0	25.1	21.9	16.9	13.5	11.3	9.7	8.4	9.3	8.5
297	A. B. S. & F. Co.	Plain cast iron (Columbia B.S.Co.)	21.0	20.3	18.5	16.2	...	13.2	...	11.1	...	...
298	Purdue	Plain cast iron (Columbia B.S.Co.)	27.0	28.6	21.8	18.3	14.0	13.5	15.3	...	...	...
299	A. B. S. & F. Co.	Diamond S, chilled ends (A.B.S.Co.)	21.0	18.9	17.3	16.8	...	13.1	...	10.7	...	...
300	Purdue	Diamond S, chilled ends (A.B.S.Co.)	24.2	20.0	16.2	21.5	17.4	13.5	11.2	10.8	9.8	9.8
301	A. B. S. & F. Co.	Walsh, two hard iron inserts	22.8	20.5	18.3	17.3	...	10.6	...	12.3	...	...
302	Purdue	Walsh, two hard iron inserts	22.6	20.0	14.9	14.7	12.1	10.3	8.7	8.6	9.1	8.7
303	A. B. S. & F. Co.	Pittsburg, malleable iron shell	23.7	20.5	19.8	16.6	...	14.4	...	11.5	...	...
304	Purdue	Pittsburg, malleable iron shell	24.4	21.9	17.0	17.7	17.9	17.5	14.0	11.8	11.2	10.7
305	A. B. S. & F. Co.	Pittsburg, steel shell (P.B.S.Co.)	26.8	25.4	21.5	22.8	...	18.9	...	17.6	...	...
306	Purdue	Pittsburg, steel shell (P.B.S.Co.)	29.9	29.6	21.2	23.0	20.9	18.7	15.8	14.7	14.2	15.8
307	A. B. S. & F. Co.	National, chilled ends (N.B.C.Co.)	29.4	27.5	23.4	25.8	...	23.2	...	22.2	...	...
308	Purdue	National, chilled ends (N.B.C.Co.)	16.8	15.2	11.9	15.1	11.3	9.8	8.2	7.5	6.9	8.3
			19.3	16.4	14.3	15.2	...	12.1	...	11.2	...	...

stop from 80 miles per hour, at pressures of 12,000, 14,000, 16,000, 18,000 and 20,000 lbs., as shown in Table 2.

Table 2.

Kind of shoe	12000	14000	16000	18000	20000
Congdon	9.60	9.08	8.68	8.57	7.25
Plain cast iron	8.22	9.22	9.19	8.70	7.21
Spear-Miller	9.98	9.47	8.42	7.67	8.30
National	8.73	8.99	8.67	7.68	6.87
Diamond "S"	9.72	9.55	8.73	8.86	7.02
"U" shoe	9.60	9.27	8.72	8.45	7.34
Pittsburgh	19.75	18.75	17.75	17.10	15.27

At Purdue a series of tests was also conducted for the Association of Manufacturers of Chilled Car Wheels, the results showing both the chilled iron and steel wheel tested under 2808, 4152, 6840 and 12,000 lbs. pressure from an initial speed of 40 miles per hour. See Table 3.

Table 3.

Test.	Kind of shoe	Chilled iron. Pressures.				Rolled steel wheels. Pressures.			
		2808	4152	6840	12000	2808	4152	6840	12000
406	Streeter, Chill ends	24.7	20.8	17.6	13.8	21.4	18.7	14.7	12.8
407	Lappin	18.5	16.5	14.8	13.6	18.5	16.2	13.2	11.4
408	Diamond S	22.5	20.0	18.4	14.8	19.8	16.5	14.0	11.7
409	V Inserts	17.4	17.0	11.8	10.9	19.3	16.9	13.9	12.8
	Average	20.8	18.6	15.6	13.3	19.8	17.1	13.9	12.2

In reviewing the foregoing tests, the first item that attracts attention is the greater coefficient of friction on the chilled iron wheel. The number of brake shoes used in the various tests are different, therefore the averages are not exactly on the same basis. The result of the Diamond "S" shoe throughout seems to be very consistent. The tests made by Purdue University in 1910 show the Diamond "S" coefficients at different pressures to be almost exactly equal to the average of all shoes tested, and again in 1913, the shoes tested for the Association of Manufacturers of Chilled Car Wheels give the identical coefficients for the Diamond "S" shoe, and for that reason it is known that the tests are comparative, although they were not all made at the same time.

Chart No. 1 shows the results of the tests of the Diamond "S" shoe on the chilled iron wheels, stops being made from 40 miles per hour; also on the steel wheel at 40, 65 and 80 miles per hour. From this diagram, and from the review of the tables in general, it is evident that there is a dropping off in the coefficient of friction in brake shoes as the pressure increases. The rate of decrease amounts to about 6 per cent of the coefficient of friction for each increase of 1000 lbs. pressure. This 6 per cent drop is constant within the limits of these tests and holds true for both chilled iron and steel. This may be illustrated by the following data from the test conducted by Purdue University for the Association of Manufacturers of

Chilled Car Wheels. On chilled iron wheels with Diamond "S" shoes the pressures and efficiencies for these pressures were as follows:

Pressure	3000	4000	5000	6000	7000	8000	9000	10,000
Efficiency	22	20.7	19.4	18.4	17.6	16.9	16.3	15.8
As calculated		20.7	19.5	18.3	17.3	16.6	15.9	15.4

For steel wheels the shoe pressures and corresponding efficiencies were as follows:

Pressure	3000	4000	5000	6000	7000	8000	9000	10,000
Efficiency	19.3	17.1	15.6	14.5	13.7	13.1	12.6	12.2
As calculated		18.1	16	14.6	13.6	12.8	12.3	11.8

While there are some departures from this 6 per cent reduction per 1000 lbs. increment in shoe pressure, these variations are compensating. In general the calculated values follow the observed values very closely.

It is also evident that there is a dropping off in the coefficient of friction as the velocity of the rotating wheel increases. It is, therefore, self evident that the retarding force is not pro-

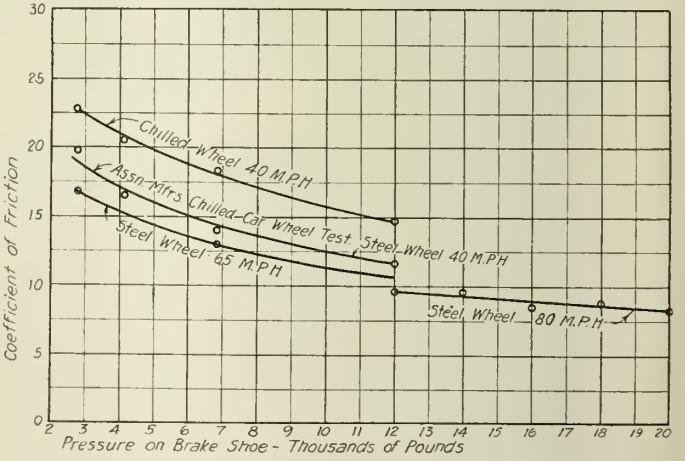


Chart No. 1—Coefficient of Friction for the "Diamond S" Brake Shoe, Chilled vs. Steel Wheels.

portional to the braking power or shoe pressure, but in general terms, for pressures between 2,000 and 15,000 lbs. per shoe, the amount of work accomplished increases with but half the rapidity that the shoe pressure increases, that is to say, doubling the shoe pressure will increase the retarding effect 50 per cent. This is shown graphically in Chart 2. At very low and very high pressures the work accomplished increases in a very much lower ratio. In the case of the Diamond "S" shoe on the chilled iron wheel, at a constant speed of 20 miles per hour, the coefficient of friction at 800 lbs. pressure was 44 per cent

and at 2,000 lbs. pressure, 26.3 per cent. This is shown graphically on Chart 3. The retarding force at 800 lbs. was 352 lbs. while at 2,000 lbs. pressure, the retarding force was 526 lbs. This shows that for an increase in shoe pressure of 150 per cent, the work done increased but 50 per cent. This shows the great advantage of the light continuous pressure as compared with heavy intermittent pressure in controlling trains on heavy grades. Respecting very high pressures, Dean Benjamin of Purdue University in his report of May 10, 1911, to the Chairman of the Brake Shoe Committee of the Master Car Builders' Association states: "It is easily seen that the coefficients of friction drop rapidly between 18,000 and 20,000 lbs. pressure and

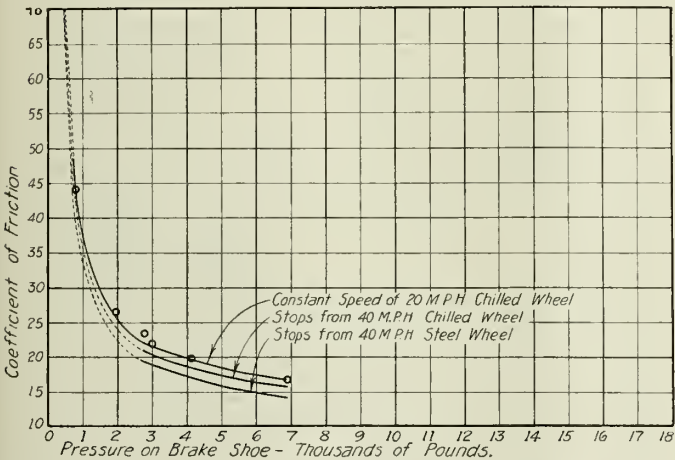


Chart No. 2—Coefficients of Friction, Chilled and Steel Wheels at Stops from 40 Miles per Hour and Chilled Wheel at Constant Speed of 20 Miles per Hour.

that the amount of wear is correspondingly great while the stopping distance, of course, is not materially diminished."

Relation of Speed to Coefficient of Friction: On account of the majority of tests on the steel wheel having been made at high speeds and those on the chilled iron wheel at 40 miles per hour and less, a direct comparison of the effect of speed on the coefficient of friction is not as clearly worked out as would be desirable. However, there is sufficient data to indicate the probable effect through a range of from 40 to 80 miles per hour. This is brought out in Chart 1. Under heavier pressures the effect of speed is not as noticeable as at lower pressures. The probability is that after reaching 12,000 lbs. pressure the speed effect is very largely eliminated, whereas at the lower pressures the effect of increasing speeds is a very material reduction in the coefficient of friction.

Two of the tests on steel wheels may be compared. One of these was made with an initial speed of 40 miles per hour, the second with an initial speed of 65 miles per hour. The coefficients of friction under the various pressures for the two speeds are as follows:

Pressure	3000	4000	5000	6000	7000	8000	9000	10,000
Coefficient at 40 m. p. h.	19.3	17.1	15.6	14.5	13.7	13.1	12.6	12.2
Coefficient at 65 m. p. h.	17.5	15.5	14.0	13.0	12.4	11.6	11.3	10.8
Calculated for 65 m. p. h.	17.4	15.4	14.0	13.0	12.3	11.8	11.3	11.0

It will be seen that throughout the range of this list there is a drop of 10 per cent in brake efficiency in passing from 40 to 65 miles per hour with steel wheels. There are no data at hand to show just what the variation is in the case of chilled wheels but it is very probable that the loss in efficiency at higher speeds is very similar to that of steel wheels under like conditions.

Brake Efficiency, Chilled Iron vs. Steel Wheels: The question is often raised as to whether the brake efficiency of chilled iron wheels is equal to that of steel wheels. The indication is very strong in all the foregoing tests that not only is the brake efficiency of the chilled iron wheel equal to that of the steel wheel, but as a matter of fact, it is about 25 per cent higher. This is shown in comparing tests made for the Association of Manufacturers of Chilled Car Wheels with tests made for the

Master Car Builders' Association, stops being made from an initial speed of 40 miles per hour. According to Chart 1 the coefficients of friction are easily 25 per cent in favor of the chilled iron wheel in stops made from an initial speed of 40 miles per hour.

Pressure	3000	4000	5000	6000	7000	8000	9000	10,000
Coefficient for chilled iron	22	20.7	19.4	18.4	17.6	16.9	16.3	15.8
Steel	19.3	17.1	15.6	14.5	13.7	13.1	12.6	12.2
Per cent difference	14	21	24	27	28	29	29	29

It will be seen in this test that the coefficient of friction was rather more than 25 per cent higher in the case of the chilled iron wheel.

That the coefficient of friction between the brake shoe and the chilled iron wheel is materially greater than on the steel wheel, all conditions being equal, is clearly indicated in the Master Car Builders' specifications which contain the following essentials:

First:—

"Tests upon chilled iron wheel from an initial speed of 40 miles per hour at 2808 lbs. pressure 22 per cent at 4152 lbs. pressure 20 per cent at 6840 lbs. pressure 16 per cent

Second:—

"Tests upon steel wheel from an initial speed of 65 miles per hour at 2808 lbs. pressure 16 per cent at 4152 lbs. pressure 14 per cent at 6840 lbs. pressure 12 per cent"

The only condition in the above specifications which cannot be directly compared is that the speed on the steel wheel is at 65 miles per hour, while the chilled iron wheel is 40 miles per hour. However, from the tests made, it does not seem that the difference on account of the speed element can amount to more than 10 per cent, and reducing the specifications for coefficients of friction on the steel wheel to 40 miles per hour by the use of this factor, we have the following comparison of coefficients of friction on brake shoes for stops from an initial speed of 40 miles per hour on both the chilled iron and the steel wheels:

Pressure	Chilled Iron	Steel Wheel	Difference	Per cent in favor of Chilled Iron
2808 lbs.	22 per cent	17.6 per cent	4.4	25
4152 lbs.	20 per cent	15.4 per cent	4.6	29.8
6840 lbs.	16 per cent	13.2 per cent	2.8	21.2

This indicates that the Master Car Builders' Association, in its specifications, demands 25 per cent greater efficiency in brake

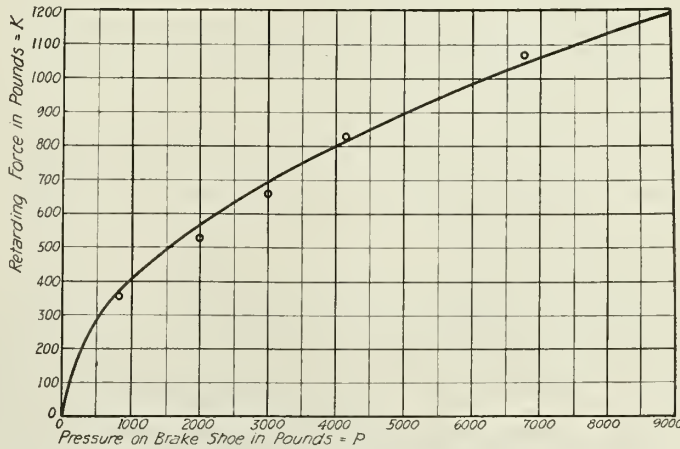


Chart No. 3—Relation of Retarding Force to Pressure on Brake Shoe at a Speed of 20 Miles per Hour. General Equation, $K^2 = 160P$.

shoes when applied to chilled iron wheels than when applied to steel wheels. Applying these specifications to the tests made at Purdue University for the Association of Manufacturers of Chilled Car Wheels, it is notable that only two of the shoes fully met the specifications. These were the Streeter and the Diamond "S", which showed the following percentages in favor of the chilled iron wheel:

Streeter Shoe:

- At 2808 lbs. pressure, 15.4 per cent greater retarding force.
- At 4152 lbs. pressure, 11.2 per cent greater retarding force.
- At 6840 lbs. pressure, 19.7 per cent greater retarding force.
- At 12000 lbs. pressure, 7.8 per cent greater retarding force.

Diamond "S" Shoe:

- At 2808 lbs. pressure, 13.6 per cent greater retarding force.
- At 4152 lbs. pressure, 21.2 per cent greater retarding force.
- At 6840 lbs. pressure, 31.4 per cent greater retarding force.
- At 12000 lbs. pressure, 26.5 per cent greater retarding force.

In the report of Purdue University, signed by Prof. Lewis E. Endsley, addressed to the chairman of the Master Car Builders' committee on brake shoe tests, dated Feb. 21, 1910, is found the following note concerning the tests:

"None of the 14 shoes tested damaged the surface of the cast iron wheel during the wearing tests. In the wearing test on the steel tired wheel at a constant speed of 20 miles per hour and at a pressure of 2808 lbs., two shoes scored the wheel. Shoe No. 286 which was given 300 applications, cut four V-shaped grooves about 1-32 inch deep and several smaller ones in the surface of the wheel around the entire circumference. After test of this shoe, the wheel had to be ground with a revolving emery wheel in order to get a smooth surface for the next shoe. The other shoe that scored the steel tired wheel was No. 288. This shoe was given only 100 applications for in that time it had cut five grooves similar to those cut by shoe No. 286."

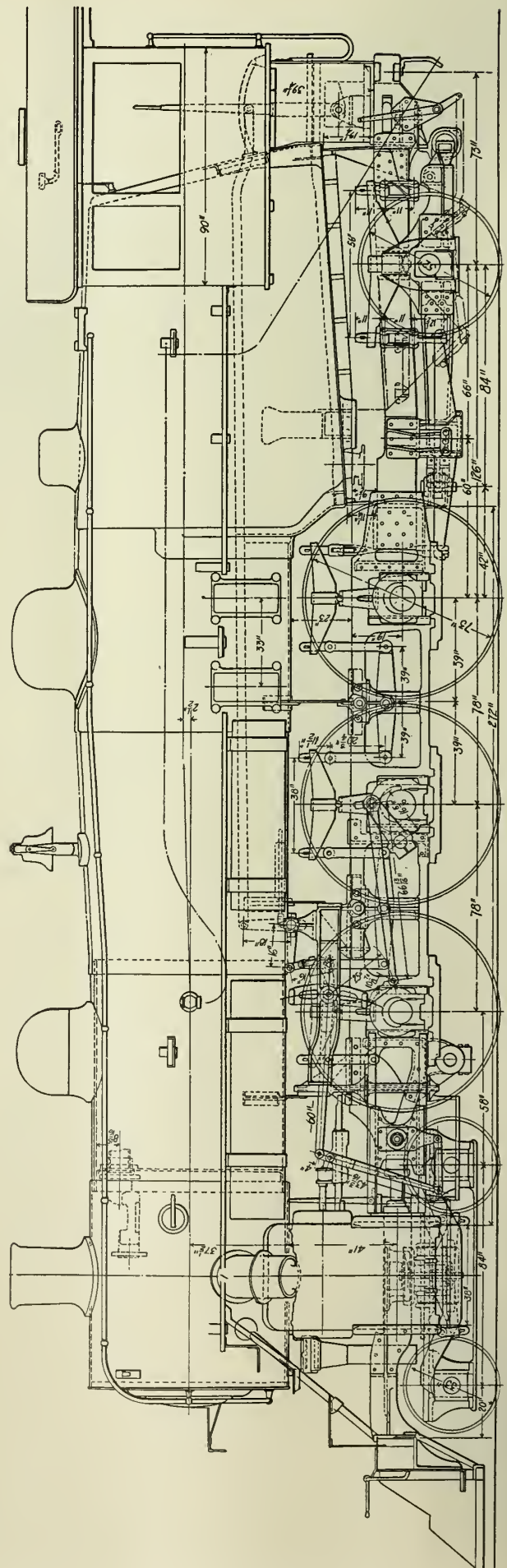
The above shows (and which is very often found to be the case in practice) that insert shoes cannot be used on steel wheels on account of the severe scoring and wearing away of steel, whereas no such effect is found on the chilled iron wheel; and it will be found that the shoes with the steel inserts, which do the most damage to the steel wheels and, therefore, cannot be used, are the ones which give the high coefficient of friction and should be eliminated from consideration in making comparisons of laboratory tests.

The final conclusion from all tests made at Purdue University is that the coefficient of brake shoe friction on chilled iron wheels is fully 25 per cent greater than on the steel wheels when working under ordinary conditions.

Report Recommends Government Wire Lines.

The special commission appointed by Postmaster General Burleson to investigate the practicability of acquirement by the federal government of the telegraph and telephone lines of the country, has made a report of its findings to congress. The report was sent to the senate in response to a resolution introduced by Senator Norris. It is accompanied by a mass of statistical information, and is signed by the following, who composed the committee: Daniel C. Roper, first assistant postmaster general, Merritt O. Chance, chief clerk, post office department; John C. Koons, superintendent of the division of salaries and allowances,

The report states that the United States is "alone of the leading nations which has left to private enterprise the ownership and operation of the telegraph and telephone facilities," and that practically all of the economists who have treated the subject are agreed that telegraph and telephone facilities should be controlled by the government. It declares further that Theodore N. Vail, president of the American Telephone & Telegraph Co., by his statement that the telephone business must be "under common control" and "sufficiently strong to constitute practically one system, inter-communicating, inter-dependent, universal,"



Elevation, Pacific Type Locomotive, Chicago Great Western R. R.

las himself pointed out that the most efficient telephone service can be attained only under a condition of monopoly. The report continues:

"The private monopoly has no incentive to extend its facilities to unprofitable territory; but the government must serve all the people. This universal service is accomplished by the equalization of rates. In fixing rates, the policy of this government is to superimpose no charge for taxation, but only to see to it that the service as a whole is self-supporting. The private monopoly, on the other hand, must make a profit, and, in providing for this, tends to increase its rates to the highest point that will not, by so greatly restricting the volume of business, impair the aggregate profit.

"It is obvious that the longer the acquisition by the government of these facilities is deferred the greater will be the cost. Moreover, it is economic waste to permit private enterprise to build up vast properties that must eventually be taken over by the government in resuming its constitutional monopoly at a cost out of all proportion to the value of parts of such property that may be utilized to advantage in the postal system.

"So far as the public generally is concerned, the entire telegraph service is owned and operated by two telegraph companies. Telegraphic facilities have not been extended to the small towns and villages along with the government postal facilities, nor has the cost of the service been reduced in the inverse proportion that would seem warranted by the increasing volume of business transacted. Neither has the volume of business in this country, in proportion to the population, been as great as in European countries

where this facility is owned and operated governmentally.

"It is needless to enter into the manifold advantages and benefits that would accrue to the people from a universal telephone service. As it has done with the mails, it is the duty of the government to make this facility available to all of its citizens without discrimination.

"According to the best available data, the capitalization of the long-distance and toll lines represents approximately \$200,000,000 and the capitalization of the entire commercial net work approximately \$900,000,000. The cost to the government would be less than the appraised value, since it would be undesirable for the government to purchase the real estate holdings of the companies. Exchanges could be leased until accommodations could be provided in the post offices and stations."

The report says that "the only way to afford to the people the complete and modern postal facilities that the constitution makes it the duty of the government to provide," is by carrying out these suggestion: "(1) That congress declare a government monopoly over all telegraph, telephone, and radio communication, and such other means for the transmission of intelligence as may hereafter develop. (2) That congress acquire by purchase at appraised value the commercial telephone network, except the farmer lines. (3) That congress authorize the postmaster-general to issue, in his discretion and under such regulations as he may prescribe, revocable licenses for the operation, by private individuals, associations, companies, and corporations, of the telegraph service and such parts of the telephone service as may not be acquired by the government."

Pacific Type Locomotives for the Chicago Great Western R. R.

The requirements of modern passenger service were clearly reflected in the locomotives built for this class of work during the year 1913. These engines were all, with but few exceptions, of the Pacific type, designed to use superheated steam, and carrying the heaviest wheel loads permitted by the physical condition of their respective roads. The Pacific type is steadily replacing the ten-wheel type in heavy work, and is proving quite as adaptable to either heavy passenger or fast freight service as did its predecessor.

During the month of December, 1913, the Baldwin Locomotive Works completed, for the Chicago Great Western R. R., five Pacific type locomotives which are notable because of their general design and the details of their construction. These engines develop a tractive force of 38,700 pounds, and with 152,400 pounds on driving wheels the ratio of adhesion is very nearly 4. The cylinder volume is 15.9

cubic feet, and the total equivalent heating surface of the boiler is 4293 square feet. There are thus provided 310 square feet of equivalent heating surface per cubic foot of cylinder volume; a liberal allowance, even for a fast passenger locomotive.

The boiler is of the extended wagon-top type, equipped with the Gaines locomotive furnace. In the present instance, the firebox has a deep sloping throat, and is placed entirely back of the driving-wheels. The length of the combustion chamber measured from the vertical face of the tube sheet to the front of the bridge-wall, is 30 inches. This wall has a thickness of 10 inches, and it is carried on a steel casting which is supported by lugs formed in one piece with the mud ring. The lugs are lipped on the bottom, thus relieving the bolts of shear. Air is conducted to the top of the wall through five wrought iron pipes, each three inches



Pacific Type Locomotive, Chicago Great Western R. R.

in diameter, which are set vertically in the brick work. The air, as it leaves the pipes, is in a heated condition, and is deflected in a downward direction under a brick arch. This arch is supported on four water tubes, and extends backward a distance of approximately 40 inches from the top of the bridge-wall. A long flame way is thus provided for the gases before they enter the tubes.

The total inside length of the firebox is 126 inches, while the grate has a length of 96 inches and presents a surface of 56 square feet. The firebox is supported on expansion plates at the front and back. The inside shell is radially stayed, and the front end of the crown is supported on two "T" bars which are hung on expansion links. 351 flexible stays are placed in the breakage zones in the sides, throat and back head.

The main frames are vanadium steel castings, 4½ inches in width. They are strongly braced at the front, main and rear driving pedestals; and the upper frame rails are also transversely braced by the guide yoke, valve motion bearer, and a broad steel casting placed between the main and rear drivers. The back pedestal brace is a large casting, which strengthens the frames at the splice between the main and rear sections, and also supports the expansion plate carrying the forward end of the mud ring and the radius-bar pin for the trailing truck. This truck is of the improved Hodges type, with spring-links arranged to swing in planes tangential to the arc in which the truck frame swings. No cross beams are used in the truck equalization, and ample space is provided for a deep ashpan. This is of the two-hopper type with swing-bottoms.

The steam distribution is controlled by 15-inch piston valves, driven by Walschaerts motion and set with a lead of 3/16 inch. The arrangement of the superheater and steam piping calls for no special comment. The cylinders are fitted with by-pass valves of the Sheedy pattern.

The details of these locomotives have, where practicable, been made to interchange with those of engines already in service. This is particularly true of the Class L-I Mikado type locomotives built for the road in 1912. The piston valves, crossheads, main driving boxes, pedestal shoes and wedges, driving springs, and spring saddles, are among the more important details that interchange in these two types.

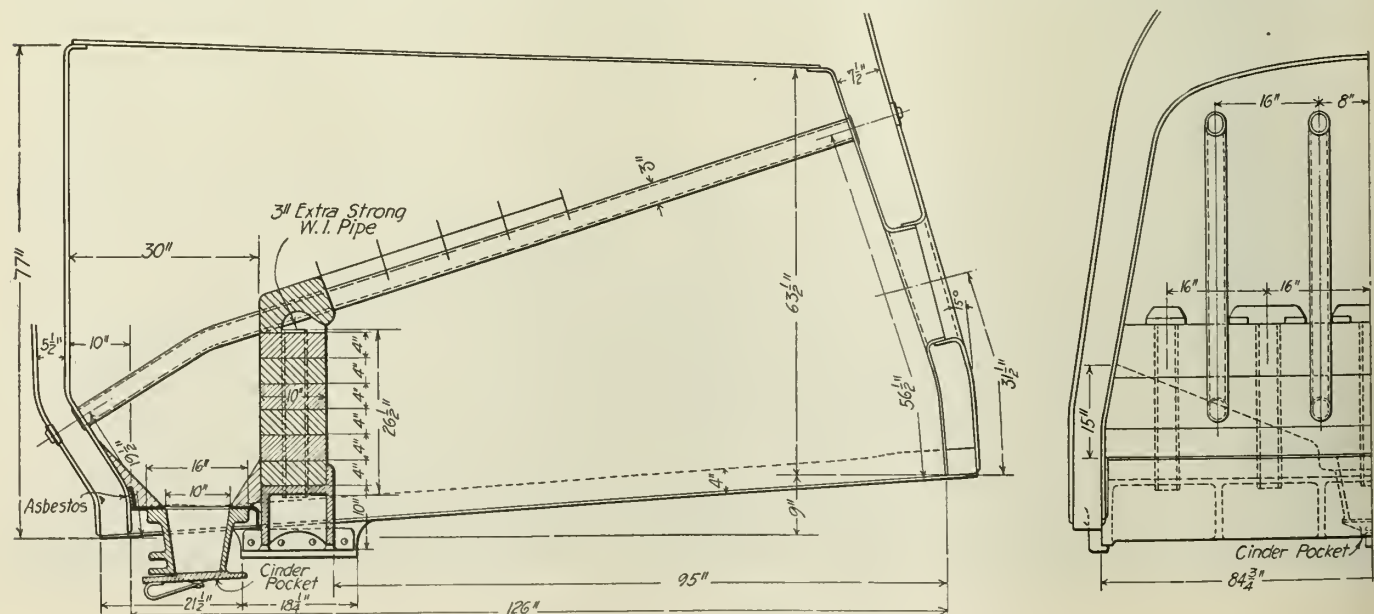
The tender is fitted with a vestibule connection at the rear. The tender and the leading engine truck wheels are of solid rolled steel, manufactured by the Standard Steel Works Co. These engines represent advanced practice, although they embody only such features as have been tried out in

service, and found reliable. Efficiency is the key-note of the design, and there is every indication that the locomotives will prove successful.

The leading features of these locomotives are indicated in the following table:

Type	4-6-2
Service	Passenger
Cylinders	25 by 28 ins.
Valves	15 in. piston.
Valve gear	Walschaert.
Tractive power	38,700 lbs.
Boiler, type	Wagon top
Min. diameter	72 ins.
Working pressure	190 lbs.
Fire-box Gaines type, size.....	84 by 126 ins.
Grate area	56 sq. ft.
Kind of fuel	Soft coal.
Tubes, no. and dia.	239 2 ins.
Flues, no. and dia.	32 5½ ins.
Length	20 ft. 6 ins.
Heating surface, fire-box.....	225 sq. ft.
Tubes and flues	3474 sq. ft.
Arch tubes	33 sq. ft.
Total	3732 sq. ft.
Superheating surface	794 sq. ft.
Driving wheels, diameter.....	73 ins.
Journals, main	11 by 12 ins.
Journals, others	9 by 12 ins.
Truck wheels, front, dia.	33 ins.
Journals	6 by 10 ins.
Back, diameter	52 ins.
Journals	8 by 14 ins.
Weight, on driving wheels.....	152,400 lbs.
Total engine	257,000 lbs.
Total engine and tender.....	410,000 lbs.
Wheel base, driving	13 ft. 0 ins.
Total engine	35 ft. 4 ins.
Total engine and tender.....	66 ft. 0 ins.
Tender, wheels, dia.	36 ins.
Journals	5½ by 10 ins.
Capacity, water	8000 gals.
Capacity, coal	11 tons.

"I had occasion recently to order from my old home in Vermont, two barrels of potatoes to be sent to my residence in the city of Washington. The railroad charge for carrying these potatoes 600 miles was \$1.45. The charge of the truck man who brought them from the railroad station to



Cross Sections of Firebox, Pacific Type Locomotive, Chicago Great Western R. R.

my house was \$1.00.”—C. A. Prouty, Interstate Commerce Commission.

Recommendation for Terminal Commission in Chicago.

The Citizens' Terminal Plan Committee, of Chicago, an independent organization of business men, through its chairman, Alfred L. Baker, has addressed a formal communication to the city council urging that body to create a railway terminal commission of experts. The recommendation is that the proposed body determine the broad lines of policy which should govern the city in its future adjustments of railroad terminals. The council referred the matter to its committee on railway terminals, and also committed to the same body a resolution introduced by Alderman Merriam, embodying the same plan. This resolution directs the committee to hold public hearings, preparatory to the drafting of an ordinance creating the commission of experts.

The Citizens' Committee's letter says:

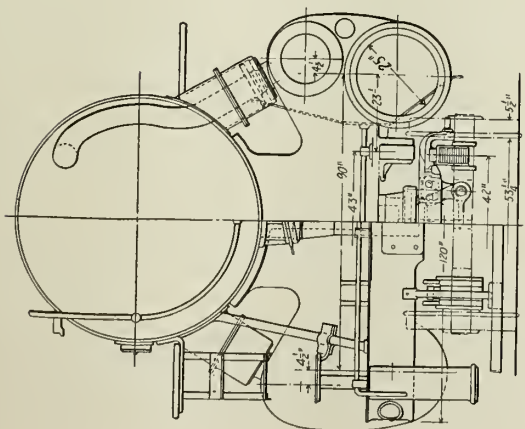
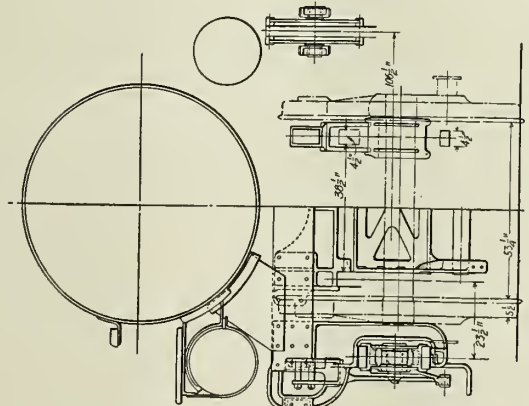
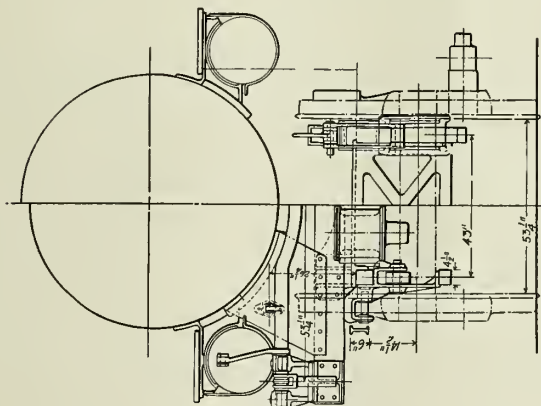
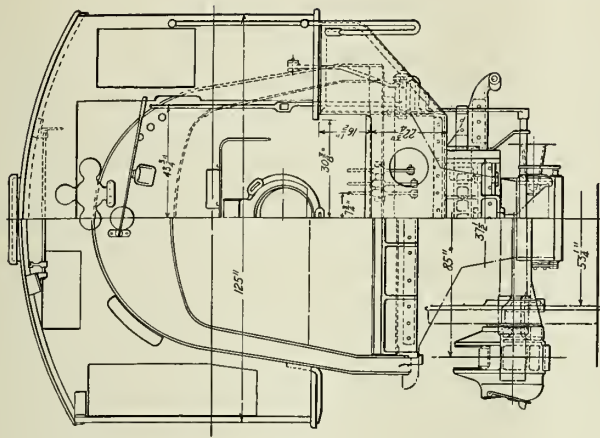
“The developments of the last year, and especially of the last two months, have made it perfectly clear that no correct solution can be reached without considering the terminal situation as a whole, and determining at least the broad lines of policy to which future steps, taken either by the city or by the railroads, shall conform. It is evident that the city cannot properly determine what these broad lines of policy should be, nor how they can best be carried into effect, without a comprehensive study and report by a properly constituted expert commission.

“The solution of the railroad terminal problem involves the rearrangement and simplification of at least some of the railroad entrances into the city and of terminal facilities within and near the city, the intensive development and use of these approaches and facilities, the preparation for terminal electrification, the treatment of suburban service, such application of the through routing principle as may be found desirable and practicable, the straightening of the river, the opening and alteration of streets, the construction of bridges and viaducts, and many other features involving railroad plans and city plans with their attendant engineering, financial, legal, architectural, economic and other questions.

“It is as important to the railroads and to the business interests involved as it is to the city and its people that these questions shall at once be thoroughly examined, so that such steps may be taken as are now practicable to improve a situation which is preventing right development, and so that other steps may be taken in the future as opportunity occurs.

“There are said to be 29 railroads which have terminals in this city. Within the next few years a majority of these roads will follow the Pennsylvania, the Chicago, Burlington & Quincy railroad, and the Chicago, Milwaukee & St. Paul in presenting plans for increased or at least different terminal facilities. As in the case of the roads named, the object of all will be to improve their respective facilities for conducting transportation; but as in the case of the Pennsylvania terminal, each will press for its own advantage as against its competitors, and with no intention of yielding a competitive advantage for the common good.

“The city can meet this situation only by the study and adoption of some broad and comprehensive scheme which will recognize the rights and the interests of the railroads as agencies of transportation, but into which the railroads shall fit their future terminal plans. The net result of such a comprehensive policy and plan may quite possibly be to the operating and financial advantage of the railroads as a whole, and even of those who may be compelled to forego some present competitive advantage.”



Cross Sections, Pacific Type Locomotive, Chicago Great Western R. R.

RAILWAY REVIEW

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SATURDAY, FEBRUARY 7, 1914.

The feature of the iron and steel market this week is the tendency manifested to contract for second, and in many cases, for third quarter delivery of crude and semi-finished material. A further hardening of quotations has occurred. Railroad buying continues comparatively light. It is known there is much business held up. Pig iron has developed much activity. Sheets, steel pipe and other minor products have been slightly advanced. Moderate orders have been placed for engines and cars. The undertone of the market is stronger than for some months.

Interstate Commerce Commissioner Harlan is reported to have said, on Tuesday of this week:

"No well-informed person can doubt that the discontinuance of these free services would save the carriers millions of dollars of expense annually, nor can any well-informed person doubt that if such service should be measured in relation to its cost and its value and the general conditions surrounding it, and should then be made to contribute on a reasonable basis to the revenues of the carriers performing it the income of the carriers would be increased by many million dollars a year. To the extent, therefore, that these free services may justly be said to account for or contribute to any inadequacy in the revenues of the carriers, it would seem to follow that the proposed increase in rates means

that the general shipping public must accept increased rate burdens in order that the carriers may continue without charge to render these valuable and costly services to a relatively small number of shippers. The propriety, therefore, under existing circumstances of discontinuing the performance of these special services without charge is manifestly a matter that should receive immediate consideration."

This seems to be interpreted as meaning that the granting of the five per cent increase will be indefinitely postponed. We do not so understand it. In the group of 78 questions to which the carriers are now sending in the voluminous answer required, Group B covers the subject of special service or allowances in connection with transportation service. It was the purpose to make this one of the important investigations; and the report on the investigation of allowances to industrial or plant railways is naturally a part of it.

As we read that report it was not the intention to denounce the railways for the situation developed. The railways and the industries concerned submitted this subject voluntarily to the Commission three years ago. The railways welcome the findings of the Commission and will arrange to secure for themselves the additional income as fast as it can legally be done. The Commission may estimate this saving and take it out of the five per cent; but this will not operate on all the railways in the territory, equally, and will give very little to some of them. Advice and directions from the Commission, on the conservation of revenue, is unobjectionable and even welcome except to shippers who have had undue advantages. But they will not afford the uniform, adequate and prompt relief which the situation calls for and the country demands.

"This ought ye to have done and not left the other undone."

Since the foregoing was written the purpose of the Commission has been more explicitly set forth with the formal announcement that a series of hearings will be held, at Washington, commencing February 12, at which the question of free services will be canvassed thoroughly. It should be well understood that these hearings are definitely a sequel to the Commission's inquiry incident to its decision in the industrial railways case. The fact that the Commission has interdicted certain free services necessitates its indicating where the line shall be drawn between legal and illegal services of the same general nature. And the relation of all this to the impending question of a five per cent advance in rates, remains as clearly indicated in the Commission's decision, and just as clearly set forth long previously, in accordance with the purport of our remarks above.

Safety on the Pennsylvania R. R.

A highly interesting review of what has been accomplished during the past year in the interests of safety, both to its employees and to the public, has been issued by the Pennsylvania R. R. The success

of the efforts put forth, in so far as the traveling public is concerned, is sufficiently indicated by the fact that during the year elapsed, a total of 111,000,000 passengers were carried without a fatality chargeable to train accident. The bulletin enumerates many interesting practices, conditions and facts contributing to this result. For example, the high standards applied to the road's permanent way are such that in 1913 an average of \$2095 for each of 12,766 miles of track was expended for maintenance. The corresponding figure for all roads east of the Mississippi and north of the Ohio rivers is given as \$1553. Nearly seven men per mile of line are employed in the maintenance of way department.

This road has long been known for its extensive use of rock ballast. Further improved standards introduced into the permanent way are 100-pound rails; the increase in the number of ties from 16 per 33-foot rail to 18 as a minimum, while on main lines 20 ties per rail are used; the extensive substitution of solid masonry and concrete for steel in bridges and culverts; the increase in automatic block signaling, which by June, 1914, is expected to cover completely the main lines between New York, Pittsburgh, Philadelphia and Washington; and the general placing of easy crossovers, No. 20's preferred, wherever revision tracks and interlocking plants has been found advisable or feasible. It is stated that since October 1, 1912, a total of \$6,500,000 has been expended on authorized changes in signals and interlocking plants throughout which the improvements above enumerated were applied. The cost of grade crossing elimination during the past ten years has amounted to \$27,742,433 and the announcement is made that no new work will be undertaken in the future in which grade crossings are permitted.

This road claims to have in operation on its lines nearly 50 per cent of the all-steel passenger car equipment in the country and has at the present time 378 additional cars of this variety on order. More than 40 per cent of all the steel Pullman equipment operating in the United States is stated to be assigned to the Pennsylvania R. R. Inspection of materials and equipment during 1913 cost upwards of \$2,000,000. Since their appointment 35 safety committees have made a total of 17,333 formal recommendations, 13,861 of which have been adopted at a cost of \$413,425. During the first six months of 1913 alone, \$75,362 were expended in this manner, that amount covering 2390 recommendations. During the year ending June 30, 1912, a total of 4,478,135 surprise tests and special reports in the observance of operating rules and signal indications showed an efficiency of 99.8 per cent. Laxity and indifference among engine men is being eradicated by a special study of discipline records, 5607 of such records having been reviewed and the justifiable warnings issued during the past year. Train men are forbidden to frequent saloons; on the contrary numerous recreation facilities are supported in whole or in part,

as for example, the twenty-six branches of the Y. M. C. A. on the Pennsylvania R. R. received contributions from the company during 1913 to the extent of \$105,454.

Still further precautions in the interest of the public are as respects the state of health of dining car and restaurant employees. Since January 1, 1913, a rule has been in effect requiring that all such employees pass rigid physical examinations at stated intervals, which at present is every thirty days, and any such not found in perfect condition are not permitted to return to duty until supplied with a "certificate of ability" by a company physician. The danger of spreading communicable disease is thus reduced to a minimum. The company's police department is a highly important factor in the security of the public, both to those patronizing the trains and to those who are wont to trespass on the company's right of way. Approximately \$800,000 were expended in the maintenance of this service during 1913, and in that time, 11,434 arrests were made resulting in 10,014 convictions. Nearly half of this number were trespassers on the company's property and as such were in danger of injury or death from moving trains. The number of trespassers killed in 1907 was 572; in 1913, this number was 303, while in 1912 the number had been reduced to 255, a reduction of 55 per cent, to be credited entirely to the company's activity in suppressing the trespass evil. Twenty of the arrests made during 1913 were for depredations involving the safety of trains. Besides all this, the company is making every effort to appeal to the popular intelligence and sentiment by making available full information as to the causes of accidents occurring on its lines, giving and accepting suggestions as to the means whereby future mishaps of similar nature can be prevented. The railroads in this country as a whole have acquired the unfortunate reputation, especially abroad, of being remiss in their interest in the public safety. In view of the foregoing, such opinion, in so far as it concerns the road in question, is not only unjustified but when expressed, is plainly libelous.

Protecting Ties From Mechanical Wear.

The paper entitled "Protection of Ties from Mechanical Destruction," by Mr. Howard F. Weiss, read before the recent annual meeting of the American Wood Preservers' Association, and published on page 226, in this issue, deals with an important question of track maintenance economy. While the treatment of the subject is brief, as the author says he intended it should be, yet the ground covered is comprehensive and presents a good outline or synopsis for the study of those whose experience may not have been closely identified with the maintenance side of railway engineering. In addressing wood preservers in general, and tie preservers particularly, Mr. Weiss correctly inferred that some of these gentlemen may have had

but little or no experience with ties under traffic. It must also be borne in mind that every year brings into the maintenance department of railways a considerable number of young engineers who started out with a transit, on location, or in a drafting room, and who have given but little thought to the questions of track maintenance. For the benefit of all such, if not to the whole class of engineers of the road department, a repetition of elementary principles is always timely. From the further consideration that much of the bad practice referred to in this paper is still largely in evidence on railroads, it is needless to remark that this paper should appeal to many others who may find but little in it that is new information.

The need for conservation of tie timber has been agitated and discussed in an intelligent manner for fully twenty years, and yet in the face of this fact there has been, and still continues to be, a lamentable waste of it for want of protection from mechanical wear. In much practice ties of soft wood have been used under heavy traffic without tie plates at all, and in many instances adequate protection has been lacking because the tie plates were not properly designed or applied. There is no longer any doubt about the inefficient service of narrow or thin tie plates. In the early days, when manufacturers of tie plates were on the defensive, they had to advise the use of light plates in order to sell them at all, but the continual increase in weight of rolling stock as well as increase in volume of traffic has made bearing surface and beam stiffness essential elements of tie plate design. On all heavy-traffic lines dirt and sand ballast have been replaced with gravel or crushed stone, to afford firmer support for the ties, and on all but the hardest woods metal plates have been found necessary for the most efficient support of the rails at their points of bearing upon the ties; and where the conditions of curvature or traffic are found to be severe, the use of plates is found to be economical even on the hardest of our native timbers. In short, it is no longer a question of plates, but to get plates of sufficient size and strength. It is not necessary to add that the outlay for tie plates is a large item of expense, but it cannot be helped. Trying to do without tie plates with soft wood ties under heavy traffic is a good deal like trying to work horses unshod—it works all right in the fields and on sand roads, but with heavy pulling on macadam roads something is needed to take the wear.

The wasteful methods of using untreated timber for railroad ties have been deplorable enough, and the only reason that railroad managements could regard such with passivity has been because tie timber was cheap. The thing that has enforced chemical treatment of ties has been the rise in the price of timber. With treated ties the expense for properly designed tie plates is, of course, a smaller percentage of the cost of the tie laid down in the track than it is with ties in the natural state of the wood. The economy in the use of tie plates

with treated ties is, therefore, so apparent that those responsible for maintenance of the track cannot ignore it or overlook it. It is simply downright extravagance, like money deliberately thrown away, to use treated soft wood ties without tie plates.

As for variation in size of plates for different varieties of wood, hard and soft, as proposed by Mr. Weiss, the idea is logical enough, but practical considerations would limit the designs for this purpose to very few, certainly to not more than two with any one road, and then only when there would be some prospect of constancy of supply of timber of the same character respecting hardness.

The proposition of fixing the price of ties with relation to the degree of hardness of the wood, or sustaining power, so to speak, is desirable enough from the standpoint of the railroad companies, but it is doubtful whether the condition of the lumber market would permit arbitrary action to this intent that would be worth the while. There are probably but few localities where railroads can now dictate prices in keeping with such fine classifications of timber as this. Very extensively the situation is such that they must accept whatever timbers are available, and pay such prices as will bring forth a supply to meet the demand.

Mr. Weiss' conclusion as to the dapping and boring of ties previous to treatment is, from principle, in line with best practice. The dapping, or preparation of seats for uniform bearing of both rails on the tie, is practicable in any case, and ought to be done at all tie preserving plants, before treatment. The boring of the ties for the spikes is practicable wherever the section of rail with which the ties will be used is definitely known in advance. So far as tie renewals are concerned, this can be done with intermediate ties, but ties to be used at the joints had perhaps better be left blank or not bored, at least on one end. Where there are several sections of rail, which is very often the case, the question of boring the ties at any time before laying them would involve some difficulties in distribution, and, for that reason, perhaps, more than any other, the boring of ties before treatment has been but little practiced.

Federal Suits and Indictments.

The federal grand jury, in Chicago, on January 31, returned indictments against three railroads and the packing firm of Swift & Co., on charges of rebating, brought by special agents of the Interstate Commerce Commission. The railroads indicted are the Pennsylvania; its subsidiary, the Pittsburgh, Cincinnati, Chicago & St. Louis, and the Chicago & Northwestern. Named in the indictments are the Ann Arbor R. R., charged with having rebated to Swift & Co.; the W. H. Merritt Grain Co., of Chicago, charged with having received rebates from the Pennsylvania Lines; the B. A. Eckart Milling Co., of Chicago, charged with having received rebates from the Panhandle, and the David Rutter Coal Co., of Evanston, Ill., charged with having received rebates from the Northwestern. Swift & Co. is the only one of these firms alleged to have received rebates which is indicted, the government attorneys stating that they sought to punish the

railroads giving the alleged rebates, and not the shippers profiting by them in these instances. Swift & Co. was indicted instead of the Ann Arbor R. R., for the reason that the Michigan road is not within the Chicago district. Sixty counts are contained in the indictments against Swift & Co., making the company liable to a possible fine of \$1,200,000. Fines of \$100,000 to \$200,000 may be levied against the railroads if the indictments are sustained on trial.

Forty-five suits aggregating \$22,500, were filed in the federal court at Chicago, January 31, by United States District Attorney James H. Wilkerson against eleven railroads leading into Chicago, on charges of having violated the 28-hour stock law. The railroads are:

Chicago, Indiana & Louisville, three suits; Atchison, Topeka & Santa Fe, two suits; Erie Railroad, one suit; New York, Chicago & St. Louis, one suit; Pere Marquette, one

suit; Wabash, one suit; Chicago, Milwaukee & St. Paul, one suit; Chicago, Rock Island & Pacific, 17 suits; Chicago & Northwestern, 11 suits; Chicago, Burlington & Quincy, five suits; Illinois Central, three suits. Each suit was for \$500 and all were brought in connection with cattle shipments from Western states to the stock yards.

Twenty-one suits on behalf of the government were filed against the Philadelphia, Baltimore & Washington R. R., at Philadelphia, Jan. 31, to recover a penalty of \$500 in each case for alleged violation of the twenty-eight hour stock law.

The United States Circuit Court of Appeals, at Cincinnati, Ohio, Feb. 3, affirmed a decision assessing fines, which total \$62,000, against the Hocking Valley R. R. and the Sunday Creek Coal Co., on charges of giving and taking rebates.

Decision of the Interstate Commerce Commission in the Industrial Railways Case

In the Matter of Allowances to Short Lines of Railroads Serving Industries

The decision in this case is handed down in a voluminous report which is of such far-reaching importance that we give extracts therefrom at considerable length. The commission holds:

1. That the service by line carriers in official classification territory beyond a reasonably convenient point of interchange, between their rails and the tracks of industries with plant railways, is a shippers' service, a part of the industrial operations of the plant, and not a service of transportation; and that the performance of such services by the line carriers without charge in addition to the rate, and the allowances paid by them therefor to industries, or their plant railways, for performing the service for themselves, are unlawful rebates, in fact and in effect, and give undue and unreasonable preferences and advantages to the industries so favored and work undue and unreasonable prejudice and disadvantage to shippers in the same line of business who do not receive any such allowances and who do not receive the benefit of any such services. 2. That the admission of industrial lines to the benefit of the modified per diem agreement results in many cases in a substantial addition to their revenues that accrues directly to the benefit of the industry and is an undue, unreasonable and unlawful preference and advantage to the industry. 3. That the delivery of a car by a line carrier upon the interchange track is a delivery to the industry itself, and that the elimination of demurrage, under the present practices of the line carriers, as a transportation charge against industries with plant railways claiming to be common carriers, results in undue, unreasonable and unlawful preferences and advantages to such industries, and works an undue, unreasonable and unlawful prejudice and disadvantage to shippers not enjoying the benefit of such arrangements.

The Interstate Commerce Commission has handed down, as noted in these columns last week, its decision in case No. 4181, known as the "industrial railways case." The principles therein set forth are most comprehensive and will vitally affect the largest industries of the country, and necessitate material changes in handling the freight movement on railroads within the large industrial districts. The case was submitted Feb. 28, 1913, and decided Jan. 20, 1914. The following interests were among those represented before the commission: Central Freight Association and Trunk Line carriers; New York Central lines; Baltimore & Ohio R. R.; Union R. R.; Newburgh & South Shore Ry.; Lake Terminal Ry.; Elwood, Anderson & LaPelle R. R.; Benwood & Wheeling Connecting R. R.; McKeesport

Connecting R. R.; Etna & Montrose Ry.; Lucy Furnaces R. R.; Pittsburgh & Ohio Valley R. R.; St. Clair Terminal R. R.; Pencoyd & Philadelphia R. R.; South Buffalo Ry.; Monongahela Connecting R. R.; Baltimore & Sparrows-Point R. R.; Philadelphia, Bethlehem & New England R. R.; Bethlehem Steel Co. Commissioner Harlan wrote the report, of which we give the following extended abstract:

Report of the Commission.

This is a proceeding to determine the legality of the allowances paid by public carriers, east of the Mississippi river, to industries on their rails that own and operate plant railways in connection with their industrial establishments. The allowances are made to the industries or to their subsidiary railways in the form of (a) divisions out of the rate, (b) per diem reclaims, (c) remission of demurrage and (d) furnace allowances. Involved with that question is the related and equally important question of the legality of the services performed by the line carriers, without charge in addition to the rate, in spotting cars in and about industrial plants that have no locomotives of their own or that have their own locomotives but nevertheless look to the line carriers to switch their traffic to and from any point in the plant in accordance with the demands of the industry.

The allowances so paid and the free services so performed involve in the aggregate an immense expenditure, for which the carriers must necessarily be reimbursed through the rates exacted on the traffic of the general public; at the same time it must be noted, the allowances and free services so paid and performed by the carriers relieve the particular industries of a large burden of expense which the industries themselves would otherwise have to meet as a part of their manufacturing cost. This operates as a discrimination against the smaller competitors of the favored concerns because, in the nature of things, the benefit of such allowances and free services can be enjoyed only by the larger industrial establishments with plant railways.

The importance of the case cannot easily be overstated. It is important to the commercial and industrial enterprises now enjoying these special advantages at the hands of the carriers, because of the large and direct financial aid and benefit to the industries resulting from the allowances and free services. It is of no less concern to other large manufacturing and industrial companies which, while similarly situated, are not at the moment so favored by the carriers, but are putting themselves in

form to claim these concessions from them in the near future. It is equally important to the great mass of shippers, who neither receive the allowance nor free services nor are in a position to claim them, but who, in the open markets, must nevertheless meet the competition of industries so favored and are put by these practices at a commercial disadvantage that is obvious and sometimes very acute. Finally, the matter is of far-reaching consequence to the public, for upon the general public rests the burden of contributing sufficient revenues to the carriers to enable them to meet their expenditures, including those incurred on behalf of the industries so favored, and in addition to earn an adequate return upon the property so devoted to the service of the public.

Depletion of Railroad Revenues.

The exact amount of the loss to the carriers resulting from such allowances and free service does not appear from the record, but the evidence establishes the fact that the depletion of their revenues through these practices is very great. The amount paid in allowances and reclaims is large; and the services rendered free by the line carriers to a relatively few favored industries would, if charged for on a reasonable basis, increase the revenues of the carriers by many millions annually. The practical immunity from demurrage charges, enjoyed by these industries in consequence of these practices, is also a very substantial item.

Allowances—During the year ending June 30, 1912, the Pennsylvania Railroad paid \$1,019,910.41 in divisions out of the rate to only ten such industrial railways connected with steel plants; the New York Central's western lines paid to twelve such industrial railways an aggregate of \$660,057.93; the Baltimore & Ohio paid to thirteen such industrial railways the sum of \$530,317.06. Five of these industrial railways received from the several lines the additional amount of \$1,059,270 in per diem reclaims. Just how much demurrage these arrangements enabled these industries to avoid is not shown, but the loss in car-service revenues to the carriers must have been very material.

In many of the cases before us on this record, the cash revenues received by these plant railways, out of the rates of the line carriers are sufficient to lift from the industries the entire cost of their operation. In the instances where the income is said not to be sufficient to do this no account has been taken of the profit to the industry of the elimination of demurrage as a transportation charge against it. When carefully analyzed, it is thought that in the majority of cases the industry is under no burden of cost for operating its plant railroad, even for its purely interworks switching. And in many instances the plant railway enjoys revenues that are sufficient not only to relieve the industry of the cost of its operation, but to enable the plant railway company, besides laying up a substantial surplus, to declare large dividends on its stock held by the industry. In the case of the Baltimore & Sparrows Point R. R., the plant railroad of the Maryland Steel Co., the annual dividends on its stock during the last 11 years have aggregated more than 423 per cent, and have ranged from 20 to 55 per cent a year.

Free services—During the year ending June 30, 1911, the railroads performed for a single steel industry, the Republic Iron & Steel Co., at Youngstown, O., free spotting services for 75,134 cars at a cost to the railroads of \$104,329.62, or \$1.40 per car. That industry, as a facility in its industrial operations, maintains a system of standard-gage tracks aggregating between 35 and 40 miles, all located in and around the plants. With these the rails of several railroads connect; and instead of the railroads' transportation service ending where the plant tracks begin, the railroads without additional compensation deliver and spot the inbound loaded cars at such points within the plant inclosure as the steel company requests; and in the same manner they also spot the empty cars for loading. In such cases the superintendent or yardmaster of the industry usually

has control of the switching and spotting operations on the plant tracks, although the locomotives and crews are furnished by the railroads and are paid for by them.

The service thus performed by the carrier at large industries where the tracks are owned by the industry and the motive power and crews are supplied by the carrier is described by a competent witness as follows:

"For inbound material to be delivered at the plant the carrier with its own power first identifies, assorts and assembles the cars in its own time; it then takes the various kinds of material, the coal, ore, limestone, etc., and groups them, because it is known by the carrier just the different deliveries required for these materials. The cars are then switched to the point of placement and spotted into the unloading position, even to the extent of pushing them up on the high trestles and spotting them over the doors of the bins. The subsequent gathering up of the empty cars, sorting them out and getting them back into the carrier's yard is done by the carrier with its own power and at its own convenience. The employees of the industry do the loading and unloading, but the entire movement over the industrial tracks is performed with the power of the carrier."

These allowances paid to and free services performed for large industrial establishments obviously relieve them, as heretofore stated, of a heavy burden of expense which the industries themselves would otherwise have to meet as a part of their manufacturing cost; and that manufacturing expense is now borne by the carriers. The amount of the expense was accurately ascertained of record at only a few plants; but the industrial concerns for which such free service is rendered are numerous. On the Pennsylvania lines, east, there are 233 such plants with more or less extensive system of private tracks within their plant yards on which the line carrier, without charge, now performs the service of spotting empty and loaded cars in and around the plant.

Some idea of the aggregate depletion of the revenues of the carriers, as the result of the allowances, reclaims, free services and loss of demurrage growing out of these practices in the territory covered by the inquiry may be had from the above figures, showing the extent of the financial benefits enjoyed in that way by a small proportion of the industrial plants in that territory. The total effect upon the carriers' revenues is obviously a matter of many million dollars a year.

The record amply demonstrates that these allowances and free services were never taken into consideration in fixing the rate, but in effect are concession from the rate. They have grown up as the direct result of competition among the carriers for the traffic, or, to express the thought more accurately, they are an example of the special concessions and rebates in service that shippers with a large traffic are able to wring from the carriers in consideration of being permitted to handle the traffic or share with other lines in its carriage.

Nevertheless, the allowances actually paid to these industries, or their subsidiary railways, are here sought to be justified by those receiving them on the theory that the industries in handling their own traffic into and out of the plant with their own power, and, as their own convenience may require, are performing a part of the carrier's proper service of transportation, for which the industries may be compensated by the line carrier out of the rate. The free services are sought to be justified on the theory that the transportation service of the line carrier properly extends into a plant to and from each separate building and points within it that is reached by the plant rails.

Problems Involved.

The problems arising out of these practices are so presented on the record as to require us to dispose of them upon fundamental grounds. In other words, the privileges and advantages of this character, not enjoyed by a relatively small number of

more or less extensive industrial establishments, must either be held to be an unlawful concession to them by the carriers or, if lawful, the principles upon which they may be justified must be ascertained and clearly defined, so that like privileges and advantages may be claimed, as of right, by all industrial establishments served by these carriers, whether they be large or small. The allowances and free services to which we refer very materially increase the operating expenses, are a heavy drain upon the revenues of the carriers, and, as heretofore stated, must be provided for out of their general revenues.

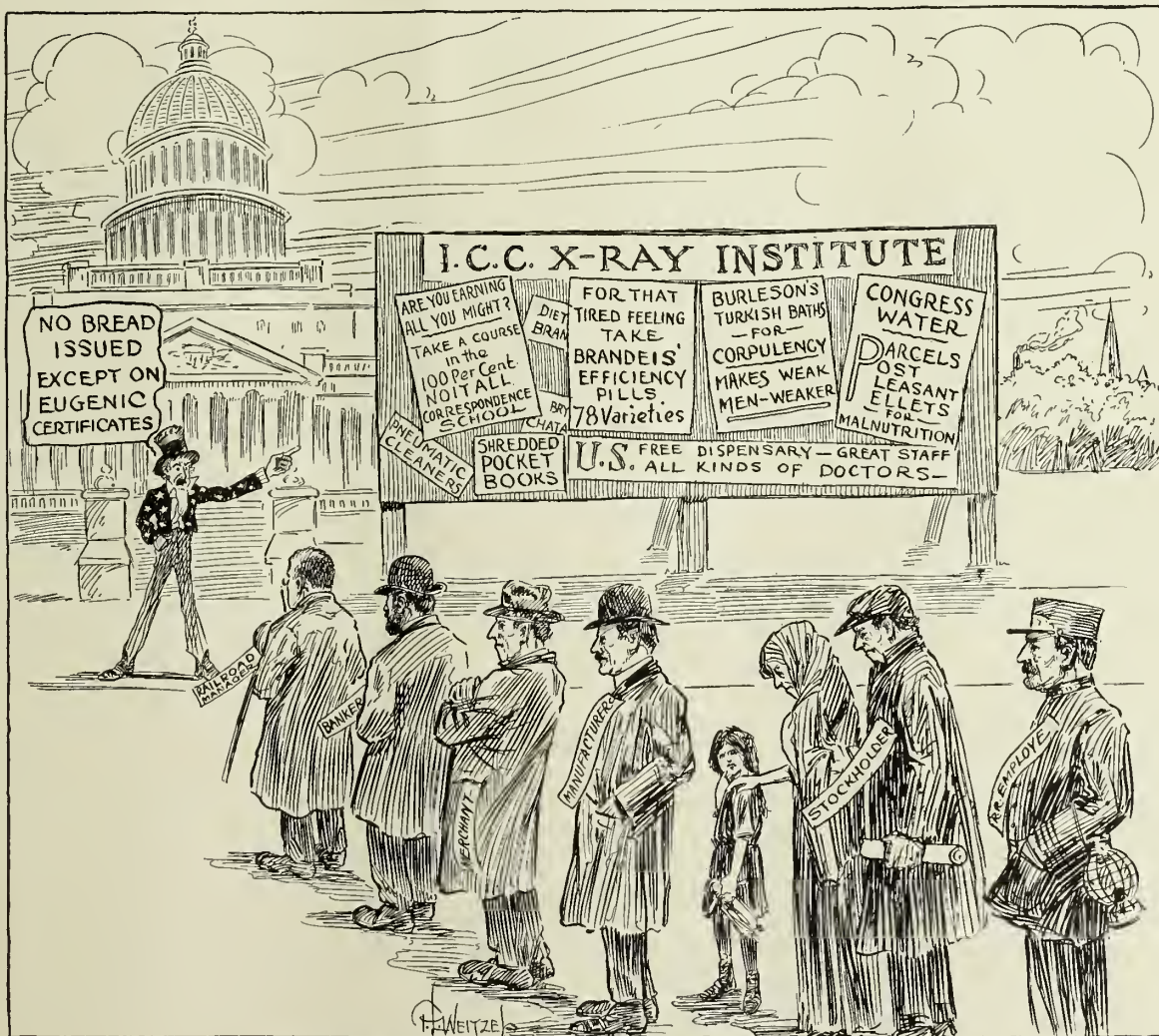
It follows, therefore, upon a large view of the record, that the real question before us is whether the particular industries, which these plant railways serve, and by which or in the interest of which they are owned, are themselves to bear the burden of operating them, or whether the allowances and free services which the line carriers now pay to and perform for these industries, a class of shippers that necessarily must always be relatively small in number, are to remain a burden, the cost of which may be spread by the carriers through their rates over the traffic of the entire republic. If the allowances and free services may on any ground be justified and found to be lawful, they will on like grounds be claimed by and must in the near future be extended to all industries similarly situated.

We are, therefore, at the parting of the ways with respect to this very heavy tax upon transportation. Many other industries not now enjoying such allowances are only awaiting our approval of them here before claiming like favors from the carriers as of right: and it is certain that if these practices are

now found to be lawful, the announcement of our conclusions will at once be followed by preparations on the part of similar industries throughout the country to throw upon the carriers the cost of operating their plant railways. Such a ruling now not improbably will fix this relation between the line carriers and the more or less extensive industries of the country as a permanent practice, the burden of which must be borne through increased rates by the general shipping public.

Relation of Practices to Rate Advances.

Indeed, the very carriers that are augmenting their expense accounts and dissipating their revenues in this manner, to the extent of many millions of dollars a year and for the benefit of a comparatively few shippers, are now complaining that their present earnings are insufficient and, on that ground, have asked our permission to make a substantial increase in their general rate schedules. In that sense the proposed advance in rates has a certain very definite and immediate relation to this proceeding. In this general connection it may safely be assumed that no substantial part of the well-informed and reflecting public would deny to the owners of the railroads of the country a reasonable return on their investments; nevertheless, before they may fairly ask the general public to share further in carrying their burdens, it is manifest that the railroads must themselves properly conserve their resources of revenue by making every service rendered by them contribute reasonably to their earnings. This having been done, the Commission upon an adequate showing of the need of additional revenues will



THE BREAD LINE AT WASHINGTON GETS ADVICE.

"When we go down to Washington and say have mercy upon us, for we cannot make a living at these rates, we are sent away sorrowing with the words, 'Depart in peace, and don't come back here until you can prove to us just how much it costs you to carry a box of shoes from Boston to Dyersburg.'"

not shrink from the responsibility of sanctioning such measures, including even a general advance in rates, as may be required to bring reasonable prosperity to railroads, so far as this may be accomplished under rates and charges that are reasonably just alike to shippers and to the carriers.

Aside from the right of the owners of the property so devoted to the use of the public to receive from the public a reasonable return on their investments, it is of profound importance to the public in its own interest to accord fair and equal treatment to the owners of railroads, for upon no other basis may we continue to look to private capital for the further development and extension of our railroad facilities. The general public interest is therefore advanced in a very direct way by the reasonable success of railroad investments under rate schedules that reasonably respect the rights of shippers. But if further burdens through an increased scale of rates may justly be imposed on the general public, all must agree that unlawful concessions, rebates and preferences in the interest of a small proportion of the shipping public ought to be eliminated from the practices of carriers. It is therefore appropriate, as it is also our duty on general grounds, to examine carefully into the legality of the allowances, free services, per diem and demurrage concessions, of the character disclosed on the record before us, by means of which the revenues of the carriers are so heavily taxed and their net earnings so largely impaired; and we now take up the consideration of that question with a full appreciation of its far-reaching importance.

Scope of the Inquiry.

The order instituting the proceeding embraces all industries with plant railways east of the Mississippi river. The investigation, however, has been confined for the present to iron and steel industries in that territory. But before stating the facts relating to the various plants described of record, it is proper to say that the whole matter was voluntarily brought to our attention by certain of these industries and the line carriers that serve them. The demands of plant railways for larger allowances, the increasing number of industries that were incorporating railroad companies to take over the operation of their plant tracks and locomotives with a view to demanding allowances, and the growing volume of complaint against the discriminations arising out of these relations between the line carriers and the industries so favored, together with certain formal and informal rulings by the commission in other cases, had combined to raise a doubt on the part of the carriers and the industries as to the legality of these allowances and free services.

These apprehensions led, in 1909, to an extended investigation of the matter by the line carriers and the steel interests. Committees were appointed and detailed information gathered as to the character of the industrial railways of iron and steel plants then enjoying allowances from the line carriers, and as to the nature of their operations, their relation to the controlling industries, and the amount of the allowances being made to them. But the same influence that led the carriers originally to make such allowances, namely, the immense traffic, both inbound and outbound, of the iron and steel industries of this territory, undoubtedly made it impossible for the committees to reach an agreement. The matter was thereupon turned over to the legal departments of the line carriers and the industries in order, as it was said, to divest the problem of these traffic influences, and new committees were appointed to carry on further investigations.

It is our understanding that the general conclusion reached, as the result of a series of conferences between them, was that allowances to industrial railroads were illegal where no real service of transportation was performed. The committees thereupon undertook to determine what industrial railroads connected with iron and steel industries in this territory were, to use the language of counsel, real railroads. In the spring of 1911 these committees laid the matter before the commission

in the form of a stipulation between the United States Steel Corporation on the one hand and the line carriers on the other, accompanied by recommendations that allowances might lawfully be continued to six designated industrial railroads serving iron and steel industries in the territory in question, and that no allowances could lawfully be granted to any of the others. There were certain minor matters about which the committees could not agree, but the whole situation was submitted to us, with the statement that both parties in interest would abide by the findings of the commission, subject only to the privilege of review by the courts in the event that our order invaded any invested right. Upon the presentation of the stipulation and recommendations protest was made by other steel and iron interests having plant railways to which, under the recommendations embodied in the stipulation, allowances were not thereafter to be made; protests were also made by industries with plant railroads to which allowances had not therefore been made, but which were preparing to assert their right to have allowances. It was apparent, therefore, that the whole situation would have to be taken in hand by the commission and that a more extended record than the stipulation and recommendations would be necessary before any order dealing with these matters could fairly be entered. Disregarding the stipulation and recommendations, this general investigation was thereupon instituted by the commission on its own initiative. It includes all short lines of railroads serving industries of any kind in official Classification territory, but the record thus far made, with one or two exceptions, is confined, as just stated, to the plant railways of iron and steel industries east of Chicago. It is shown of record, however, that the practice of incorporating plant railroads, and through them of receiving allowances from the trunk lines out of the rate, extends to all branches of industry in that territory where the tonnage to be shipped is large.

Character of Industrial Railways.

There are certain features that are characteristic of all these plant railways. The ordinary plant consists usually of blast furnaces, steel mills, rolling mills and other manufacturing departments. It covers from 25 to 125 or more acres of land, in many cases inclosed by fences and gates. One of the important problems that each plant must meet in its own way is the disposition of slag and other refuse that accumulates in large quantities from the operation of the furnaces and mills. A convenient dumping ground must be provided, and this, partially at least, is the explanation of the location of the plant in practically every instance either on a river bank or lake shore, where the submerged lands may be filled up to establish harbor lines, or on or adjoining lowlands or gullies where the refuse may be conveniently dumped. In practically every instance plant rails and locomotives are provided as a means for disposing of these waste materials, and a surprising amount of low or submerged lands have in that way been brought up to grade and made available for the extension of the plants themselves or for use by other industries. Some of these made lands are of great value.

The plants, however, have various other and still more important uses for rails and locomotives, and it is repeatedly admitted, of record, and abundantly illustrated in the case of all these plants, that locomotives and a system of rails in and about an iron and steel plant are a necessary facility in the industry. The plant tracks ordinarily are used not only for the movement of cars between the rails of the line carriers and various points within the plant, but they are required for the prompt and economical movement of material between its various departments. In some cases they are operated as a bureau or department of the industrial company; but at this time in the majority of instances they are operated by an incorporated railroad company owned by the industry.

In many cases the industrial railroad performs only the interchange switching with the line carriers, while the industry

with other power, does the interwork switching itself and not through its plant railway. In other instances the incorporated industrial railroad performs all the switching within the plant as well as the switching to and from the rails of the line carriers. In addition to the standard-gage spur and switch tracks in and about these plants, all the larger iron and steel industries maintain a system of narrow-gage tracks operated with their own power and confined exclusively to mill work. In all cases there is a practical identity in the ownership of the plant railway and the plant.

In the case of some of the plants the industrial railroad company owns no physical property, but formally leases its right of way, tracks, and equipment from the industry by which it is itself owned; in other cases the industrial railroad owns the equipment and leases the tracks and right of way from the industry; and in still other cases the right of way has been deeded to the industrial railroad company in fee, and the tracks and equipment have been assigned to it. At the majority of the iron and steel plants described of record the rights of way of the line carriers adjoin the property line of the industry, and in such cases the interchange of cars with the plant could readily be performed by the line carrier by means of a short switch track. In a few cases only is the plant located at a distance from a line carrier; in such cases the industrial railroad usually extends its rails to the trunk line; and the extraordinary financial results accruing to the industry, in the way of divisions and allowances, as a consequence of such an arrangement, are fully shown of record.

Per Diem Reclaims.

The depletion and loss in the revenues of the line carriers through this voluntary and preferential contribution in money and services to a relatively few industries has already been adverted to, but it is more extensive than has been generally understood. The payments made to large shippers by the trunk line carriers east of Chicago, in the form of allowances to their industrial or plant railroads, aggregate many millions of dollars a year. A large additional amount is also annually contributed by the line carriers to the same industries through the so-called per diem reclaims.

In order to have a clear idea of the practice of carriers in the matter of per diem charges and of the important privileges resulting from it to these iron and steel industries, it is necessary to understand the modified agreement, which is the basis upon which the line carriers settle with switching roads for the detention of their equipment. The ordinary switching or terminal line, when a member of the per diem agreement, is under an expense of 45 cents a day for each car of a trunk line held upon its rails. Usually such lines have no equipment of their own upon which they in turn may earn revenues from the trunk lines. In order, therefore, that the per diem charge may not unduly deplete the revenues of the switching lines, the latter under the modified agreement are entitled to make a reclaim against their immediate trunk-line connections for a stipulated number of days, the period, as contemplated and intended under the practice, being based upon the actual experience of the respective switching lines in the necessary detention of cars on their rails.

The periods agreed upon with the industrial lines before us range from $3\frac{1}{2}$ days in the case of one plant railway to a maximum of $5\frac{1}{2}$ days, and appear in some cases to be substantially in excess of their reasonable necessities. During the period so designated for a given industrial line it is required to pay, to the trunk line owning a car, a per diem charge for the number of days the car is actually on its rails; but, under its right to make reclaim for the whole period upon its immediate trunk-line connection, the industrial line makes a profit of 45 cents per day for each day saved out of the designated reclaim period by the prompt return of the car. The industrial lines that have been given the benefit of the modified agreement are not only practically relieved of the payment of per

diem charges, but, through these arrangements, many of them receive a substantial addition to their revenues, which accrues to the benefit of the controlling industry. In the iron and steel industry this charge or per diem reclaim in many instances has become the source of large revenues to the plant railways and to the industries that own them. Of the 30 industrial railroads, parties to this proceeding, 10 are members of the per diem agreement. It is shown of record that for the year ending June 30, 1911, the aggregate amount of per diem reclaims received by only five of these roads amounted to \$1,039,273.99.

Switching and Spotting.

In addition to the cash revenues lost by the line carriers through reclaims and the complete elimination of demurrage as a transportation charge against such industries, there is the gratuitous switching service performed by the line carriers in many large plants which have installed extensive spur and switch tracks in and about their mills and other buildings for necessary industrial purposes, and yet look to the line carriers to extend their rates to every door and other points within the plant, regardless of its size or the intricacy of the plant tracks or the cost of the service; and to do their inbound and outbound switching without charge, and even to do their interworks switching, in some cases without profit. It is impossible to estimate the aggregate cost to the line carriers of this free service in the territory east of the Mississippi river, but the amount is very large and its reasonable value to the shippers for whom it is performed must amount to many millions of dollars a year.

In short, we are here dealing with preferences and discriminations on a huge scale and with services rendered by the line carriers which, if charged for on a reasonable basis, would increase their revenues by millions of dollars annually. The conditions on the Pennsylvania lines east of Pittsburg will alone be sufficiently illustrative. It has 4200 private siding connections, of which 3800 are of the simpler form with a capacity of a few cars each. On these sidings the spotting is done without any charge in addition to the line rate. On its various main and branch lines there are about 400 more or less complicated systems of tracks within plants. At 233 of these industries the line carrier, entirely without charge in addition to the rate, and notwithstanding the fact that it is under no such obligation, performs the service of spotting empty and loaded cars in and around the plant; at 145 the spotting is done with the power of the industry, and at 24 the service is performed partly by the industry and partly by the carrier. Of the 145 plants in which the industry does the work with its own power a majority have not incorporated their plant railways. Where the plant tracks and locomotives are incorporated, the line carrier delivers the inbound cars and takes the outbound cars at designated interchange tracks within the plant or just outside.

Furnace Allowances.

The last of the four different forms mentioned in the opening paragraph of this report in which the line carriers make contributions to iron and steel industries is through the so-called furnace allowances. At the time of the hearing these allowances were \$2.25 a car on ore, \$1.75 on coke, and \$1.60 on limestone. The allowances are referred to repeatedly on the record as rate adjustments, but the meaning of this phrase as used by the witnesses is not satisfactorily explained. It is also said that the allowances are partly rate adjustments and are partly made for service performed. But a majority of the witnesses said they were paid in order to equalize conditions at the various blast furnaces so that the assembling cost of materials that go into a ton of pig iron would be the same at all iron and steel industries. This is the explanation that has been made in other proceedings before us; and this view is supported by the rather significant fact that the allowances now usually accorded to these industries are precisely the allowances originally arranged for in the contract hitherto mentioned between the Monongahela Connecting Ry. and the Pittsburgh & Lake Erie.

If, however, it is the real purpose of the line carriers through such allowances to put the industries on a parity so far as the cost of manufacture is concerned, it necessarily follows that they have undertaken in this manner to regulate competition as between these industries. This is not a duty devolving upon common carriers, nor do we understand it to be a lawful procedure. Moreover, if that is the intent and purpose of a furnace allowance, it is not really carried out, for there is a striking diversity of practice with respect to the allowances made to the various iron and steel industries or to their plant railways that are described on the record before us.

Allowances in the amounts above mentioned are made to only five of these industries, and no allowance whatever is made in the case of nine other industries that manufacture iron and steel. In the case of seven of the plant railways mentioned of record, 10 cents a ton is paid on inbound material and 15 cents a ton on outbound manufactured products; in another case, allowances of 10 cents on all material, both inbound and outbound. In two cases the allowance is from \$2 to \$2.50 per car on both the inbound and outbound movement, and in another case it is \$2 a car on inbound traffic and \$4 on outbound cars. At three of the industries there is no allowance, but all switching service between the interchange point and the points of loading and unloading within the plant is performed by the line carriers without charge. Regardless of the form and extent of these allowances the fact remains, and is clearly established of record, that they grew out of the competition of the carriers for the traffic, and, whatever their original purpose, their present result in effect is a contribution by the line carriers that relieves the industry of what is essentially a part of the cost of manufacture. The whole practice results in undue preferences and unlawful discriminations, and the allowances themselves we find to be unlawful on general grounds.

General Observations.

A full understanding of these matters, resulting from a careful examination of the record, impresses us with the inherent unlawfulness of this relation between large industries and the line carriers, built up upon the fiction that their plant railroads are servants of the shipping public, and therefore perform a service of transportation for the proprietary industries for which they may be compensated by the line carriers out of the rates. The practice has grown step by step until, by reason of the immense drain upon the revenues of the line carriers, it has now become a burden of substantial proportions upon the general shipping public. The primary purpose of the act to regulate commerce, as the courts have often said, was to strike down undue preference and favoritism, and a large part of our labors is devoted to complaints of that nature. The cost to the line carriers of these contributions by them in money and services, per diem reclaims and demurrage exceptions, to the few favored shippers shown on this record, does not appear. It has been estimated at not less than \$15,000,000 a year, and this we regard as conservative.

As we have just indicated, these practices were not suddenly devised in their present form, but are more or less the result of a process of development. The traffic of these industries is so enormous as to make it a facile instrument for forcing concessions out of the line carriers; and when one line has yielded to these influences the others serving the same industry must necessarily pay the same price or lose their share of the tonnage offered for carriage by the industry. In that manner the practice has spread from industry to industry, and the varying forms by which it is surrounded and under which it is conducted at the different plants are simply a cloak and device to give it the color of legality. It was admitted of record by counsel for many of the more important of these iron and steel companies that the trunk lines would be entirely within their legal rights if they abandoned the allowances now being paid to some industries and abandoned the services now being performed without charge for other industries.

What we decide upon the testimony adduced is that these practices are unlawful in themselves, because they are rebates, in fact and in effect, and also give undue and unreasonable preferences and advantages to the industries so favored and work undue and unreasonable prejudice and disadvantage to shippers in the same business who do not receive any such allowances or rebates and who do not receive the benefit of any such services. And we hold further upon the record that the form in which these plant facilities are organized and operated is an unlawful device adopted by the industries for the purpose of securing rebates from the published rates and rebates in service and other undue and unreasonable advantages forbidden by law.

As we have heretofore stated, these matters were voluntarily brought to our attention by a joint committee of the trunk lines and the steel corporation, and were submitted for our consideration on the understanding that the conclusions reached would be accepted both by the carriers and by the industries. Under these circumstances it seems to be unnecessary at this time to enter an order; we assume that the trunk lines and the industries will at once adjust their practices in conformity herewith. We are warranted also in assuming that there will be no effort, through trackage rights and similar devices, to continue in another form the relations which we here declare to be unlawful. It may be well to add that all questions that may arise or be suggested under section 15 of the act are reserved for consideration upon the request of the parties in interest.

Commissioner Prouty will later present his views on these questions.

Protection of Ties From Mechanical Destruction.

By Howard F. Weiss, Director, Forest Products Laboratory.

From a paper read before the annual meeting of the American Wood Preservers' Association, New Orleans, La., Jan. 20-22, 1914. It deals with the protection of ties from rail wear and spike killing, and covers the selection and use of tie plates, comparisons of the holding power of drive spikes and screw spikes and of the compressive resistance of various timbers.

In 1907 the American Railway Engineering Association sent out a number of letters asking railroad engineers what percentage of their ties failed from decay and what percentage from mechanical destruction. The replies, in general, were that about 90 per cent of oak ties failed because of decay, as against 25 per cent of cedar. In other words, the mechanical destruction of the ties varied from a minimum of about 10 per cent for oak to a maximum of about 75 per cent for cedar. The many good results which have been and are being secured by timber-treating engineers in protecting ties from decay are placing each year a larger percentage of our ties in the cedar class, in so far as their mechanical life is concerned.

It is a waste of preservative, effort and money to inject into ties an amount of preservative which will protect ties beyond their mechanical life, because after the tie has once failed mechanically it is removed from the track. With costly treatments, particularly such as are given by the full-cell cresote process, this problem is of immense importance to railroads. By the mechanical destruction of ties I mean rail wear and spike cutting.

Protection of Ties from Rail Wear—The protection of ties from rail wear is secured by means of tie plates. These serve two primary functions: (1) The protection of the tie from the crushing and pounding action of the rail, due to the passage of rolling stock; and (2) the protection of the tie from the grinding action of the rail caused by its tendency to creep and vibrate.

A great variety of plates has been advocated to protect ties from destruction. They may be classed, however, as wood and metal plates. The former are rather extensively used

abroad, and are also under test in this country. From the experience which we have had with them in different test tracks laid in co-operation with American roads, the results have not thus far been satisfactory. Wood plates offer little or no reinforcement to spikes when these are subjected to a lateral thrust; consequently the spikes are more likely to bend and rail spreading is likely to occur. Furthermore, the plates often tend to work loose from under the rail, and if spikes are driven through them they split badly. In some of our tests, where wood plates were attached to the ties, they actually became imbedded in the ties. If the tie is slotted so that the plate can be inserted in such a manner that its upper surface will be level with the top of the tie many of these objections are overcome, but this method of treatment increases the cost of preparing ties for service and also weakens them.

Metal plates vary considerably in form, but may be classed into two types, viz., pronged or ridged plates and flat plates. The object of the former class is to imbed the plate in the tie, thus making it a part of the tie and assisting the spikes in resisting rail spread. The chief disadvantage we have noted with this type of plate is its tendency to gouge into the wood. The untreated interior of the tie is thus exposed to the weather and decay is readily admitted. Flat plates do not have this objection, but are troublesome at times in that they become loose and rattle under the rail. Furthermore, they simply rest upon the tie and offer no reinforcement to the spike against lateral thrust.

A feature in tie plate design which has perhaps not been given the serious attention to which it is entitled is the size of plate for the kind of tie on which it is to be placed. A light, small tie plate is of little or no value in protecting the tie from destruction. It is necessary to have the plate of such surface area that the crushing action of the rail will be distributed as widely as possible, and to have sufficient thickness so that no buckling will occur. If cedar ties are interspersed in a track with white oak ties and the same size tie plates are placed upon both, the cedar ties are going to fail from mechanical destruction far more quickly than the white oak ties; therefore, to secure best results, tie plates should be so designed that the unit loads placed on various kinds of ties will be approximately the same. Perhaps best results are secured by placing in the track ties of uniform hardness, at least in given stretches.

The Forest Products Laboratory has made over 2000 tests on about 70 species of timber to determine their resistances to crushing when the force is applied at right angles to the grain as in the case of cross ties. These results, based upon wood in a green condition, are given in Table 1. As some of the species given in the table were represented by only a few trees, further tests may vary the rating shown. Variations of 20 per cent in the strength of the same species of wood are not uncommon, due largely to the conditions under which the tree grew.

Table 1.—Crushing Strength of Cross Ties in Percentage of White Oak.

Kind of Tie, Common Name	Fibre Stress at Elastic Limit Perpendicular to Grain. Lbs. per Sq. In.	Fibre Stress in White Oak, or 853 Lbs. per Sq. In.
Osage Orange	2260	265.0
Honey Locust	1684	197.5
Black Locust	1426	167.2
Post Oak	1148	134.6
Pignut Hickory	1142	133.9
Shagbark Hickory	1070	125.5
Big Shellbark Hickory	997	116.9
Butternut Hickory	986	115.7
Yellow Oak	857	100.5
White Oak	853	100.0
Bur Oak	836	98.0
White Ash	828	97.1
Red Oak	778	91.2
Sugar Maple	742	87.0

Rock Elm	696	81.6
Beech	607	71.2
Redwood	578	67.8
Bald Cypress	548	64.3
Red Maple	531	62.3
Hackberry	525	61.6
Incense Cedar	518	60.8
Hemlock	497	58.3
Longleaf Pine	491	57.6
Tamarack	480	56.3
Silver Maple	456	53.5
Yellow Birch	454	53.2
Douglas Fir	427	50.1
Shortleaf Pine	400	46.9
Red Pine	358	42.0
Sugar Pine	353	41.4
White Elm	351	41.2
Western Yellow Pine	348	40.8
Lodgepole Pine	348	40.8
Red Spruce	345	40.5
White Pine	314	36.8
Engelman Spruce	290	34.0
Arbovitae	288	33.8
White Spruce	262	30.7
Butternut	258	30.3
Buckeye (yellow)	210	24.6

I have taken as my standard for comparison with other woods a white oak tie. It will be noticed that a number of woods are stronger than white oak. On the other hand, most of the ties have a less crushing resistance than the standard white oak tie, and for this reason require larger plates. There is a fixed relation between the specific gravity or dry weight of the wood and its strength; in other words, woods which are light in weight are low in crushing resistance, while woods heavy in weight offer considerable resistance to crushing.

It might be claimed that this property of hardness or strength should be considered in fixing the price of cross ties; that is, ties which have a low crushing strength, and which consequently require a large-sized tie plate in order to be protected from mechanical destruction, should, other things being equal, sell at a lower price in an untreated condition than similar ties which are heavier and which offer greater resistance to mechanical destruction. If this principle were carried out in practice it would result in some cases in a readjustment of tie plates. It is felt that such a readjustment is warranted from the standpoint of efficient track maintenance.

The question has frequently arisen, "What effect have the different preservative processes upon the strength of ties?" This matter has been investigated by Dr. W. K. Hatt at Purdue University, and in Table 2 are given some general results secured from his tests. It will be noted that the difference in strength between treated and untreated ties, except in the cases of those treated with crude oil, is so slight as to make this a matter of little practical importance. Of course, this statement assumes that the ties are properly treated and are not injured by excessive heating or other causes.

Protection of Ties from Spike Cutting—The function of spikes is to hold the rail to the tie, which, analyzed, means that they must exert a resistance to pull and resistance to lateral thrust, the former resulting from the so-called "bumping" of the rail, the latter accentuated by the centrifugal force exerted by the train in rounding curves. As in the case of plates, a great many methods have been advocated for fastening rails to ties, but I will call your attention to three types of construction, in more or less extended use. These involve the use of the cut spike, the screw spike and the dowel.

The cut spike is by far the one most generally employed in this country. It is cheap, enables quick laying of the rail, and is easily applied. When freshly driven in sound, heavy timber it also gives very satisfactory results. It has, however, been subject to severe criticism because it frequently becomes loose in the ties, and under such condition may be responsible for unsafe track. This feature has led to considerable experimenting in an effort to overcome these disadvantages.

The screw spike has been most successful thus far in re-

moving the chief criticism levied against the cut spike, viz., its low holding power. Screw spikes, however, are more costly than cut spikes and more difficult to insert in the track. Their use, however, is growing and will doubtless continue to do so, as this form of spike possesses considerable merit. In a large number of tests made at Purdue University, a part of which were conducted by the Forest Service, it was found that screw spikes had from 1.7 to 3.8 times the strength of common cut spikes against pull, and from 1.2 to 2.4 times the lateral resistance of the common spike. In round numbers one screw spike is about as efficient as two cut spikes, so far as holding the rail to the tie is concerned. Some detailed information on this point is given in Table 2.

Table 2.—Showing Effect of Treating Ties Upon Their Crushing Strength and Spike Holding Power.*

Treating Process	Crushing Strength at Elastic Limit Perpendicular to Grain in Per Cent of Untreated Tie	Resistance to Spike Pulling in Per Cent of Untreated Tie with Cut Spikes	Resistance to Pull Pounds
Red Oak—Untreated	100	100	173
Burnettized	97	98	172
Lowry	104	93	163
Rueping	92	93	162
Full Cell	104	101	172
Loblolly Pine—Untreated	100	100	215
Rueping	99	123	209
Lowry	104	94	219
Rueping	112	109	246
Full Cell	100	84	184
Crude Cell	73	53	192
Shortleaf Pine—Untreated	100	100	241
Rueping	103	100	209
Full Cell	108	103	223
Crude Oil	72	45	176
Longleaf Pine—Untreated	100	100	202
Rueping	109	100	205
Full Cell	101	105	270
Red Gum—Untreated	100	100	228
Rueping	97	102	222
Full Cell	99	105	252
Crude Oil	90	70	270

The large number of ties cut from comparatively soft woods, such as loblolly pine, have encouraged certain roads to experiment with hard wood dowels. These are simply plugs of hard wood, such as red oak, usually creosoted, screwed into the tie. The spike is then driven or screwed into this hardwood dowel. By this method a very firm grasp of the rail to the tie is secured, and should the spike become loose and worn, the hardwood dowel can be unscrewed from the tie and a new one inserted. Of course, such a method of treatment is expensive; and, furthermore, it has a disadvantage in that it weakens the tie unless the ballast is kept in very good condition. Where it has been put to practical test this method has, however, yielded very satisfactory results.

Adzing and Boring Ties.—This is a method of preparing ties for service which is one of comparatively recent origin in this country. As by far the larger majority of cross ties now in use are hewn, the problem of securing a uniform bearing of the rail or tie plate on the tie is of great importance. Unfortunately, common practice in this country consists in adzing such ties after they have been treated. This removes the preserved layer of wood at the very point where its protection is most needed. In order to secure best practice it is absolutely essential to have the rail or tie plate bear uniformly on the tie, and unless the ties are adzed this result is rarely accomplished. Adzing is, therefore, strongly recommended, particularly on hewn ties, and the proper time adz is before the ties are treated, and not after. While the mechanical adzing of ties is still in its infancy, it is quite likely machinery to do this work will become a part of the well-equipped tie treating plant.

Another feature in too limited use at present is the boring of the ties for the insertion of spikes. When screw spikes are

used it is absolutely essential to bore a hole into the tie in order to insert them, and if this hole is bored after the tie is treated the unprotected interior is more or less exposed to decay. Boring should, therefore, be preferably done before the ties are treated. Even with the ordinary cut spike, boring is of direct value. Some tests along this line have been made by the Forest Service and are shown in Table 3. It will be noted that the spikes driven into a hole three-eighths inch in diameter had a greater holding power than spikes driven into the tie not bored. This is due to the fact that when a spike is driven into a bored tie the fibers are not crushed to the same extent as when no boring has been made.

Table 3.—Showing Effect on Holding Power of Driving Cut Spikes Into Bored Holes.*

(All ties Red Oak untreated.)

Method of Inserting Spike in Tie	Resistance to Pull Pounds
Ordinary 9-16 inch square spikes driven without boring..	7613
Ordinary 9-16 inch square spikes pointed on four sides, in hole $\frac{3}{8}$ inch in diameter	8178
Ordinary 9-16 inch square spikes pointed on four sides, driven in hole 7-16 inch in diameter	7856
Ordinary 9-16 inch square spikes pointed on four sides, driven in hole $\frac{1}{2}$ inch in diameter	7664

Conclusions.

The following general conclusions can be drawn from this paper:

(1) The increasing number of treated ties being used in this country is increasing the importance of protecting them from mechanical destruction, because the problem of protection from decay is being rapidly solved. To secure best results, therefore, a protection of treated ties from rail and spike cutting is strongly recommended.

(2) It is believed that, other things being equal, the size of the tie plate should depend upon the kind of tie with which it is to be used. Soft ties demand a larger plate than hard ties. It is felt that this fact should be recognized in fixing upon the price of various timbers for cross ties.

(3) Preservative treatments with creosote and zinc chloride when properly made affect the strength of ties so slightly that any difference in crushing value is of little or no practical importance.

(4) On account of their holding power screw spikes are preferred to cut spikes and can be recommended where high-class construction is desired.

(5) Adzing and boring ties, particularly the adzing of hewn ties, prior to treatment, is considered of prime importance in preparing them for service. Adzing after treatment should be classed bad practice, as it exposes or tends to expose the interior of ties to decay at a point where protection is most needed.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The second annual meeting of the Chamber of Commerce of the United States of America will be held at Washington, D. C., February 11, 12 and 13. This will be one of the most influential business gatherings of the year, and the discussions will be exceptionally opportune, coming as they do immediately subsequent to the administration's declarations of its position relative to the various methods of corporate control. Of particular interest to transportation and the allied industries is the fact that two entire days, Thursday and Friday, February 12 and 13, will be given over to a special program of discussions on

*Bulletin 118, Forest Service—"Prolonging the Life of Cross-ties"—By Howard F. Weiss.

*A part of the differences in strength here noted are due to varying moisture contents of the ties and the fact that different ties had, of course, to be used, it being impossible to keep these absolutely uniform.

Data taken from experiments made under the direction of Dr. W. K. Hatt and published in the bulletins of the American Railway Engineering Association.

trust legislation. A feature preceding this, on Wednesday, will be an address by Charles A. Prouty, member of the Interstate Commerce Commission, on "Physical Valuation of Railroads." Among the speakers on the special program for Thursday and Friday, mentioned above, will be the following: President, Charles R. Van Hise, University of Wisconsin; Louis D. Brandeis, Boston, Mass.; Frederick P. Fish, former president American Telephone & Telegraph Co.; Victor Morawetz, New York city; Prof. Henry R. Seager, Columbia University, New York; Henry H. Towne, president Yale & Towne Mfg. Co. and former president of Merchants' Association, New York city.

The discussion will be confined principally to topics as follows: 1. Concentration of industry in the United States: What constitutes (a) Unreasonable restraint of trade? (b) Unfair competition? In what respects does the Sherman law require definition? 2. Should holding companies be abolished? Should interlocking directorates be prohibited? Should persons or corporations be permitted to own control of competing corporations which between them do more than half the business in a particular line? 3. What should be the rights and privileges of private parties: (a) In intervention in government action under the Sherman law to prove damages. (b) In invoking equity powers to restrain violations of the Sherman law. (c) Under the statute of limitations: should the statute be extended in their interests so as to run from the date of the entry of judgment in a government suit? 4. What should be the functions of a federal interstate trade commission: (a) Administrative powers to restore competition and enforce the Sherman law and new laws defining its scope. (b) Quasi-judicial powers of legisla-

tion. (c) What requirements as to publicity should be enforced. 5. Is the trust form of organization industrially efficient? Elliot H. Goodwin is general secretary of the Chamber of Commerce, at 707 Riggs building, Washington, D. C.

The annual banquet of the Traffic Club of Pittsburgh will be held March 27. As these annual parties of the club have outgrown the size of any hotel banquet hall in Pittsburgh, it has been arranged to hold the affair this year in Soldiers' Memorial Hall.

The annual banquet of the Chicago Transportation Association will be held at the Hotel Sherman, Chicago, on February 24, at 6:30 p. m. Levy Mayer and Glenn Frank will be the speakers at this strictly informal occasion.

The sixth annual dinner of the Pittsburgh Passenger Club will be held at the Fort Pitt Hotel, Pittsburgh, Pa., Monday evening, February 9. For the first time women will be admitted to this banquet. The principal speakers will be Mayor Joseph G. Armstrong, C. L. French and Wyn B. Morris.

The Transportation Club of Louisville, Ky., has announced that it will hold its second annual banquet on Tuesday afternoon, February 10, at the Seelbach hotel. Frank G. Maus, general freight agent, Pennsylvania Railroad, who was the chairman of last year's banquet, will again have charge of the arrangements in the coming banquet, and the club expects to duplicate last year's successful entertainment.

The Railway Supply Man's Point of View

Cost as Influenced by Irregularity of Business.

A railway supply man made the remark the other day to the writer that he wished he was the president of a railroad, or two or three of them, as he would make money for his roads in buying railway equipment just at the present time—a pretty good illustration of how cost is influenced by the irregularity of business.

If it is possible for a railway president to buy his cars at very much less at one time than at another, it must mean one of two things: either the manufacturer at one time makes too high a profit, or at another time too low a profit. Either condition is unfortunate both for the railroad and for the manufacturer who supplies the railroad with material, or finished product. There is no question that cost of railway equipment is very greatly influenced by irregularity of business, and there is a very wide range in such costs.

Not very long ago, one of our leading railroads placed an order for a lot of cars. After getting in the bids for a certain specified number, and after having made its contract, the railroad decided to order twice the number of cars originally determined upon. One of the successful bidders was called in and told that instead of having the number of cars originally ordered, they were to have twice as many; seemingly a matter of congratulation for the railway supply man. The railway supply man was willing to take an order, say for two hundred and fifty cars, but when his order was increased to five hundred cars, and at the same price, he found that he could not afford to lose any more than he was losing on the original two hundred and fifty. He could stand that, but he could not stand the added loss of another two hundred and fifty. He was a good deal in the position of the little boy who had been invited out to dinner, and who had been supplied very abundantly by a generous hostess with pie. Knowing the proverbial unlimited capacity of the aver-

age small boy, she had given him several pieces, and finally, upon offering him a still further supply, the little boy indicated that he had had a sufficient quantity. She said to him: "Why, what's the matter, Johnny? Do you really mean to say that you don't want any more pie?" "Yes, ma'am," replied the small boy, "I don't want any more pie, and I don't want what I got."

Possibly this illustrates pretty well the supply man's point of view at times when costs are influenced downward by irregularity of business. Not only the railroads, but the men who supply the railroads with equipment, are entitled to a fair profit, and naturally, it would be much better if the supply manufacturer could figure each year in advance just about the amount of equipment that he could sell, and then arrange his manufacturing plant accordingly. Year in and year out, he probably could make more money, and the railroads could buy on better terms than they now do. If a manufacturer sells to a railroad at too low a price, and continues to do so, whether it is caused by the irregularity of business or otherwise, he is not making money—not getting a fair return in the way of profit. If the price at which he sells is so low as to be below the cost of production, it is only a matter of time before such a concern must go out of business, because such a company must necessarily reach the limit of its resources, even if the limit is stretched by borrowing, etc.; for there is a limit.

Now, the railway supply manufacturer, as well as any other wise business man, will take advantage of the irregularity of business to reap a harvest when he has the opportunity, and will go cautiously, but no less surely, to a much lower price when competition and conditions force him to it. It is probably impossible to maintain prices always at a certain fixed mark, and there is bound to be some variation due to very natural causes, but the more nearly we can approximate to a regularity of buying and selling, the more surely shall we eliminate economic waste.

If a railroad buys at a time when the manufacturer is hungry for business, very naturally it is going to buy at a low price, and the reverse would be true when the manufacturing plants are crowded with business. This proposition of a feast or a famine is one that is not working to the advantage of any one in the long run.

Manufacturers to be "Regulated."

If the administration's proposed Interstate Trade Commission is established by law, the manufacturers of railway supplies will have to submit to similar regulation to that imposed on the railways. Mr. Brandeis favored the pending bill before the House Committee on Interstate and Foreign Commerce last week. He took the position that interstate commerce corporations were no different in the eyes of Congress for legislative purposes from interstate carriers, and should be subjected to rules of uniform accounting. He laid special stress on the lack of efficiency in modern business methods, and, while imputing no wrong-doing to corporations in their present methods of bookkeeping, said it was impossible to reach a clear understanding of the evils of present-day business without the facts. He said the Bureau of Corporations, in its investigation of the steel industry, had encountered great difficulty in arriving at just conclusions because the information in its possession had been secured piece meal.

With reference to publicity to be given to the records of the proposed Trade Commission, he said publicity should be made mandatory only as to those questions in which the public had a legitimate interest. He thought the broadest possible discretion should be vested in the Board in this regard, and that business built up on a secret formula, a secret process, or upon a list of customers should be fully protected. He also went on record in opposition to giving a corporation a certificate of character by publicity, but he favored "making corporations deserve such a certificate" by the kind of publicity to be indulged in. Mr. Brandeis said he thought the publicity provision in the Clayton bill was too comprehensive, and favored giving to Congress the power to demand information of the Board whenever it was desired.

Creco Annual Dinner.

The Tower room of the Union League club in Chicago has been the scene of many a dinner. If its walls could speak, they could tell interesting stories of what they have witnessed in the years that have gone since the establishment of the club. Many who have sat at the big round table in that room have crossed the Great Divide, over which there seems to be no return trail.

All of these things came to the mind of the guest who was honored with an invitation to meet last Tuesday evening with the Creco family at its twenty-first anniversary dinner. One always feels honored to be a guest in a home—to be received as one of the family, and with this feeling still in mind, the writer is prompted not only to tell of the very enjoyable evening, but to draw a lesson from that evening for the benefit of the railway supply fraternity generally.

The big round table was most appropriately decorated. The entire center was occupied by miniatures—exact and faithful reproductions of the five plants of the Chicago Railway Equipment Co.—a picture pleasing to the eye of what "Creco" is outwardly and tangibly. In the center of the table, on a slight elevation, stood the beautiful general office building, and the plant which stands behind it. At the left stood the Detroit plant, and at the right the new and remodeled works of the Franklin rolling mills. Back of these,

to the right and the left, were the Marion on one side and the Grand Rapids malleable iron works on the other. Little miniature tracks encircled the buildings, running in and out through them. Toy engines and cars moved over the tracks now and then. Electric light wires were strung on twenty-one "mile posts," representative of the twenty-one years of the company.

With the close of the dinner, and with lights dimmed in the room, the buildings were lit up, the whistles blew, and the smoke from the many little chimneys arose to mingle with the smoke of the Havanas, which told of the close of the time for physical feasting, and announced the beginning of the intellectual repast. The introduction by President E. B. Leigh, and the excellent paper which he read, followed by other papers from members of the organization, was not only an inspiration to the shareholders and guests, but was a revelation to them of the reasons for the continuing success of the company.

Only one thing "disturbed" the program of the evening. Under the leadership of Mr. Arthur Wyman, assistant to the president, the "Creco Boys" instituted a mimic strike, presenting to President Leigh demands summarized in his acceptance from them on his twenty-first "Creco" birthday of a handsome watch, bearing an inscription indicative of the esteem and affection in which he is held by his entire organization. Mr. Leigh promptly "yielded" to these "demands" in happy vein, expressing his heartfelt appreciation of this further evidence of the loyalty of his staff. The loyalty inspired by their leader and responded to by those closely and actively associated with him in business is an explanation of past success, a congratulation for the present, and a guarantee of the future.

The guest who sat that evening as one of the family, who possibly was able better to judge the meaning and the effect of it all, went away with a broader vision and clearer insight, and a more exact knowledge as to what constitutes those things which are necessary for successful business. What was gained there that night should be of interest, and should be of help to the men who would naturally read "The Railway Supplyman's Point of View." It will be more than appropriate to take up from time to time some of the results learned from the Creco dinner, and we announce to those who are interested the following subjects for discussion in future issues of this department of the Railway Review:

Co-operation.

Loyalty.

High Ideals in Business.

Sales Success Not Necessarily Business Success.

Selling as a Training for Manufacturing.

Manufacturing as a Training for Selling.

Railway Service as Training School for Railway Supply Business.—V.

JOHN MACKENZIE.

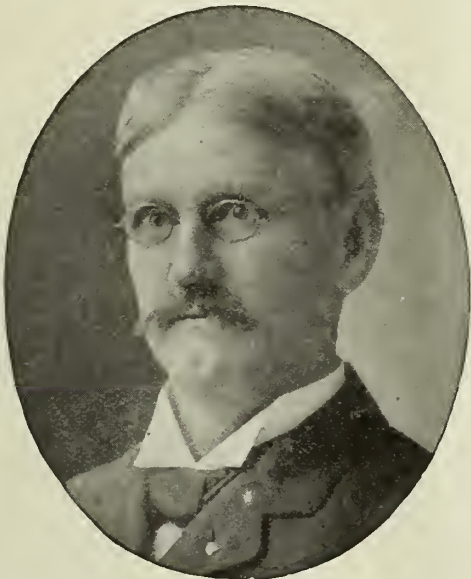
John Mackenzie was an active railway man for over thirty years, except for about two years when he was with a locomotive building establishment. He is now in his seventieth year, and has been in the hospital three months as a result, as he says, of "attempting to derail a street car." His many friends are glad it was not more serious, although he still feels the effects of it. During a quarter of a century, there was no more active and well-known figure on the floor of the annual railway mechanical conventions than Mackenzie.

In 1872 he was a foreman in the shops of the Memphis & Ohio Rd., at Memphis, Tenn.; which position he left to go to the Rogers Locomotive Works, where he was storekeeper and foreman. The old Rogers works had a great reputation in those days, and is possibly better remembered to-day in some foreign countries for which it built engines than it is at home. In 1874 he was appointed superintendent of machinery of the Hannibal & St. Joseph Ry., at Hannibal,

Mo. In 1876 he went to the Kansas Pacific, as superintendent of machinery, and remained there until 1881, when he was appointed assistant superintendent of motive power and car department of the Union Pacific, under Isaac Congden, at Omaha; the Kansas Pacific having been merged in the Union Pacific.

In 1883 he became superintendent of the New York, Chicago & St. Louis (the "Nickel Plate") where he remained until the close of his active railway work in 1902. He then became interested in the manufacture of a wrecking frog, and is still the president and general manager of the Johnson Wrecking Frog Co.

Mr. Mackenzie joined the American Railway Master Mechanics' Association in the Centennial Exposition year, 1876, at the meeting at Philadelphia, and is still on the list of



John Mackenzie, President and General Manager, Johnson Wrecking Frog Co.

active members. He was president of the association for two years. He was also a member of the Master Car Builders' Association, and a member of the arbitration committee for ten years—eight years as chairman. He was a charter member of the Western Railway Club, and a member of the Central Railway Club, serving two terms as president.

The supply business has kept Mr. Mackenzie in touch with his old railway friends and associates; although from the limitations of age he is not as familiar a figure among them as he was for so long a period. No recent photograph of Mackenzie being available, we are using one taken some years ago.

SUPPLY TRADE NOTES.

—At a recent meeting of the Association of Manufacturers of Chilled Car Wheels officers were elected for the coming year as follows: President, T. A. Griffin, Griffin Car Wheel Co., Chicago; vice-president, E. F. Carry, vice-president and general manager American Car & Foundry Co., Chicago; J. A. Kilpatrick, president Albany Car Wheel Co., Albany, N. Y.; secretary and treasurer, George W. Lyndon, Chicago; executive committee, W. C. Arthurs, J. D. Rhodes, S. F. Pryor, F. B. Cooley, C. A. Lindstrom, A. J. Miller and A. G. Wellington. The association is made up of 25 firms and companies which manufacture chilled cast iron carwheels. Recently it secured the first addition to its membership among wheel manufacturers outside of the United States, in the Canadian Pacific Railroad, which is represented by H. H. Vaughan.

—The Central Railway Supply Co., of Chicago, has moved to 176 North Market street. O. D. Brigham is president of the company.

—Jerome-Edwards Metallic Packing Co., has placed its railway sales in the hands of the Equipment Improvement Co., 30 Church street, New York.

—A. H. Weston, for many years mechanical engineer of the T. H. Symington Co., and located for the past two years at Rochester, N. Y., has been transferred to the sales department of the company, and reported February 1 to C. J. Symington, vice-president in charges of sales, with offices at 30 Church street, New York.

—Employees of the Westinghouse Electric & Manufacturing Co., it is said, have organized a union that will have no affiliation with any other union but will be purely a shop organization. It is the intention to bring in the employees of all the Westinghouse interests in Pittsburgh. The purpose of the organization is not to call strikes but to arbitrate uniform wage scales and look after the general welfare of the workingmen.

—William Thornton Henry, sales manager of the New York Air Brake Co., who died recently, was born at Ithaca, N. Y., December 25, 1848, the son of the Rev. James L. and Gertrude Kemeys Henry. For a number of years Mr. Henry was connected with a prominent packing house in Philadelphia, and entered the employ of The New York Air Brake Co. in 1898, as a salesman. He advanced to western manager, and, finally, to position of sales manager, which position he held until his death, January 6, 1914. Mr. Henry was very popular. He was a member of the best railway and other clubs—New York Railroad club, Central Railroad club, Lawyers' club, Engineers' club, Elks, Sons of the Revolution, and many others. He was noted for his strong personality, and was beloved by all who came in contact with him and his wonderful character.

—The Railway Business Association, a part of whose general executive committee are elected and a part appointed, has organized for 1914 with the following official roster: President, Geo. A. Post, New York; treasurer, Chas. A. Moore, New York; assistant treasurer, M. S. Clayton, New York; vice-presidents, A. M. Kittredge, Dayton, O.; W. E. Clow, Chicago; G. W. Simmons, St. Louis; S. P. Bush, Columbus, O.; Alba B. Johnson, Philadelphia; H. G. Prout, Pittsburgh; W. G. Pearce, New York; executive members, G. M. Basford, New York; J. C. Bradley, Buffalo; J. S. Coffin, New York; Walter H. Cottingham, Cleveland; O. H. Cutler, New York; Henry Elliot, East St. Louis; Irving T. Hartz, Chicago; F. T. Heffelfinger, Minneapolis; Robert P. Lamont, Chicago; W. B. Leach, Boston, Mass.; E. B. Leigh, Chicago; W. H. Marshall, New York; William McConway, Pittsburgh; A. H. Mulliken, Chicago; Rudolph Ortmann, Chicago; S. F. Pryer, St. Louis; W. W. Salmon, Rochester, N. Y.; Justus H. Schwacke, Philadelphia; Geo. T. Smith, Jersey City; James S. Stevenson, Detroit; H. H. Westinghouse, New York; W. W. Willits, Chicago.

RAILWAY NEWS.

Atlantic Coast Line.—The Atlantic Coast Line has let contracts for construction of 62 miles of second track from Selma to Parkton, N. C. Sections 1 and 2 were awarded to W. Z. Williams & Co. of Macon, Ga.; section 3 to C. W. Lane & Co. of Atlanta, Ga.; section 4 to J. L. Shehan of Elkton, Tenn., and section 5 to A. & C. Wright of Elkton. The work is to begin immediately and be completed by next autumn.

Boston & Maine.—The Boston & Maine R. R. and the Hampden Railroad corporation has filed a petition with the Massachusetts Public Service Commission asking for approval of a joint operating agreement. The Boston & Maine would lease the Hampden Railroad for a yearly rental of \$165,000 and assume all operating, franchise, tax and insurance expenses.

Canadian Northern.—By a majority of 297, property owners of St. Catharines, Ont., have turned down a by-law to allow the Canadian Northern Ry. \$100,000 in return for which it agreed to run the Toronto-Buffalo line through Saint Catharines.

Chicago, Milwaukee & St. Paul.—The Chicago, Milwaukee & St. Paul Ry. has filed plans and specifications for the northwest side grade crossing elimination project in Milwaukee, Wis. The final plans call for an expenditure of \$10,000,000 for the depression of the trackage system between the Menomonee valley and North Milwaukee station, 8.3 miles. In place of the present double tracks, a set of four tracks will be laid, and all switch and side tracks will be renewed. Work will start as soon as the plans are approved by the railroad commission of Wisconsin.

The Chicago, Milwaukee & St. Paul Ry. has sold to New York bankers \$1,150,000 convertible debenture 4½ per cent gold bonds, which is the last of the unissued portion of the \$50,000,000 bonds which were authorized two years ago. They will mature in 1932. It is declared that these bonds were sold at the time that the \$9,741,000 4½ per cent general mortgage bonds were taken by the same syndicate. This would make the total bond issue of the company during the last week \$10,891,000.

Chicago Rock Island & Pacific.—Announcement is made that a committee has been appointed to consider what will be done toward a readjustment of the securities of the Rock Island holding companies. It is stated that several plans have been submitted to this committee, which are having their careful consideration, and it is hoped that in due time some satisfactory solution will be reached. The abolition of the two holding companies, known as the Rock Island Co. of New York and the Chicago, Rock Island & Pacific Railroad Co. of Iowa, will probably be effected, says a report, by the failure of the Chicago, Rock Island & Pacific Railroad Co. to declare a dividend on its stock at the next period.

Chicago, St. Paul, Minneapolis & Omaha.—The Chicago, St. Paul, Minneapolis & Omaha Ry. has applied to the Railroad Commission of Wisconsin to issue \$1,700,000 debenture bonds of 1930. The proceeds, it is reported, are to be used for extensions and betterments during the past two years, amounting to about \$1,240,000, and the remainder for locomotives, steel passenger coaches, steel smoking and baggage cars costing about \$500,000. The commission previously authorized the company to issue \$90,000 of consolidated mortgage bonds for the completion of the branch line to Park Falls, Wis.

Detroit, Toledo & Ironton.—It is expected that the reorganization committee of the Detroit, Toledo & Ironton Ry. will be able to close out the receivership about February 20, at which time J. M. Kurn will be elected president of the new organization.

A report from Columbus, O., says that plans for the reorganization of the Detroit, Toledo & Ironton, as outlined to the state utilities commission February 5 by Judge Harmon, chief counsel for the reorganization committee, include the complete surrender of the present stocks and bonds, which amount to \$43,000,000. The new company, to be composed of present bond and stock holders, proposes to issue \$20,000,000 common stock, but no preferred stock at this time, it was explained. The common stock, it was stated, will be distributed among the stock and bondholders when they surrender the \$43,000,000 which they now own. This will practically mean a reduction of the capital stock of the company by \$23,000,000. The present bondholders also agree to put up \$4,650,000 when the new stock is issued. This, with \$2,000,000, which will be secured from the sale of equipment bonds, is to be used for extension and improvement purposes.

Hampden Railroad.—See Boston & Maine R. R. under Railway News.

Intercolonial Railway.—The Canadian department of railways and canals, Ottawa, Ont., has awarded contract to the Union Construction Co., Ltd., North Sydney, N. S., for diversion of line of the Intercolonial Railway from North Sydney to Leitches Creek, N. S.

Kansas City, Mexico & Orient.—Assets of the Kansas City, Mexico & Orient Ry. are to be sold within sixty days for not less than \$6,000,000 under the terms of an order signed in the federal court at Kansas City, Mo., February 3, by Judge John C. Pollock. Carrying out the order of sale means dissolution of the receivership. A bondholders' committee, already appointed, will probably bid in the property and turn it over to a reorganized company. Frederick Hurdle of London, English member of the bondholders' committee, is said to be ready to begin the refinancing of the road as soon as the sale is completed.

Laramie, Hahn's Peak & Pacific.—The new plan formulated

by the reorganization committee of the Laramie, Hahn's Peak & Pacific R. R. and its subsidiary involves a cash payment by the holders of the first refunding mortgage bonds, collateral trust notes, general mortgage bonds, unsecured notes and claims against and stock of the railway company. These must be deposited under the plan before February 16 with 25 per cent cash payment.

Louisville & Nashville.—It is stated that the \$7,400,000 South & North Alabama general construction mortgage 5 per cent bonds guaranteed by Louisville & Nashville R. R. offered for subscription by J. P. Morgan & Co., the First National Bank and National City Bank at 104¾ have been heavily oversubscribed.

Pennsylvania Railroad.—The net earnings of the Pennsylvania Railroad system for the last calendar year fell off \$11,222,972. The system earned \$71,231,184 net. The financial statement for the year shows a large increase in gross. The loss in net is caused by a big increase in total operating expenses, which were \$319,395,120 for the year, an increase of \$29,023,805. Forced increases of wages and larger taxes are responsible for much of this increase in operating expenses.

The total operating revenue for the year was \$390,626,308, an increase of \$17,800,832. Most of the decrease in net is charged against the lines west, but the lines east show a decrease in income and a large increase in revenue. The total operating revenue on the lines east was \$261,109,510, an increase of \$13,284,404 over the year of 1912. The total operating expenses on the lines east were \$211,172,076, an increase of \$16,484,721, making the total railway operating income on the lines east \$49,937,433, which is a decrease of \$3,200,316 over 1912.

Total operating revenue on the lines west was \$129,516,798, an increase of \$4,516,428. Total operating expenses on the lines west were \$108,223,047 an increase of \$12,539,084, making the total operating income on the lines west \$21,293,750, a decrease of \$8,022,655.

On the Pennsylvania Railroad itself revenues from every class of traffic, including freight, passenger, express and mail and non-transportation, were \$185,400,825, an increase of \$10,793,227. But all the expenses increased in these amounts. Maintenance of way and structures, \$2,014,116; maintenance of equipment, \$2,764,811; traffic, \$301,610; transportation, \$5,047,715, and general, \$221,202, a total increase of \$11,547,345 which makes the decrease of the Pennsylvania Railroad \$1,510,650, including auxiliary operations.

Southern Railway.—The Southern Railway has made surveys for double tracking its line from Wauhatchie, Tenn., to the Chattanooga terminals.

Wabash Railroad.—A minimum price of \$34,000,000 for the Wabash Railroad is fixed in the decree entered by Judge Elmer B. Adams in the United States court at St. Louis, Mo., January 30, for the foreclosure of the first refunding mortgage of the road. The decree finds that \$40,600,000 of refunding bonds are outstanding, and that there is due for defaulted interest \$4,323,621, which must be paid within twenty days from the date of entering the decree. Otherwise, the road will be sold at public auction. Chester H. Krum of St. Louis was appointed as special master to make the sale.

After declaring the up-set, or minimum price, for the property shall be \$34,000,000, the decree specifies that any bidder at the foreclosure sale shall be required to deposit with the special master \$1,700,000 in cash, or \$3,500,000 in refunding bonds, before making his bid. The property will be sold subject to the lien of prior mortgages. Provision is made for the payment of the receivers' certificates out of the proceeds of the sale. No plan of reorganization, it is said, has yet been prepared, nor has a date been fixed for the sale. Pending the sale, the property will continue to be operated by the receivers, as at present.

PERSONALS.

W. J. Edwards, roadmaster of the Alabama Great Southern R. R. at Birmingham, Ala., effective February 1, has been appointed superintendent, with headquarters at Birmingham, succeeding J. W. Evens, resigned.

Charles H. Stein, engineer maintenance of way of the Central R. R. of New Jersey, at Jersey City, N. J., has been appointed superintendent of the New Jersey Central and Lehigh & Susquehanna divisions, with headquarters at Jersey City, N. J., vice E. E. Kerwin, resigned to accept service with another company.

John W. Meredith, division superintendent of the Central R. R. of New Jersey, at East Long Branch, N. J., effective

February 1, was appointed general superintendent of the company, to succeed C. W. Huntington, resigned to accept service with another company.

Samuel B. Zartman has been appointed superintendent of the New Jersey Southern division of the Central R. R. of New Jersey, with headquarters at East Long Branch, N. J., effective February 1.

Nathan G. Campbell, division trainmaster of the Central R. R. of New Jersey at Mauch Chunk, Pa., has been appointed general agent at Newark, N. J., succeeding S. B. Zartman, assigned to other duties.

Abiel D. Edgar, division trainmaster of the Central R. R. of New Jersey, at Jersey City, N. J., has been appointed assistant superintendent of the New Jersey Central division, with headquarters at Jersey City.

R. H. England has been appointed general manager of the Kanawha & West Virginia R. R., with headquarters at Charleston, W. Va., succeeding C. E. Fultz, resigned.

E. E. Kerwin, superintendent of the New Jersey Central and Lehigh & Susquehanna divisions of the Central R. R. of New Jersey, with headquarters at Jersey City, N. J., has resigned to accept service with the Minneapolis & St. Louis R. R.

T. B. Hamilton, general superintendent of the Central system of the Pennsylvania Lines West of Pittsburgh, effective

Alfred H. Smith, president of the New York Central Lines at New York, has also been elected president of the Rutland Railroad.

G. C. Jackson has been appointed auditor of claims of the Canadian Pacific Ry., with headquarters at Montreal, Que.

H. M. Hood, auditor of the New Orleans, Mobile & Chicago R. R., has been appointed comptroller, effective February 1, with office at Mobile, Ala.

E. Wilson, trainmaster of the International & Great Northern Ry., at Palestine, Tex., has been appointed superintendent of the Fort Worth division, with headquarters at Mart, Tex., succeeding S. E. Burkhead, promoted.

Howard Elliott, chairman of the board of the New York, New Haven & Hartford R. R., has been elected also vice-president of the Rutland Railroad.

George T. Jarvis, general manager of the Rutland Railroad, with office at Rutland, Vt., was recently elected vice-president and general manager.

I. W. Booth has been appointed assistant secretary of the Norfolk & Western Ry., with office at Philadelphia, Pa., to fill the vacancy caused by the death of H. W. Griffith.

Morris McDonald will retire from the presidency of the Boston & Maine R. R. at an early date. Mr. McDonald will retain office as president of the Maine Central R. R., with headquarters at Portland, Maine.



Morris McDonald, President of the Boston & Maine and Maine Central, who will retire from the Presidency of the B. & M.



A. M. Schoyer, Resident Vice-President at Chicago of the Pennsylvania Company and Pennsylvania Lines West.



Charles H. Stein, who has been appointed Division Superintendent of the Central R. R. of New Jersey at Jersey City.

February 1, was appointed general manager of the Vandalia Railroad, with headquarters at St. Louis, Mo., succeeding A. M. Schoyer, who has been elected resident vice-president of the Pennsylvania Company and the Pennsylvania Lines West of Pittsburgh, with office at Chicago.

W. C. Downing, superintendent of the Pittsburgh division of the Pennsylvania Lines West of Pittsburgh, has been appointed general superintendent of the Central system, with office at Toledo, Ohio, vice T. B. Hamilton.

J. C. McCullough has been appointed superintendent of the Pittsburgh division of the Pennsylvania Lines West of Pittsburgh, Southwest system (Pittsburgh, Cincinnati, Chicago & St. Louis Ry.), with office at Pittsburgh, Pa., succeeding W. C. Downing, promoted.

G. Le Boutiller, division engineer of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, effective February 1, was appointed superintendent of the Richmond division of the Southwest system, with office at Richmond, Ind., vice J. C. McCullough, transferred.

S. E. Burkhead, superintendent of the Fort Worth division of the International & Great Northern Ry., with headquarters at Mart, Tex., has been appointed an assistant general manager, with headquarters at Houston, Tex.

C. H. Bristol, superintendent of the Colorado division of the Atchison, Topeka & Santa Fe Ry., at Pueblo, Colo., has been appointed acting general superintendent of the Northern district, western lines, with headquarters at La Junta, Colo., to succeed J. M. Kurn, resigned to take service with another company.

A. M. Schoyer, whose appointment as fifth vice-president of the Pennsylvania Lines West of Pittsburgh was announced in our previous issue, was born November 1, 1859, at Allegheny City, Pa. Mr. Schoyer first entered railway service in 1872, serving as messenger, telegraph operator, chief operator, train dispatcher, chief train dispatcher, superintendent telegraph, division superintendent, and general superintendent, all with the Pennsylvania Lines West of Pittsburgh. It was in 1892 that he was appointed superintendent of telegraph. He was superintendent of telegraph of the Vandalia Railroad as well as of the Pennsylvania Lines West of Pittsburgh 1893 to 1899. He served as superintendent of the Eastern division from November 1, 1899, to December 31, 1901, and as general superintendent since January 1, 1902. Mr. Schoyer was appointed general manager of the Vandalia Railroad, with office at St. Louis, Mo., effective January 1, 1913, succeeding Benjamin McKeen, who on the same date became general manager of the Pennsylvania

Lines West of Pittsburgh. Effective February 1, 1914, Mr. Schoyer was elected resident vice-president. Pennsylvania Lines West of Pittsburgh and Pennsylvania Company, with office in Chicago.

E. O. Griffin, general storekeeper for the International & Great Northern Ry., effective February 1, in addition to his duties as storekeeper, was appointed general fuel and supply agent, with headquarters at Palestine, Tex.

Major Bluford Wilson, on February 2, was elected president of the Chicago, Peoria & St. Louis R. R., succeeding John P. Ramsey, resigned.

Frederick S. Wynn, purchasing agent of the Southern Railway, has been appointed secretary of the company, to succeed the late R. D. Lankford.

J. R. Cary, general superintendent of the West Virginia general division of the Chesapeake & Ohio Ry., with headquarters at Huntington, W. Va., consequent to changes effective February 1 in division headquarters and names of divisions, has been appointed general superintendent at Clifton Forge, Va., in charge of the Eastern division. This was formerly known as the Virginia division and embraces all lines east of Handley, W. Va.

J. P. Stevens, general superintendent of the Chesapeake & Ohio Ry. at Richmond, Va., has been appointed general superintendent of the Central division, which was formerly the Western division, and now includes all lines and branches from Handley, W. Va., to Elkhorn City, Ky. Mr. Stevens will have headquarters at Huntington, W. Va.

W. R. Hudson now has jurisdiction over the Western general division of the Chesapeake & Ohio Ry., with headquarters, as heretofore, at Covington, Ky. This was formerly the Kentucky division. It embraces all lines from Big Sandy Junction, Ky., west, and the Chesapeake & Ohio Ry. of Indiana.

William Walliser, whose appointment as assistant to general manager of the Chicago & North Western Ry. was noted in a previous issue of the Railway Review, began his railroad career in May, 1883, as an engine caretaker on the Chicago & North Western, at West Chicago, Ill., and he has since been continuously in the service of that company. From November 10, 1883, to November 7, 1902, he was locomotive fireman, then freight brakeman and later freight conductor on the Galena division; November 7, 1902, to November 9, 1903, trainmaster, and November 9, 1903, to March 17, 1909, assistant superintendent of the Galena division. Mr. Walliser was promoted to superintendent of the Minnesota division, March 17, 1909. May 1, 1911, he was made superintendent of the East Iowa division, with headquarters at Belle Plaine, Ia., which position he held until January 15, 1914, when he was appointed assistant to general managers, with office at Chicago.

Winthrop M. Daniels, chairman of the New Jersey Board of Public Utility Commissioners, Trenton, N. J., has been appointed a member of the Interstate Commerce Commission.

Henry Clay Hall, Colorado Springs, Colo., has been appointed a member of the Interstate Commerce Commission.

B. A. Worthington, reported in our previous issue as about to leave the Chicago & Alton R. R., has resigned as a director and president of the company. Mr. Worthington, it is understood, will continue in railroad work as an expert with offices in New York and Chicago.

W. G. Bierd, vice-president and general manager of the Minneapolis & St. Louis R. R., has been elected a director and president of the Chicago & Alton R. R., to succeed B. A. Worthington, resigned.

Morton Riddle, hitherto general superintendent of the Third division of the Atlantic Coast Line R. R., with headquarters at Jacksonville, Fla., effective February 10, is appointed general manager of the Florida East Coast Ry., with headquarters at St. Augustine, Fla.

J. N. Brand, general superintendent of the Second division of the Atlantic Coast Line R. R., at Savannah, Ga., effective February 1, was appointed general superintendent of the Third division, with headquarters at Jacksonville, Fla., succeeding Morton Riddle, resigned to accept service with another company.

R. A. McCranie, district superintendent of the Atlantic Coast Line R. R., at Waycross, Ga., has been appointed general superintendent of the Second division, with headquarters at Savannah, Ga., succeeding J. N. Brand, transferred.

O. T. Waring, engineer of roadway of the Atlantic Coast Line R. R., at Savannah, Ga., has been appointed district

superintendent at Waycross, Ga., succeeding R. A. McCranie, promoted.

L. L. Knight has been appointed auditor of the Macon, Dublin & Savannah R. R., with headquarters at Macon, Ga., vice A. S. Hale, whose entire time will be devoted to offices of secretary and treasurer.

Daniel Breck, vice-president and general manager of the Missouri, Oklahoma & Gulf Ry., with office at Muskogee, Okla., has resigned.

William Coughlin, general superintendent of the Missouri, Oklahoma & Gulf Ry., has been appointed general manager, with headquarters at Muskogee, Okla.

John R. Jones, trainmaster of the International & Great Northern Ry., at San Antonio, Tex., has been appointed superintendent of San Antonio division, with headquarters at San Antonio. The position had been vacant since the promotion of A. G. Whittington, now vice-president and general manager.

J. F. Goodrich, assistant superintendent of the Arizona Eastern R. R., at Hayden Junction, Ariz., has been assigned to other duties and his former office has been abolished, effective February 1.

J. W. Evens, superintendent of the Alabama Great Southern R. R., at Birmingham, Ala., has resigned to accept service with the Missouri, Kansas & Texas Ry., with headquarters at Oklahoma City, Okla.

TRAFFIC.

W. C. O'Dwyer, general freight and passenger agent of the New Orleans, Mobile & Chicago R. R., effective February 1, was appointed traffic manager, with office, as heretofore, at Mobile, Ala.

D. C. MacDonald, district freight agent of the Canadian Pacific Ry. at Nelson, B. C., has been appointed assistant general claims agent for western lines.

G. W. Feakins has been appointed general agent of the El Paso & Southwestern R. R., with office at St. Louis, Mo., succeeding Garnett King, promoted. Mr. Feakins was previously assistant to general traffic manager, at Chicago.

W. F. Munde, contracting freight agent of the Macon, Dublin & Savannah R. R., at Jacksonville, Fla., has been appointed commercial agent at Jacksonville, succeeding E. S. Johnson, resigned, to engage in other business. His former position has been abolished.

J. P. Billups, general passenger agent of the Atlanta & West Point R. R., and Western Ry. of Alabama, has been appointed also general passenger agent of Georgia Railroad.

Russell Sage Underwood has been appointed assistant to general traffic manager of the Erie Railroad, with office at 50 Church street, New York.

George R. Wheeler has been appointed, effective February 1, milk freight agent of the Erie Railroad, with office at Chambers street, New York, vice Frank E. Smith, who retires at his own request.

Asa B. Clark has been appointed division freight agent of the Erie Railroad, at New York city, succeeding George R. Wheeler, promoted.

H. M. Williams has been appointed traveling freight agent of the Atlanta, Birmingham & Atlantic R. R., with headquarters at Cincinnati, Ohio, succeeding L. J. Steinhauer, resigned to engage in other business.

C. A. Redden has been appointed commercial agent of the Frisco Lines, at Jacksonville, Fla.

ENGINEERING.

B. J. Dalton, formerly professor of railway engineering at the University of Kansas, has been appointed assistant district engineer, Western district, Division of Valuation, Interstate Commerce Commission, with headquarters at Kansas City, Mo.

Clifton B. Spencer, office engineer of the St. Louis & San Francisco R. R. at St. Louis, Mo., has resigned to accept appointment as senior civil engineer in charge of road and track department of the Western district, Division of Valuation, Interstate Commerce Commission, with headquarters at Kansas City, Mo.

Frank B. Sheetz, formerly contract engineer of the Kansas City Bridge Co., has been appointed senior structural engineer in charge of bridge and building department, Western district of the Division of Valuation, Interstate Commerce Commission, with headquarters at Kansas City, Mo.

R. S. Mennie has been appointed engineer of shop improvements of the Rock Island Lines, with office at Chicago, succeeding **W. J. Eddy**, promoted.

J. Beaumont, signal engineer of the Chicago, Great Western R. R., Chicago, Ill., has resigned to accept appointment as senior signal engineer of the Third district, Division of Valuation, Interstate Commerce Commission, with headquarters at Chicago.

M. H. Gold has been appointed division engineer of the Alabama division of the Seaboard Air Line Ry., with office at Americus, Ga., succeeding **R. B. Gandy**, resigned.

S. H. Osborne, division engineer of the Oregon Short Line R. R., now has jurisdiction over the entire Idaho division, with headquarters at Pocatello, Idaho, vice **G. H. Cumberland**, resigned. Mr. Osborne's former headquarters were at Salt Lake City, Utah.

C. H. Chenworth, assistant engineer of the Atlantic Coast Line R. R., with office at Savannah, Ga., has been appointed engineer of roadway, at Savannah, succeeding **O. T. Waring**, promoted.

J. C. Resch, division engineer of the Texas & Pacific Ry., at Big Springs, Tex., has been appointed assistant chief engineer of the International & Great Northern Ry., with office at Houston, Tex.

Raymond V. Reamer, assistant supervisor of the Central R. R. of New Jersey, at Jersey City, N. J., effective February 1, was appointed engineer maintenance of way, Central division and branches, with headquarters at Jersey City, succeeding **C. H. Stein**, promoted.

H. H. Decker, engineer of maintenance, of the Chicago & Northwestern Ry., lines east of the Missouri river, with office at Chicago, has resigned to engage in the contracting business.

D. Rounseville, resident engineer of the Chicago & North Western Ry., at Pekin, Ill., effective February 1, was appointed engineer of maintenance, lines east of the Missouri river, with office at Chicago, to succeed **H. H. Decker**, resigned.

MECHANICAL.

D. C. Clough has been appointed master mechanic of the Oregon Electric Ry. and the United Railways Co., at Portland, Ore., succeeding **G. H. Hopkins**, resigned.

Francis H. Adams, formerly engineer of shop extensions of the Atchison, Topeka & Santa Fe Ry., Topeka, Kan., has been appointed senior mechanical engineer in charge of the mechanical department, including motive power and car equipment, Western district of the Division of Valuation, Interstate Commerce Commission, with headquarters at Kansas City, Mo.

F. W. Wilson has been appointed supervisor of locomotive operation of the Cedar Rapids, Minnesota and Dakota divisions of the Chicago, Rock Island & Pacific Ry., with headquarters at Cedar Rapids, Iowa.

F. O. Walsh, formerly superintendent of machinery of the Brazil Railway, South America, has been appointed superintendent of motive power and equipment of the Georgia Railroad, with headquarters at Augusta, Ga. The office of master mechanic formerly held by **J. H. Watters** is abolished, Mr. Watters having resigned.

A. P. Prendergast, effective February 1, was appointed superintendent of machinery of the Texas & Pacific Ry., with headquarters at Marshall, Tex., succeeding **F. S. Anthony**, resigned.

J. H. Watters, master mechanic of the Georgia Railroad at Augusta, Ga., resigned February 1 to engage in other work. Mr. Watters has been in railway service continuously for 43 years.

W. P. Hobson, master mechanic of the Cincinnati division of the Chesapeake & Ohio Ry., has had his jurisdiction extended over the Ashland division; headquarters at Covington, Ky.

W. S. Butler, master mechanic of the Chesapeake & Ohio Ry. at Hinton, W. Va., effective February 1, was appointed master mechanic of the Huntington and Big Sandy divisions, with headquarters at Huntington, W. Va.

G. W. Robertson, master mechanic of the Chesapeake & Ohio Ry. at Lexington, Ky., effective February 1, was appointed master mechanic of the Hinton division, with headquarters at Hinton, W. Va.

OBITUARY.

L. C. Russell, traveling passenger agent of the Grand Trunk Ry. system, at Chicago, died in that city February 4.

D. F. Maroney, former vice-president of the Pittsburgh, Shawmut & Northern R. R., and later president of the Brookville & Mahoning R. R. (Pittsburgh & Shawmut R. R.), died suddenly February 2, at his home near Washington, Pa. He was 55 years old.

Joseph B. Baker, superintendent of the Philadelphia Terminal division of the Pennsylvania Railroad, with offices at Broad Street station, Philadelphia, died February 3, at his home in Merion, Pa. Mr. Baker was born in Gap, Lancaster county, Pa., August, 31, 1853. He worked for the Pennsylvania Railroad nearly all of his life. He was graduated from Lehigh university in 1884 and immediately entered the employ of the company as a rodman at Altoona, Pa. He was made assistant supervisor of the Middle division in 1887. He worked on nearly every other division of the road until November 1, 1902, when he was made superintendent of the Philadelphia Terminal division, at Philadelphia.

NEW ROADS AND PROJECTS.

Alabama.—See New Roads and Projects under Mississippi.

The Mobile & Baldwin County R. R. has let contract for construction of 10 miles of track south of Fairhope, Ala., to **J. M. Gillis** of Brewton, Ala. There will remain 25 miles more of track to be built to reach the proposed terminal at Pensacola, Fla. Directors include **W. H. Miller**, president; **W. B. Miller** of Chicago, vice-president; **J. O. Acree** of Mobile, treasurer; **J. N. Gillis** of Brewton and **John P. Lowell** of Mobile, secretary.

Arizona.—It has been reported elsewhere that the Arizona Eastern R. R. was about to construct a line of railroad from Christmas to San Carlos, Ariz., also other extensions in accordance with the articles of incorporation of the company. The Railway Review is officially informed that there is no immediate prospect of such construction or any railroad construction being undertaken in that state because of anti-railroad agitation.

Colorado.—A press report from Washington, D. C., states that at a recent conference before Secretary Lane of the Interior Department a group of western men who are interested in railroad building and development outlined a plan for a new railroad about 800 miles long, which it is proposed to run from Grand Junction, Colo., to San Diego, Cal. The representatives of the project have been in Washington to learn the steps needed to obtain a right-of-way over public lands. The route proposed traverses parts of Colorado, New Mexico, Arizona, Utah and California.

Florida.—**Edward Walker**, vice-president of the Tampa, Atlantic & Gulf R. R., a project formerly known as the Tampa, Charlotte & East Coast R. R. is quoted as saying that the company is considering two routes. One would extend from Tampa, Fla., north of Lake Okeechobee to Port Sewall on the east coast. The other route, which has been surveyed, runs from Tampa via Charlotte Harbor, south of Lake Okeechobee to Fort Lauderdale or Miami. On the former route there would have to be a trestle bridge three miles in length, constructed across the Kissimmee river; but to offset this, there would have to be about 26 miles of fill on the southern route where the line entered the Everglades.

Illinois.—The Lehigh Stone Co., Kankakee, Ill., is constructing a line of railway from Lehigh to a point two miles west of Irwin, Ill.

Indiana.—The Indianapolis & Frankfort R. R., previously noted, has been chartered and located but, according to our advices, is not likely to undertake construction this year. This matter, however, is in the hands of the executive committee who may authorize the work earlier if financial conditions improve. **F. T. Hatch**, 1314 Syndicate building, St. Louis, Mo., is chief engineer.

Kansas.—The Scott & Pittsburg Ry. is reported incorporated, with \$100,000 capital stock, for the purpose of constructing a railroad from Fort Scott, Kan., to Pittsburg, Kan., a distance of 40 miles. **A. C. Dickman**, Fort Scott, is interested.

Louisiana.—The Calcasieu Construction Co. of Lake Charles, La., it is reported, will build approximately 120 miles of standard-gage railroad for the Orange & Northeastern Ry. from Port Orange to Natchitoches via Vinton, Starks, Merryville and Leesville. **Ed. Kennedy**, Lake Charles, is manager, and **T. H. Mandell** is chief engineer. Other officers are **C. Brent Richard**, president; **D. C. Powell**, vice-president; **J. N. Wetherill**, treasurer, and **L. L. Moss**, secretary.

Michigan.—The Toledo, Marshall & Northern R. R. plans to start work in the spring on the construction of its proposed line. The route as planned will be from Montpelier, Ohio, to Bay City, Mich. Marshall, Mich., will be a division point. The offices of the company are located in Toledo, Ohio.

Mississippi.—The Mississippi Northwestern R. R., a former project of W. G. Seaver, has been abandoned, and a new charter for the Pensacola & Missouri Valley R. R. has been taken out instead. The new line as proposed will run from Pensacola, Fla., via Waynesboro, Newton, Carthage and Kosciusko, Miss., Helena, Ark., and Sedalia and St. Joseph, Mo., as the main line. A line from some point on the main line (probably about Carthage, Miss.) will run via Yazoo City, Greenville, Miss., Benton, Ark., to the Arkansas coal fields. This company has acquired the Pascagoula-Moss Point Northern and will extend the line to the Warrior coal fields of Alabama, crossing the Pensacola line at or near Waynesboro, Miss. Officers of the company are: Jos. A. Tabor, chairman of the board, Pascagoula, Miss.; Walter G. Seaver, president, Pascagoula, Miss.; Geo. B. Chapin, vice-president and general manager, Pascagoula, Miss.; C. G. Scott, secretary; J. J. Paquette, treasurer, Pascagoula, Miss.; W. G. Preston, general auditor and assistant treasurer, Philadelphia, Pa.; Samuel S. Watson, general counsel, New York city; J. E. Cameron, superintendent of motive power and equipment; W. S. Cartter, superintendent of construction; A. B. Kearsey, Pascagoula, traffic manager, and R. C. Fraser, New York, purchasing agent; chief engineer, appointment pending. Trust deed securing bond issue, 5 per cent fifty-year gold bonds in favor of United States Mortgage & Trust Co. has been authorized.

The Meridian & Deepwater R. R., it is reported, will resume construction of proposed line from Meridian, Miss., to Myrtlewood, Ala., 50 miles, as soon as extension of Meridian & Memphis R. R. into Meridian, Miss., and terminal are completed. About six miles of roadbed has been graded through rough country east from Meridian.

The Fernwood & Gulf R. R., says a report, plans to construct an extension to Columbia, Miss.

Montana.—Report that the Minneapolis, St. Paul & Sault Ste. Marie Ry. proposed extending the Flaxton line in Sheridan county, Montana, from its present terminus for a distance of 66 miles is not confirmed.

Nebraska.—The Niobrara, Sioux City & Omaha R. R. has been authorized by the Nebraska State Railway Commission to issue \$400,000 in stocks and bonds. The company plans to construct a line of railroad in the state of Nebraska. R. R. Kincaid, Lincoln, Neb., is interested.

North Carolina.—The Greensboro, Northern & Atlantic Ry. has started engineering work for its proposed line from Greensboro, via Burlington and Graham, N. C., to connections with the Seaboard Air Line Ry. and the Norfolk Southern R. R., also a branch from Graham or Burlington to Danville, Va., altogether about 100 miles of railroad. There will be from eight to ten steel bridges required. Directors are T. W. Troy, president; J. W. Fry, first vice-president and treasurer, both of Greensboro, N. C.; R. A. James, second vice-president, Danville, Va.; C. M. Benbow, A. W. McAlister, R. C. Hood, A. L. Brooks, J. H. Kimball and Garland Daniels, all of Greensboro; John Q. Gant, Eugene Holt and J. N. Williamson, Jr., all of Burlington, N. C.; W. E. White of Graham, N. C., and A. B. Carrington and W. R. Fitzgerald of Danville, Va. M. W. Thompson is secretary and Walter Washbaugh is chief engineer.

Nova Scotia.—See Railway News under Intercolonial Railway.

Ohio.—See New Roads and Projects under Michigan.

Oklahoma.—The Oklahoma, New Mexico & Pacific Ry. will open bids soon for the construction of an extension from Wilson to Lawton, Okla., 80 miles, via Comanche and Walters. The line is now operating westward from Ardmore to Wilson, 20 miles, and several miles of track have been laid beyond that point. Connections will be made with the Rock Island Lines at Comanche, Walters and Lawton, and with the St. Louis & San Francisco R. R. at the latter point. John Ringling is president, Jake L. Hamon, Lawton, Okla., vice-president, and George W. Rider is the chief engineer.

Texas.—L. E. Mitchell, Neosho, Mo., president of the proposed Dallas, Corsicana & Palestine R. R., is quoted as saying that the construction of the road is assured, and that quite an amount of work had already been done.

The Texas, Kansas & Omaha Ry. proposes to build 100 miles of railroad from Amarillo, Tex., to Texhoma, on the Texas-Oklahoma state line, including a bridge 1500 feet long over Canadian river. F. T. Burnham, Dwight building,

Kansas City, Mo., is president; W. H. Fuqua is treasurer and C. B. Pash, secretary, both of Amarillo, Tex. Others interested are J. L. Williams of Texhoma and R. E. Underwood of Amarillo.

R. A. Love, who has built several lines of railroad in Texas, is now promoting a line from Aransas Pass to Goliad, Tex., and points north to a connection with the International & Great Northern Ry. or the Missouri, Kansas & Texas Ry.

The San Benito & Rio Grande Valley Ry. has recently prepared plans for three extensions of its lines, the construction of two of which is proposed in the near future. The first of these extensions will be north of San Benito, Tex., branching off to the east and connecting with the main line again at Fernando, the present end of the line, forming a loop some 25 miles in length. The other extension proposed is a line 29 miles in length to connect Santa Marcia, Tex., with Latonia.

Utah.—A proposition has been presented to the Utah Development league at Salt Lake City, Utah, favoring the construction of a railroad from Park City, Utah, south and east into Uinta county. R. S. Collett, Roosevelt, Utah, who is interested, is quoted as saying that the grade on the divide would be heavy but no worse than the present grade on the Park City branch of the Denver & Rio Grande R. R. If 100 miles of railroad were built out of Park City into the basin it would open up coal and timber lands that would pay for the road. There are 2,000,000,000 feet of timber in the forest through which the road would pass. According to the forester's report 16,000,000 ties could be cut from timber now on the forest under government regulation.

Virginia.—The Clinch Mountain & Southern R. R., capital \$100,000 to \$300,000, has been chartered. R. J. Armstrong, Philadelphia, Pa., is president and H. E. Widener, Abingdon, Va., is secretary.

Washington.—Surveys have been made and most of the right of way secured for a 45-mile extension of the Tacoma Eastern R. R., from Morton, Wash., the present terminus of the road, to Toledo. From Morton the right of way continues south, passing on the east side of Davis lake, thence to Kosmos, where it turns almost directly west, following the south side of the Cowlitz river, passing through Rife and north of the town of Mossy Rock. Near the town of Mayfield, the road will swing across the Cowlitz, continuing along the north side of the river through the Silver Creek country and ending at Toledo, about six miles east of the Portland-Tacoma line of the Northern Pacific Ry. The surveys call for two branches from the road south of Morton before it begins to turn west at Kosmos. Both branches are to extend east, one branch passing through the Cispus country and the other through Verne, both converging at Randle, making a complete circle around the Big Bottom.

West Virginia.—The Chesapeake & Ohio Ry., it is said, contemplates an extension from Seth, W. Va., southeast to the mouth of Clear Fork, about 13 miles.

The Wheeling & Eastern R. R. of Wheeling, W. Va., is chartered with \$1000 capital to build a line of railroad from Short creek, in Brooke county, to a point near Potomac creek, in Ohio county, W. Va. The incorporators are B. L. Rosenbloom, R. T. Manning, M. E. McGreal, Geo. A. Feeny and B. J. Smith of Wheeling.

Electric Railways.

Information has been given out from the general offices of the Southern Illinois Railway & Power Co. that work on the extension of the road from Harrisburg, Ill., to Marion, Whiteash, New Virginia, Johnston City, West Frankfort, Benton and Herrin will begin April 1. Three forces will be put to work and it is planned to have the line completed in eighteen months. Afterwards a line will be built from Herrin to East St. Louis passing through Carterville, Carbondale and Murphysboro.

The Yakima Valley Transportation Co., North Yakima, Wash., which operates 20 miles of city and suburban lines has completed a survey for an extension of its Wide Hollow line nearly 10 miles into the fast developing Tieton unit of the Yakima reclamation project, and by a circle will reach the Cowlitz valley.

After two months' idleness, said to be due to financial stringency, the Southern Traction Co., will resume work on the line between Belleville and East St. Louis, Ill. H. D. Mephram, a promoter of the road, and William Lorimer, president of the Lorimer-Gallagher Construction Co., have returned to Belleville from London, and it is reported they have interested English capital in the project and that it is now on a sound footing. Tracks already have been laid and poles erected for a large part of the distance from East

St. Louis to Belleville, and the construction company has been ordered to go ahead with the work.

The charter of the Dallas Northwestern Traction Co. has been approved by the attorney general, filed in the offices of the secretary of state, at Austin, Tex. The company will construct and operate a line of interurban railway between Dallas and Wichita Falls, Tex. The capital stock is \$500,000, divided into 2,000 shares of \$100 each common stock and 300 shares of \$100 each of preferred stock. Two thousand shares of common stock has been subscribed and paid in. The principal place of business is to be in Dallas.

The Geneva, Seneca Falls & Auburn Ry., James W. Brennan, Geneva, N. Y., chief engineer, is making surveys for the construction of this company's proposed extension from Seneca Falls, N. Y., to Albany, N. Y.

The San Antonio & Austin Interurban Ry. has completed location surveys. Active work toward financing and building the line will now be undertaken. Vories P. Brown is president; W. P. Tuttle, H. G. Henne, W. G. Barber and A. J. Eilers, vice-presidents; S. C. Bell secretary, and J. D. Oppenheimer, treasurer.

Surveys have been completed by the Missouri Interurban R. R. to connect Sedalia, Prairie Home via Smithton, Otterville and Bunceon, Mo. Construction will not begin until all the right of way has been secured. A. W. Nelson, of Bunceon, is president; J. W. Mellor, secretary, and B. H. Colby, Security building, St. Louis, Mo., chief engineer.

Foreign Railways.

Panama.—The Panama cabinet has approved a contract for the construction of a railroad in the province of Chiriqui, in the extreme west of the republic at a cost of \$1,600,000. The road is to extend from Pedregal on the coast to David, and thence in two branches, to Bouquete to the north, and La Concepcion to the west, a total distance of 60 miles. The contract calls for American construction, R. W. Hebard & Co., of New York, being the contractors. The road will be narrow gage. The work which will begin at an early date, has the approval of Colonel Goethals and other canal engineers.

South Africa.—Very considerable additions to the mileage of Rhodesian railways are now in hand. The Blinkwater Railway is constructing 70¼ miles of new railway from Gwelo and Umyuma, their present terminus, to Victoria. The new line will serve the Athens Mine, and stations will be provided at Fairfield Siding, Shasha River, Makorofies, Zimuta, and Victoria. The distance of Victoria by rail from Beira will be 690 miles. Some 50 miles of the earthworks for the extension have already been completed. Another extension in progress is that of the Mazoe branch line, from Mazoe to Shamva station. Mazoe is 38 miles from Salisbury, and Salisbury is 385 miles from Beira. The new line runs via Rockwood and Kimberley, and during the past year some 50 miles were completed. The Mashona Railway is enlarging its gauge from 2 ft. to the South African standard of 3 ft. 6 in., and is strengthening its bridges to fit them to carry through traffic. Of these widening works, the section from Mount Hampden to Banket Junction, on the Lomagunda Ayrshire line, a distance of 54¾ miles was opened to traffic last November, and the earthworks have been completed for another 11 miles beyond Banket to Eldorado, but the steelwork on this section for the bridges over the Umsengi and Dondo rivers is not yet in place. The earthworks are also finished on the Eldorado extension to Sinoia, a length of 5 miles. The masonry for the bridge over the Hunyani river which will consist of four 100 ft. spans, is also ready for the steel work. Eldorado is 78¾ miles from Salisbury. The lines are being laid with flat-bottomed steel rails, weighing 60 lbs. per yard, fixed with keys to steel sleepers, weighing 70 lbs. each, and spaced at the rate of 2080 to the mile. The bridges are being built to a new heavy standard, capable of carrying increased rolling loads.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Illinois Central R. R., it is reported, will issue specifications next week for 70 locomotives of various types.

—The Chicago, Milwaukee & St. Paul Ry. will order 12 200-ton electrical locomotives for freight service on the Three Forks-Deer Lodge line.

—The Union Freight R. R. has ordered 1 four-wheel saddle tank locomotive (0-4-0-T type) from the American Locomotive Co. Cylinders will be 12x15 ins.; driving wheels, 43½ ins., and the total weight in working order, 93,000 lbs.

—The Holly Shelter Land Co., Woodside, N. C., has ordered 1 prairie type (2-6-2) locomotive from the Baldwin Locomotive Works.

—The Frost-Johnson Lumber Co., Campti, La., has ordered 1 mogul (2-6-0) locomotive from the Baldwin Locomotive Works.

—The Pennsylvania Railroad has placed an order with its Altoona shops for 34 Atlantic type (4-4-2-S) locomotives.

The Wakefield Iron Co., Wakefield, Mich., has ordered 2 six-wheeled (0-6-0) switching locomotives from the Baldwin Locomotive Works.

Freight Cars.

—The Union Tank Line has ordered 1000 all-steel tank cars, 8000 gallons capacity, from the American Car & Foundry Co.

—The Chesapeake & Ohio Ry. has ordered 2000 gondola cars, 115,000 lb. capacity. The Standard Steel Car Co. and the Cambria Steel Co. will each build 1000 of these cars.

—The Hocking Valley Ry. has ordered 1000 gondola cars, 105,000 lb. capacity, from the American Car & Foundry Co.

—The Pennsylvania Railroad will build 1000 steel-under-frame box cars in the company's shops at Altoona, Pa.

—The Virginian Railway has ordered 1000 freight cars from the Pressed Steel Car Co.

—The Illinois Central R. R. has ordered 1000 gondola cars from the American Car & Foundry Co., and is in the market for 500 refrigerator cars.

—The Bangor & Aroostook R. R. is inquiring for 30 freight cars.

—The Atchison, Topeka & Santa Fe Ry., according to report, is in the market for 1000 freight cars in addition to purchases recently made.

—The Chicago & North Western Ry. is reported in the market for 900 center sills.

—The Northern Pacific Ry. is inquiring for 250 ore cars.

Passenger Cars.

—The Pennsylvania Railroad has ordered 50 steel passenger cars to be built in the company's shops.

—The Northern Pacific Ry. has ordered 40 express refrigerator cars from the Western Steel Car & Foundry Co.

Iron and Steel.

—The Buffalo, Rochester & Pittsburgh Ry. has ordered about 750 tons of reinforcing bars from the Carnegie Steel Co.

—The Cleveland & Youngstown Ry. is in the market for 1300 tons of bars for reinforcing. This is in addition to 1900 tons of bridge structurals placed last week.

—The Chicago & North Western Ry., reported as having ordered 35,000 tons of rails, has placed orders for 25,000 tons and released a suspended order for 10,000 tons. This does not embrace 9000 tons for the Chicago, St. Paul, Minneapolis & Omaha Ry. which still is pending.

Bridges.

—The Charleston Northern Ry., now under construction, will erect a bridge over the Santee river about 12 miles south of Andrews, S. C.

—A steel bridge on the Pittsburgh, Lisbon & Western R. R., at Little Beaver creek, in Pennsylvania, collapsed February 1, under the weight of an engine.

—The Chicago & North Western Ry., according to report, has ordered 4500 tons of bridge steel from the American Bridge Co.

—If the city of Spokane, Wash., will pay a claim of \$12,800 for grading done for the city seven years ago by the Northern Pacific Ry., the railroad will agree to build at its own expense within three years or earlier, four overhead steel and concrete viaducts at Napa, Helena, Madelia and Eric streets, to cost \$125,000.

—Appraisers have reported on grants to property owners along the right-of-way of the proposed Paducah & Illinois R. R., and it is said that work on the bridge route will start at once, and real construction will be under way in July. The proposed bridge over the Ohio river, with approaches and track connections will cost about \$3,000,000.

—The Philadelphia & Reading Ry. has awarded contract for a bridge to be erected at Klapperthal Junction, Pa.

—See Railway News under Chicago, Milwaukee & St. Paul Ry.

—The Pennsylvania Railroad has awarded to Arthur McMullen of New York city the contract for the piers and abutments for a double-track bridge across the Delaware river about a mile and a half below Trenton, N. J. The span will be built in connection with a double-track, low-grade freight line to extend from Morrisville, Pa., to Waverly, near Newark, N. J. The bridge will be over 1200 feet in length.

—A press report states that the Chesapeake & Ohio Ry. plans the erection of a new bridge over the Ohio River at some point east of Cincinnati, Ohio., probably near Scioto-ville or between that place and Portsmouth, Ohio.

—Plans are reported to have been approved for a steel truss bridge with beams covered with concrete to be constructed over Boston & Maine R. R. tracks at Plainfield street, Springfield, Mass., estimated cost, \$900,000.

—The Chicago, Milwaukee & St. Paul Ry. has awarded contract to the Wisconsin Bridge & Iron Co. for 227 tons of bridge steel to be erected at Green Bay, Wis.

—The Baltimore & Ohio R. R. has ordered 200 tons of bridge steel from the Mt. Vernon Bridge Co., Mt. Vernon, Ohio.

—The Atlantic Coast Line R. R. has petitioned the government for authority to construct a 3000-ft. bridge over Trout creek at Jacksonville, Fla.

Buildings, Terminals, Etc.

—The Chesapeake & Ohio Ry., it is said, is preparing to erect a new freight depot at Portsmouth, Ohio.

—The Central R. R. of New Jersey is taking bids on 650 tons of structural steel for pier sheds at Jersey City, N. J.

—The directors of the port of Boston, Mass., have awarded contract for constructing a railroad terminal yard capable of accommodating about 400 cars, on Commonwealth Flat, South Boston, to the Hanscom Construction Co., Boston, at \$104,413. About $6\frac{1}{2}$ miles of track will be laid.

—It is reported that the Timpson & Henderson Ry. is considering locating its shops and general offices at Henderson, Tex.

—Work has been started on the enlargement of the shops of the Bessemer & Lake Erie R. R. at Greenville, Pa. It is stated that over \$300,000 will be spent in this work including machinery and new equipment.

—The Pennsylvania Railroad company is said to have announced that the creosoting plant of the Ohio Wood Preserving Co., Orrville, Ohio, will be enlarged at an early date.

—The Baltimore & Ohio R. R. will rebuild its coal elevator and roundhouse on Evans street, Cincinnati, Ohio, which was recently badly damaged by fire.

—The St. Louis & San Francisco R. R. is expected to begin work on the proposed new freight depot and office building about March 1. An approximate expenditure of \$100,000 will be made, including cost of improvements to the present passenger station.

—The Southern Pacific Co. is urging the city authorities of San Francisco, Cal., to take immediate action on a franchise acceptable to the company so that the matter of a new station at Third and Townsend streets in that city may be settled. Work must be begun at an early date if the terminal is to be completed in time for the exposition in 1915. The Southern Pacific plans to spend \$1,000,000 for this work.

—The Roberts & Schaefer Co., Chicago, recently closed a contract with the Carolina, Clinchfield & Ohio Ry. for the building of a fireproof reinforced concrete coaling and sanding plant at Dante, Va. Contract price approximately \$15,000.00

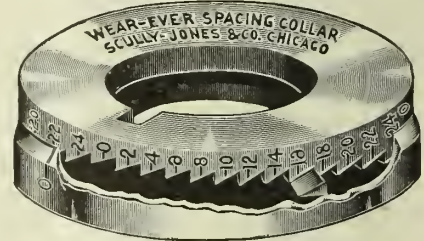
—The Toronto Terminals Railway Co. will hold a meeting in Toronto, Ont., February 14, for purposes of organization. It is stated that the matter of building a union station in Toronto is not likely to be undertaken until late this year.

—It is said to have been definitely decided by the Transcontinental Railway, the Canadian Pacific Ry. and Grand Trunk Ry. and the city, that the building of the new union passenger station at the Palais, in Quebec, Que., together with all the improvements and terminal facilities in contemplation from St. Malo to the Palais, will be commenced May 1.

The Wear-Ever Adjustable Spacing Collar.

The illustration herewith shows the new form of adjustable spacing collar being placed on the market by Scully-

Jones & Co., Railway Exchange Building, Chicago. This collar is designed primarily for use in milling machine manufacturing operations where two or more milling cutters on the same arbor must be spaced exact distances apart. As those familiar with straddle or gang milling machine operations know, it is sometimes necessary to grind the sides of the teeth of the milling cutters. This, of course, changes the distance between the faces of the milling cutters and in order to maintain sizes on the piece being manufactured, compensation must be made in some way for the amount



The Wear-Ever Spacing Collar.

ground off the cutter. This is sometimes accomplished by carrying in stock an assorted lot of solid spacing collars of varying lengths, and if the exact size cannot be found provision must be made by grinding off a solid collar that is too long, or shimming up one that is too short, during which time the milling machine is standing idle. The "wear-ever," as the new form of collar has been termed, is so designed that thicknesses may be varied a total of .024 of an inch. This is divided into twelve spaces of .002 each. The adjustment of the collar is quickly made and after each adjustment it serves the same purpose as a solid collar, without the wear of the thread on threaded collars.

Patents on Railway Devices

ISSUED BY THE UNITED STATES PATENT OFFICE, JAN. 27, 1914.

- Superheater, 1,085,107—Alfred W. Bruce, New York, N. Y., assignor to Locomotive Superheater Co.
- Dust-Collector and Water-Trap for train lines, 1,085,159—Carl Harrison Raab, Fond du Lac, Wis.
- Car-Roof, 1,085,158—Herman Pries, Michigan City, Ind.
- Running-Board for Cars, 1,085,196—Ira Shannon Downing, Cleveland, Ohio.
- Railway-Track Structure, 1,085,211—Henry Kohlmyer, Lorain, Ohio.
- Packing-Joint for Brake-Cylinders, 1,085,222—Dominick H. Rene, Birmingham, Ala., assignor to H. W. Johns-Manville Co.
- Dump-Car, 1,085,243—Argyle Campbell, Chicago, Ill., assignor to Enterprise Railway Equipment Co., Chicago, Ill.
- Dump-Door-Operating Mechanism, 1,085,244—Argyle Campbell, Chicago, Ill., assignor to Enterprise Railway Equipment Co., Chicago, Ill.
- Spring-Cap for Coupling-Lifter Holes, 1,085,262—Robert E. L. Janney, Chicago, Ill., assignor to American Steel Foundries, New York, N. Y.
- Draft-Gear Yoke, 1,085,288—Charles J. Nash, Chicago, Ill., assignor to Universal Draft Gear Attachment Co., Chicago, Ill.
- Car-Door Mechanism, 1,085,300—Ralph V. Sage, Westmont borough, Pa.
- Railway-Rail Brace, 1,085,315—Charles H. York, Moline, Ill.
- Railway and Tramway, 1,085,373—Charles de Bange, Versailles, France.
- Locomotive-Headlight, 1,085,453—Earl H. Marshall, Lawrence, Kans.
- Cattle-Guard, 1,085,456—Arthur D. McColeman, Gilchrist, Mich.
- Car-Stakes, 1,085,495—Thomas Mathias Schmitz, Cranbrook, British Columbia, Canada.
- Train-Connector for Electric-Current, 1,085,497—Herman Schroeder, Sollitt, Ill.
- Auxiliary Coupling, 1,085,532—Solomon H. Boltz, Philadelphia, Pa.
- Angle-Bar, 1,085,553—Edgar Hanston Dull, Handley, W. Va.
- Brake-Shoe, 1,085,555—George S. Evans, Lenoir City, Tenn.

RAILWAY REVIEW

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Missouri Rate Cases to Supreme Court Again.

The legal tangle in which the Missouri rate cases are involved was given another convolution, February 7, when Judge Smith McPherson of the federal district court signed an appeal carrying the case to the United States Supreme court on an assignment of errors. The previous status of the case has been a lively controversy between the railroad attorneys and the state authorities as to what court held jurisdiction in the settlement of claims aggregating \$24,000,000 on alleged overcharges accumulated during the lengthy period in which the rate laws have been in litigation. Judge McPherson, on February 6, returned a decision holding that he had no power to retain jurisdiction of suits against the railways to recover for these alleged overcharges, the decision being in the form of a decree entering a mandate of the United States Supreme court upholding the Missouri rate laws as constitutional and dissolving an injunction granted the railways in 1909 against the enforcement of the laws. The attorneys for the thirteen railroads involved want to compel Judge McPherson to take jurisdiction over the claims, and to that end presented for the judge's signature an assignment of errors charging that the court erred in the following respects: In decreeing that it refused jurisdiction to determine liability for alleged overcharges. In holding that it was without discretion under the Supreme court mandate to reserve such jurisdiction. In appointing a master to hear such claims as might be filed in the federal court. In ordering that the decree entering the higher court mandate should not bar claimants from suing in any other court. In directing that the complainant pay the costs made in the case in the Supreme court.

Railways Ask to Retain Steamship Lines.

Anticipating the effect of the Panama Canal law which decrees that after July 1, next, all railways shall dissociate themselves from competitive water lines. The Pennsylvania, Lehigh Valley and Northern Central railroads have asked the Interstate Commerce Commission to permit them to retain ownership of their steamship lines. The Northern Central is a subsidiary of the Pennsylvania R. R.. The new law empowers the commission, in its discretion, to permit the railroads to retain ownership of water lines if such a condition is for the best interests of the territory the rail and water lines serve. February 17 has been set for first hearings on the Pennsylvania application. It owns the Anchor Line on the great lakes. The Lehigh Valley owns a lake line, barges and tugs on the Atlantic coast and the Morristown Canal & Banking Corporation. In expectation of a great number of requests from railroads wishing to retain their steamship lines, the commission has divided the United States into four sections to expedite hearings and decisions. Chairman Clark will take the Pacific coast, Commissioner McChord the lake territory, Commissioner Clements the Atlantic coast as far south as Norfolk and Commissioner Meyer the South Atlantic and gulf.

Interstate Commerce Commission to Make Another Investigation of Special Privileges.

The Interstate Commerce Commission has ordered an investigation into another phase of the granting of special privileges

to large shippers. The present inquiry will relate to the alleged practices of certain railroads of leasing their facilities and other property to shippers of freight over their lines, "for such consideration and upon such terms or conditions as have the effect of reducing the rates and charges to shippers for transportation furnished to the disadvantage of shippers not receiving such privileges." The commission has ordered that all common carriers by railroad or by water be made respondents to the proceedings.

To Investigate Whether Steel Corporation Has Received Rebates.

The Interstate Commerce Commission has issued an order for hearings in the inquiry it will make into freight transaction of the United States Steel Corporation for six years past. The inquiry is in accordance with a resolution passed by the United States senate, February 2, directing the commission to investigate whether the Steel Corporation has received illegal rebates from railroads. Formal notice of the investigation has been served upon the railroads and upon the following-named concerns: United States Steel Corporation, Carnegie. Union, Illinois, and Indiana Steel companies, National Tube Co., Shelby Steel Tube Co., American Steel and Wire Co., American Sheet & Tin Plate Co., Sharon Tin Plate Co., American Bridge Co., Tennessee Coal, Iron & Railroad Co., H. C. Frick Coke Co., Interstate Transfer Railway Co. and Spirit Lake Transfer Railway Co.

To Test Out Louisville & Nashville's Refusal to Open Files.

A mandamus suit was filed in the federal court at Louisville, Ky., February 7, by George DuRelle, United States district attorney, against the Louisville & Nashville R. R., seeking to compel the railroad to produce for examination by the Interstate Commerce Commission all correspondence in the company's executive offices. This is the latest development in the investigation of the company and its subsidiaries by the commission, which investigation was brought to a halt by refusal of the road to give the commission access to its files. The present suit is brought at the direction of United States Attorney General McReynolds. In the estimation of the government attorneys it will decide a new point in connection with federal investigations and will test the meaning of a section of the Hepburn law which provides that all accounts, records and memoranda shall be opened to the Interstate Commerce Commission. The hearing on the mandamus action will come up before the federal court at Louisville, February 17.

New Union Station Plan for Chicago.

The Pennsylvania Railroad has submitted to the Chicago city council's committee on railway terminals a plan which materially modifies the plans previously under consideration for construction by the Pennsylvania of new passenger and freight terminals in that city. And the modifications bring considerably closer the prospect of agreement between the railroad officials and the city authorities, lack of which has now been holding up the execution of the improvements for some time. The Pennsylvania and the other railroads using the Union station, after six weeks' work, have rearranged their plans so as to fit nearly every concession required of them by the committee and the Chicago Plan Commission. The chief particular in which the new plan differs from the old, is in locating the Pennsylvania freight terminal east of Canal street and south of Polk street; most of it will be north of Twelfth street, but a part may extend as far south as Sixteenth street. This is a site several blocks south of that proposed by the former plan, which contemplated placing the freight terminal between Clinton and Desplaines streets, south of Van Buren. Summarized, the railroads in the new plan agree: To coöperate in the straightening of the river from Taylor street south; to give property for the river straightening at a price fixed by arbitration; to widen

Canal street to 100 feet between Washington and Twelfth streets, provided permission is given for two more tracks on the subsurface; to build a viaduct 118 feet wide in Twelfth street, between Canal street and the west bank of the river; to construct an elevated roadway between the west and north sides, the Northwestern road aiding the other three in bearing the expense; to build and maintain a new viaduct at Monroe street when the city constructs a new bridge; to widen all viaducts between Lake street and Twelfth street to the full width of the streets east of the river; to grant an easement for Congress street over railroad property east of Canal street, and to construct a viaduct of the width of the street east of the river; to build a viaduct and rearrange approaches to Sixteenth street; to repair and maintain all viaducts existing or constructed under the proposed ordinance; to pay adequate compensation for all streets and alleys vacated. Negotiations with the city council committee will be resumed at once and there is a much better prospect than ever before that a settlement will speedily be reached.

Frisco Conductors Supplied With Business Cards.

A supply of individual business cards and prospective traffic cards has been furnished all passenger conductors on the Frisco System, with a view to having them assist in the solicitation of business. The individual card bears the motto, "It will always be our desire to make your trip comfortable and pleasant on a Frisco train." The prospective traffic card bears the motto, "Let us have opportunity to demonstrate to you that we can handle your carload and l. c. l. business to your entire satisfaction. Our service is strictly first class." This plan of soliciting business is being tried out, based on the fact that passenger conductors are well acquainted with a large number of shippers and receivers of freight and are adding to their acquaintance daily. When a conductor meets a prospective shipper on any one of his trips, he is to hand him one of his business cards, as well as one of the prospective traffic cards. The prospective shipper is asked to fill in the latter, or the conductor may fill it in for him, after which it is to be mailed to the superintendent of the division on which the conductor is employed. The superintendent in turn forwards the card to the proper traffic official or agent. The cards are mailed promptly at the end of each trip. When additional cards are needed, a requisition on the office of the superintendent will bring a new supply promptly. A record of the number of cards turned in by each conductor is kept for comparative and other purposes.

Raise in Pullman Drawing Room Tariffs.

Eastern railroads have filed with the Interstate Commerce Commission a new tariff, effective March 1, under which a new and higher rate for Pullman compartments and drawing-rooms occupied exclusively by one person, will prevail. Instead of charging a single railroad fare and a single drawing-room fare as heretofore, the roads will now charge for exclusive use of a drawing-room by one person, double the railroad fare plus a single drawing-room fare; and for Pullman compartments for the exclusive use of one traveler, the present charge of one railroad fare plus the compartment fare will be increased to one and one-half railroad fare plus the present compartment fare. Such a rule was a subject of discussion some time ago, with the understanding that it would not become effective until it was approved by all the passenger associations. The eastern roads, however, have decided to adopt it without waiting for final action by the Western and Transcontinental passenger associations, and, indeed, it is now possible that the latter will refuse to adopt the modified tariff.

Bill for Alaskan Coal Development.

A bill which it is understood embodies the administration's policy for opening and developing Alaska's coal lands was introduced in the house of representatives, February

9, by Congressman Ferris, of Oklahoma, chairman of the house public lands committee. A private leasing system is the principal feature proposed in the bill, which provides for receipt by the government of a royalty of two cents a ton, plus an acreage charge to each lessee. This charge for the first year is fixed at 25 cents an acre, at 50 cents an acre for the next four years and at \$1 an acre thereafter. No lessee can lease less than 40 nor more than 2500 acres. Reservation to the government of 5120 acres of the Berling River coal fields and 7680 acres of the Mantuska fields is provided, and mining of the coal on these tracts is reserved under the President's direction for use in government works—for the navy and in constructing the proposed federal railroad. The incomes from royalties are to be paid into a special fund for Alaska development, including the cost of building the federal railroad.

The Latest Mexican Outrage.

One of the worst of the many outrages which have marked the course of anarchy and outlawry long prevailing in Mexico, was perpetrated by the bandit leader Maximo Castillo, last week. Seven American railroad men are believed to have been among the victims of the fiendish act. Castillo, it seems from the somewhat conflicting reports, after sustaining a repulse from some previous depredations, and by way of revenge, took possession of a section of the Mexico Northwestern Ry. which includes the Cumbre tunnel, which extends 3700 ft. through the continental divide, the longest tunnel on the road. A freight train which was there was captured and set on fire, and run well within the tunnel. The tunnel is lined with timber which also caught fire. A passenger train followed the freight train, and it is now considered certain that it was given no warning and plunged into the blazing interior of the tunnel. Thirty or more Mexican passengers and the American railroad officials and employees who were aboard are believed to have perished. The latter include the following: M. J. Gilmartin, superintendent Chihuahua division, Mexico Northwestern Ry., Pearson, Mex., formerly of Du Bois, Pa.; B. A. Scofield, superintendent of terminals, Ciudad Juarez, recently of Brazil, Ind.; Edward Morris, roadmaster; U. E. Webster, conductor in charge of the train; Edward J. McCutcheon, engineman; Thomas M. Kelley, conductor, L. E. Williams and K. L. Hatfield, American business men representing interests in Mexico; H. F. Marders, express agent. The tunnel is now badly caved in from the fire, and the first parties to reach the scene were unable to verify the list of dead, or the full circumstances of the tragedy. The rebel general Villa has vowed vengeance upon Castillo, and the latest report is that he has been summarily executed by the rebel forces.

American Railway Association to Drop Industrial Railways.

The American Railway Association has announced that it will make an investigation of 300 small lines and industrial plant railways which now hold membership in the association and represent themselves as common carriers, to determine whether they should be barred from participating in the privileges which the Interstate Commerce Commission found illegal in its decision on industrial plant railways. At a meeting of the committee on relations between railroads last week, 19 plant railways were barred from participating in the per-diem agreement of the association.

Wichita's Request Refused.

The Interstate Commerce Commission has denied the request of the Wichita, Kan., Board of Trade, that Wichita be made a "rate breaking point," which means that a grain dealer could ship from there by any line to any market regardless of the route of the inbound movement of grain.

As Kansas City possesses the privilege of "rate breaking," Wichita held that it, too, should have it, as about one-fourth of the 60,000 carloads of grain shipped yearly from Kansas are milled or merchandised at Wichita.

Completion of the Windsor Station at Montreal.

It is announced that the Windsor station, of the Canadian Pacific Ry., in Montreal, has been completed. This station is a very large structure, with artistic stone walls, and is one of the finest buildings of its class. It has been under con-



Box Car End Posts Reinforced by Means of Z-Bars Bolted Through to Inside Lining.

struction a number of years, and, although only partly completed, has been occupied and used for several years.

Association of Creosoting Companies of the Pacific Coast.

At a meeting held in the offices of the Pacific Coast Creosoting Company, in Seattle, Wash., on Jan. 31, the creosoting companies of the Pacific Northwest that had recently formed an association, adopted as the name of this organization the Association of Creosoting Companies of the Pacific Coast. The officers of the association, who were elected at a previous meeting, are: President, D. F. Beal, Portland, Ore.; vice-president, Lawrence Colman, Seattle; secretary-treasurer, H. E. Horrocks, Seattle. A section of the constitution and by-laws which were adopted at this meeting reads: "The object and purposes of the association shall be to advance the wood preserving industry in all its branches in every legitimate manner and afford its members opportunities for the interchange of ideas for the general welfare of the industry." Mr. O. P. M. Goss has been engaged by this association. Mr. Goss, who has been employed by the government as a timber testing engineer at the University of Washington, has sent his resignation to the government and will enter the employ of the association. Mr. Goss' title will be that of promotion engineer, employed jointly by the Association of Creosoting Companies of the Pacific Coast and the West Coast Lumber Manufacturers' Association. He will take up the compilation of data regarding the creosoting industry. The organization is essentially

a boosting organization, to have nothing to do with prices or selling of any product of its members.

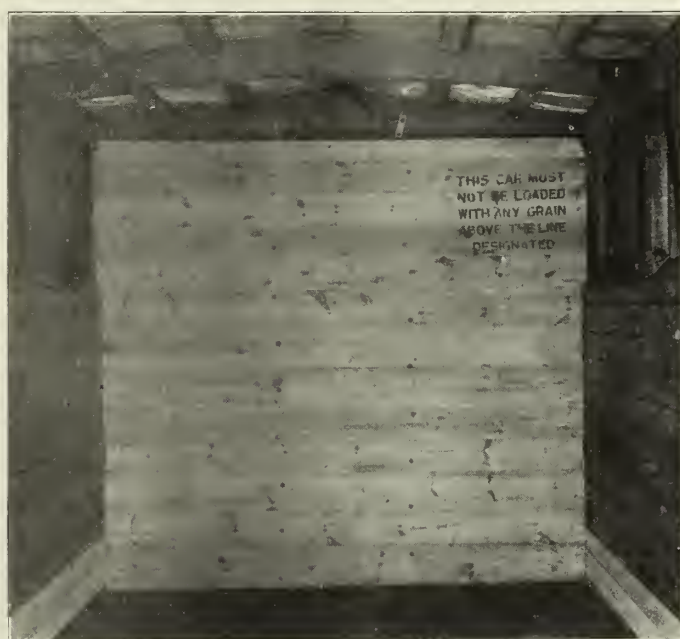
Railway Signal Glass.

At a meeting of the New York Railroad Club, to be held at the building of the United Engineering Society, No. 29, West 39th street, in New York, on Friday evening, Feb. 20, Mr. D. W. Churchill, of the Corning Glass Works, will present a paper entitled "Recent Developments in Railway Signal Glass." A turnout of railway signal engineers is expected.

Reinforcing Wooden Box Cars, Canadian Pacific Ry.

To keep wooden freight cars off the repair tracks for repairs to center sills, draft gears and the end structures of the cars is a most important problem for the car department. On the Canadian Pacific Ry. these troubles have been overcome with a minimum increase in cost, and to make the reinforcements as mentioned above, owing to the methods employed, there is no further delay to the car on the repair track than if the original structure were to be renewed.

In effecting these reinforcements, defective wood center sills are replaced with 6-in. by 22.7-lb. steel "Z" bars. These sills are made up at the Angus shops of the road at Montreal, and shipped to all repair points where sill work is being done. The steel sills are bolted to the needle beams,



Re-Lined Box Car End, Canadian Pacific Ry.

rivetted to the body bolsters, and are securely attached to the end sills. Of the 2700 cars equipped with these sills, the failures are stated to have been no more numerous than would have been experienced with any of the more costly steel underframes.

In reinforcing the ends of box cars 1¾-in. lining is applied over the old linings. This is an inexpensive method of repair inasmuch as the cost of repairs to the original lining is saved. The end posts which are so frequently broken are reinforced on the exterior by means of 3-in. by 6.7-lb. "Z" bars which are bolted to the old posts (the cracked posts not being removed), the bolts also serving to secure the heavy inside lining.

Extension of the Boston Subway

Progress in construction on the Dorchester tunnel, the Boylston street subway, and East Boston tunnel, in Boston, Mass. Data from the report of the chief engineer for the year ending June 30, 1913.

After investigating eight alternative routes for the Dorchester tunnel, with a corresponding number of surveys, a route was finally selected which passes through Dewey square, down Summer street in front of the South Terminal Station, and then curving southward, passes under Fort Point channel and private property until it reaches Dorchester avenue, near Broadway, in South Boston. Borings were made to an average depth of 60 ft. to determine the character of the earth in the locality where the tunnel will be built.

The Summer street borings indicate the ground to be hard sand, gravel and clay. The borings in South Boston near A street and those in and near Fort Point channel show a layer of clay overlying a bed of hardpan. This hardpan is at a depth of about 65 or 70 ft. below mean low water near the channel and rises to a depth of about 40 ft. below mean low water at Mount Washington avenue and A street, and to a depth of about 2 ft. below mean low water at Broadway and A street. The borings in Dorchester avenue show sand and gravel overlying a bed of blue clay from 20 to 35 ft. below the surface.

Section A, consisting of 500 ft. of 2-track subway of reinforced concrete and structural steel in Winter street, from the east end of the Cambridge connection in Tremont street to near the center of Washington street, was completed during the year.

Construction work was begun on the main contract for Section B, April 1, 1913. This section extends from the end of Section A, near the junction of Summer and Washington streets, easterly under Summer street, about 550 ft. to the east side of Arch street. Figure 1 shows a portion of Summer street under which the tunnel station is being constructed. The station is a two-story structure with two tracks and two side platforms below and a lobby for ticket offices, etc., above. Figure 2 shows a typical cross-section. Passageways leading from the westerly end of each plat-

form pass under the Washington-street tunnel and connect with the present Winter station of that tunnel. The west end of the lobby connects at grade with the present Summer station lobby and platform of the Washington street tunnel. The present stairways, in the New Filene Building, from the street will serve both the Washington street tunnel and the Dorchester tunnel stations. Another stairway from the lobby level of the new station to the street surface will be located at Chauncy street near the east end of the station. Two stairways connect each platform of the station with the lobby above. On the north side one is under Hawley street and the other is under Arch street. On the south side one stairway is under Chauncy street and the other is under the basements occupied by the Jordan Marsh Company and C. F. Hovey & Company. In addition it is proposed to have two inclined elevators, one from the north platform to the surface at Hawley street and the other from the south platform to the surface at Chauncy street.

The Dorchester tunnel was necessarily located at a sufficient depth to cross under the Washington street tunnel, which location brings the bottom about 42 ft. below the surface of the street, and this in turn makes it necessary to underpin all the buildings along the line of the work to an average depth of about 25 ft. below their original foundations, except the New Filene Building, the foundations of which extend to a greater depth than the tunnel. Two new cast iron sewers, located one on each side of the street below the sidewalks and directly above the station platforms and passageways, will take the place of the original sewers.

During the year substantial progress was made toward the completion of the Boylston Street subway. About one mile of subway, or 65 per cent of the total length from Kenmore street to the proposed temporary connection with the Tremont Street subway, near Carver street, was finished on June 30, 1913. This comprises all of the Boylston Street subway from the incline to Kenmore street to Berkeley street, with the exception of the stations at Massachusetts avenue and Copley square and about 200 ft. of uncompleted



Fig. 1—Dorchester Tunnel, Section B. Normal Condition of Traffic on Summer Street. For the Entire Width the Surface of the Street is Supported on Heavy Wooden Timbers. Subway Construction is in Progress Below.

subway at Copley square, all of which are in progress of construction.

For practically its entire length some portion of the Boylston Street subway is below the level of the ground water in the Back Bay. At the Fens the structure is entirely submerged, and about seventy per cent of the subway west of Charles street will be below elevation 108, the approximate hight of the water in the Charles River basin. The

3-in. centrifugal pump operated by compressed air. This water was strongly impregnated with sulphuretted hydrogen.

The method of stopping the flow of water from the underdrains into the pump well at the Fens, after the completion of this section of the subway, may be described as follows: A built-up wooden slab about two ft. square was constructed, pierced in the center by a 4-in. iron pipe

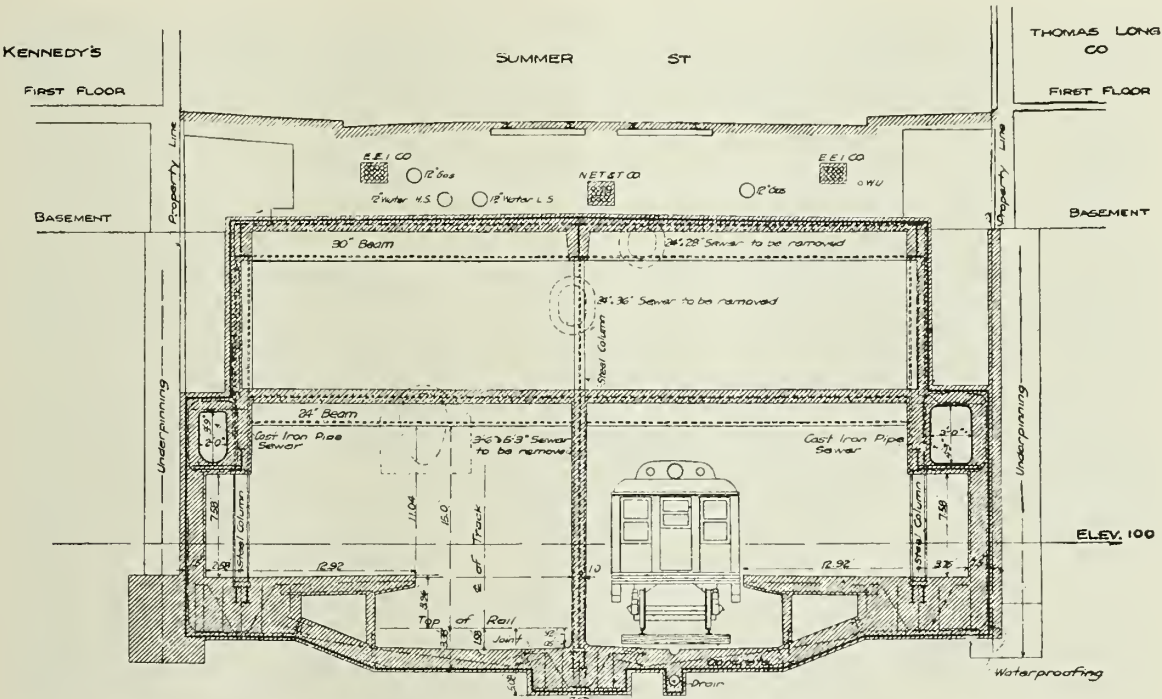


Fig. 2—Section B. Dorchester Tunnel. Cross Section 70 ft. East of Hawley St.

subway excavation therefore has necessitated the removal of large quantities of ground water before the excavation could be carried to grade and the concrete structure placed in position. A temporary pump well was installed on the west bank of the Fens into which the under-drains to the west discharged until the excavation was continued across the Fens as far as the permanent pump well at Charlesgate East. All of the ground water was then conducted into the permanent pump well through the underdrains. The underdrains were three in number, an 8-in. pipe in the center and a 6-in. pipe on each side. At the time of maximum pumping about two cubic ft. of ground water per second was being removed by two 6-in. piston pumps and one 6-in. and one

in which was set a gate valve. On the other side of the slab from the gate, rings of packing were placed to insure a tight fit against the concrete wall. Everything being ready, the slab was securely braced by timbers from the opposite wall against the concrete around the opening into the pump well through which the water was discharging, the open 4-in. pipe preventing the water at the underdrains from accumulating to a great head. The gate was then shut and the underdrains were immediately filled with grout through pipe previously placed in position in the invert of the subway. After sufficient time had elapsed for the grout to set, the temporary dam described above was removed.

The open incline located in the grass plot of Common-



Fig. 3—Boylston Street Subway, Section 1. Incline on Commonwealth Avenue Just East of Kenmore Street.

wealth avenue near Kenmore street (Fig. 3) has been completed with a concrete balustrade on the walls and an ornamental arch over the portal. The design for this work was furnished by Mr. A. A. Shurtleff, landscape architect for the park department. The concrete walls of the subway structure below the balustrade are rough pointed and the coping is crandalled to give the desired rough effect. The balustrade is made of concrete, mixed in the proportion of

cast of it, back of the Hotel Somerset. This drift was extended upward to the bottom of the conduit and the center wall was placed in the drift, the old piles supporting the conduit being left in position until concreting operations were begun. Second, drifts for the north and south side walls were carried under and across the width of the conduit in the same manner and the concrete side walls constructed therein. Third, the remaining earth cores between

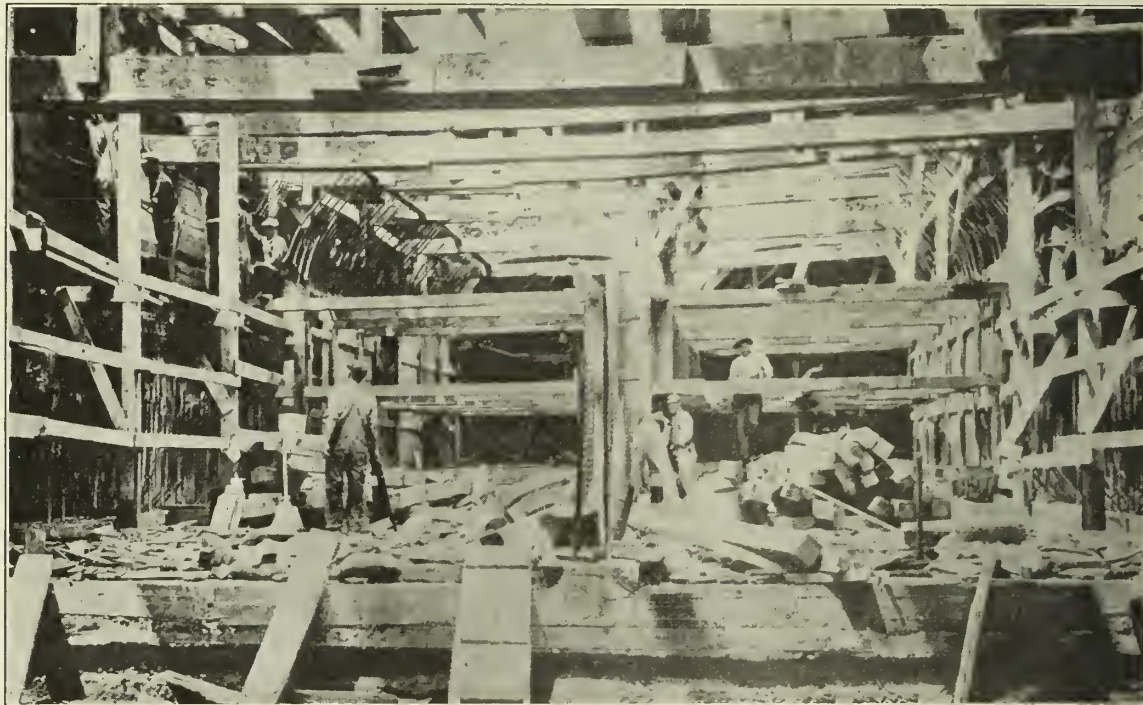


Fig. 4—Boylston Street Subway, Section 1. Construction in the Fens, below the Level of the Creek Bed.

two parts of fine crushed dark Quincy granite to one part of cement, with a rough surface obtained by washing off the surface cement, thus revealing the aggregate before the concrete became entirely set. The balusters were constructed in sand moulds at the shop and set in place on the work. The posts, rails, and ornamental trolley post casings were built in place on the walls and reinforced with small steel rods.

Some of the obstructions encountered in the construction of Section 1 of the subway have been the Back Bay fens and the Stony Brook conduit, beneath which the subway passes at Charlesgate East. Construction through the fens was between lines of interlocking steel sheet piling within a cofferdam. The construction of the subway at this place is shown in Fig. 4. The Fens pond is an estuary of the Charles river and has little or no current except during heavy rain storms. Practically all of the flow now passes through a covered duct known as the Stony Brook conduit, consisting of two barrels, one of horse-shoe section 12 ft. in its vertical diameter, and another of circular section 7 ft. in diameter. This conduit connects with the Boston Marginal conduit at the gate house near the intersection of Charlesgate East and Back street, is built of brick and concrete, and rests on a plank platform supported on piles. The cross-section of the subway under the conduit has the usual inside dimensions. The center wall and roof are reinforced by means of structural steel frames made of 8-in. Bethlehem beams set 12-ins. on centers. The thickness of roof between the clearance line of the subway and the bottom of the sewer is about 12 ins.

Construction under the conduit was carried on in the following stages: First, a center drift was carried through from the excavation west of the conduit to the excavation

the center and side walls were removed and the old piles which remained were cut out, the structural steel roof beams being set in place to support the conduit as fast as each bent of piles was removed.

The under side of the Stony Brook conduit was covered with waterproofing. The roof was concreted as thoroughly as possible by ramming the concrete in from the ends, and afterwards was grouted full through 2-in. pipes left for the purpose between the bents of steel work. This work was hampered by a large quantity of water which entered the side wall excavation through an old underdrain, parallel to and directly below the Stony Brook conduit. The underdrain had previously been cut and plugged at a point about 100 ft. north of the subway. The water which continued to come in was collected in a 3-in. iron pipe and conducted to the pump well, until the work below the conduit was completed, when the pipe was capped outside of the lines of the work.

Where the Boylston Street subway curves from the Fens into Newbury street its north wall at one point touches the property line of the Hotel Somerset, and comes within 7 ft. of the building proper, which is a brick and stone building seven stories high. On the opposite side of the street is the Hotel Eastgate.

Partly on account of the general settlement of the ground in the Back Bay district, and partly on account of the construction of the Stony Brook conduit in Charlesgate East, the walls of the Hotel Somerset on the Newbury street side, previous to any subway construction, were found to be cracked, and the southwesterly corner of the building lower than the northwesterly corner. At this place the bottom of the subway is about 40 feet below the surface of the street, and deeper than the bottom of the piles support-

ing the hotel. As any underpinning of the building would necessitate cutting through the walls and the floor, thereby making openings into the private ballroom which occupies the southwesterly portion of the lower floor, and as the tightest temporary partitions would not prevent sound and dust from construction work nor the odor of sulphuretted hydrogen from the deep excavation from pervading the hotel, it was decided not to enter the premises and underpin the foundations of the building, but to take extraordinary precautions to prevent any movement of the ground below the wooden piles upon which the building rests. These precautions consisted in driving a solid wall of interlocking steel sheet piling 35 ft. deep on the outside lines of the subway excavation for the full length of the Newbury street face of the hotel, with wing walls extending 50 ft. along the Charlesgate East fronts of both hotels, and in filling the gravel below the piles on the outside of the steel sheeting with cement grout forced in under high pressure.

The part of Section 2 embraced in the extension of the contract for Section 3 extends from Public Alley 444 through the yard formerly occupied by the public works department, under a portion of the police and fire engine stations to Boylston street at Hereford street. Figure 5 gives a general view of this work. A small amount of work was done on the part of Section 2 embraced in the extension of the contract for Section 1, or the Massachusetts avenue station, in the fall of 1912, but work was suspended through the winter, partly on account of the weather and partly on account of the negotiations in regard to the removal of the Boston Cab Company building located at the corner of Massachusetts avenue and Newbury street.

The method of construction of Section 3 consisted: First, in excavating for and constructing the north and south side walls; second, in excavating the remaining earth core to a depth of about 9 ft. and constructing the roof; third, in re-

nance and care of the Fairfield and the Hereford street sewers. The 36x48-in. sewer, crossing the subway at Fairfield street, was carried in a temporary wooden flume until a siphon at this crossing was completed. The siphon consists of two concrete manholes on either side of the subway, connected below the subway by means of two 36-in. iron pipes. There are center partitions in the manholes, so that either pipe can be pumped out and cleaned without interfering with the flow in the other. The flow from the Fairfield street sewer can also be conducted on the south side of the subway through a concrete sewer 4 ft. wide and 8 ft. 4 ins. high, built by the Commission, which connects at Hereford street with another sewer. This Hereford street sewer was rebuilt where it crosses the subway location, the reconstructed sewer being composed of three chambers, each 3 ft. 8 ins. by 7 ft. 6 ins., passing under the subway and joining the horseshoe-shaped sewer, 6 ft. x 6 ft. 8 ins., on the north side of the subway.

In order to facilitate the construction of this section the route of the surface cars of the Boston Elevated Ry. was temporarily changed April 4, 1913, from Boylston street, between Exeter and Arlington streets, to new tracks in Exeter street from Boylston street to Huntington avenue, and in Huntington avenue, Copley square, St. James avenue and Arlington street, connecting again with the old tracks at Boylston street.

The 42-in. water pipe crossing Boylston street from Huntington avenue into Clarendon street, which is the main high service supply for the down-town Boston district, was found to be so low as to interfere with the construction of the subway at this point. It is necessary to maintain service in the pipe at all times, and as its presence with a pressure of 100 lbs. per square inch, in the subway excavation, was considered to be dangerous to the surrounding buildings in case of a possible break, a temporary by-pass was



Fig. 5—Boylston Street Subway. Part of Section 2, Including Incompleted Approaches at Easterly End of the Location for the Massachusetts Avenue Station.

moving the remaining excavation below the roof and in constructing the concrete invert. The side walls and roof were built in sections 40 ft. in length. Figure 6 is a view in Section 3, looking westerly, showing the double arch of Section 2. The street car service was maintained throughout the construction of Section 3, except that during the construction of the sewer at Hereford street, which crosses below the subway at that point, the heavy semi-convertible cars were temporarily diverted by way of Huntington avenue.

Some of the difficulties in construction came from the excessive amount of water to be pumped and the mainte-

laid through Dartmouth and Newbury streets to carry the flow while the water pipe was being raised and the subway constructed at the Clarendon street crossing. The laying of the new pipe, which consists of 83 ft. of 20-in. pipe, 510 ft. of 24-in. pipe, and 485 ft. of 36-in. pipe, was begun on March 4, 1913, and the water turned on through it at 1:00 P. M. March 18, 1913.

The ground through which this section of the subway passes is similar to that encountered in other sections of this subway. At Dartmouth street there is about 17 ft. of silt between the bottom of the subway structure and the hard clay. West of Dartmouth street the subway station is

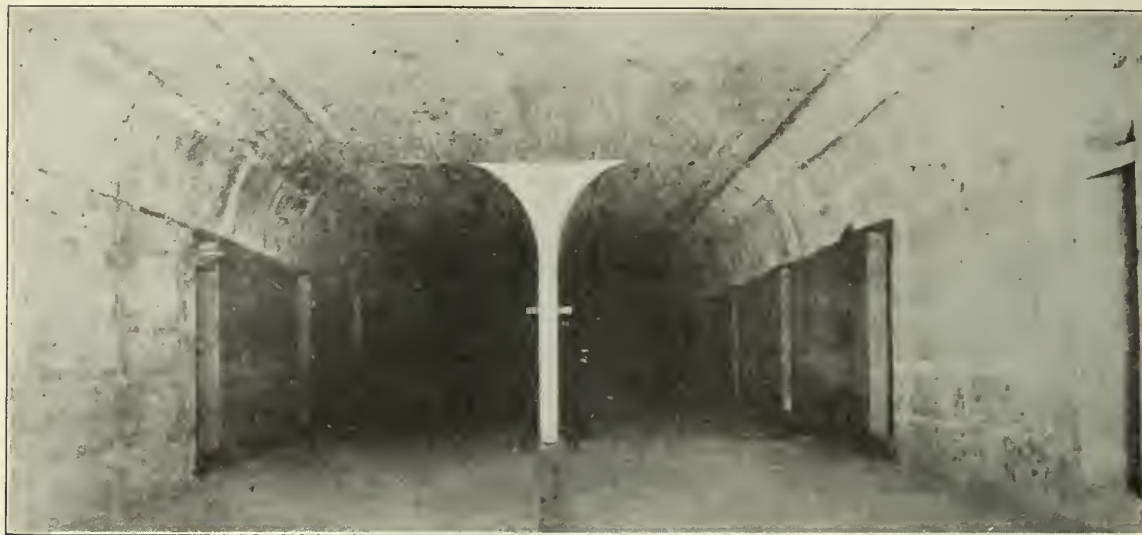


Fig. 6—Boylston Street Subway, Section 3. Station 29x50, Looking West.

to be built on the earth without pile foundation. At other places the invert rests either on the hard blue clay or upon longitudinal concrete walls or piers built up from the clay.

The location of the East Boston tunnel extension as determined upon March 11, 1913, when it was decided to locate the west end of the open incline near North Russell street, makes the total length of the extension about 2,700 ft., including the changes to be made in the grade of the East Boston tunnel under the part of Court street between Washington street and Scollay square. The westerly incline is to be between Chambers street and North Russell street, and between these two streets a land taking on the northerly side of Cambridge street about 46 ft. in width has been made for street widening, to provide a roadway and sidewalk on each side of the incline. A triangular strip has also been taken on the west side of North Russell street for the same purpose.

The first work was to construct about 70 ft. of side wall and sewer at the north corner of Court and Hanover streets. and about 200 ft. of side wall and sewer on the opposite side of Scollay square in Tremont row. The work required great care, as it was within a few feet of the buildings and over 40 ft. in depth. About the end of January, 1913, the work of underpinning the buildings on the east side of Scollay square, where the walls of the tunnel practically touch the street line, was begun, and the buildings at 87-97 Court street were underpinned and the east wall of the tunnel built.

Northwest from Howard street and extending to Stoddard street a portion of the tunnel lies under the buildings. Work under the buildings was started in April, 1913, portions of the east and center walls which were beneath the street, having been built in February and March. The walls and piers of the buildings were supported across the excavation on steel beams, and as fast as the structure of the tunnel was completed these walls and piers were usually underpinned with masonry built up from steel beams encased in concrete, on the tunnel roof, and reaching from the side wall to the center wall.

Between Howard street and the wall of the Tremont Street subway at the head of Hanover street a lobby about 10 ft. in height is to be constructed over the tunnel roof, furnishing room for ticket offices for the Hanover street entrance, and space for storage purposes. A permanent pump-well has been built at the north end of the new tunnel platform.

Drifts have been dug under the present subway north of the present station and the heavy steel columns and gird-

ers which are to support the upper structure are being placed in position. Mr. Edmund S. Davis is the chief engineer in charge of the subway and tunnel construction.

The Union Railroad.

A TYPICAL INDUSTRIAL PLANT AUXILIARY.

The Union Railroad is the largest of all the industrial railways considered in the report of the Interstate Commerce Commission deciding the industrial railways case. The following account, abstracted from that report, is of interest directly in connection with that decision, which is referred to at length on page 221, of our issue of Feb. 7, and also in relation to the broader aspects of a phase of railway operation which is thereby brought into prominence.

The Union Railroad, the largest of all the plant railways described in the Interstate Commerce Commission's report on the industrial railways case, is the property of the Carnegie Steel Co., the most important of the subsidiaries of the United States Steel Corporation. One of the witnesses, testifying in support of its present allowances and other advantageous arrangements with its trunk line connections, boastfully said at the hearing that the annual tonnage of the Union Railroad exceeds that of the Union Pacific and the Missouri Pacific combined. This statement, coupled with the fact that its services for outside shippers for the year 1911 aggregated only 2.49 per cent of its total tonnage and yielded only 3.30 per cent of its total revenues, shows at once how necessary it is as a part of the plant equipment of the Carnegie Steel Co. and how completely its activities are absorbed by the requirements of that industry.

It was constructed in 1895 for the avowed purpose of connecting three separate plants of the proprietary company. Each of these plants at that time had its own plant rails and each then leased its outside tracks to the Union Railroad. The result was that the line carriers thereafter could gain access to the combined plant only over the tracks of the Union Railroad. Later, when the Carnegie company acquired the ownership of the Carrie furnace, then one of its competitors, and still later built a mill for the manufacture of axles, the rails of the Union Railroad were extended to these new properties. There were subsequent additions that will presently be mentioned; but the record shows not only that all the tracks of this industrial line, as originally built, are necessary and actually used in order to transport material in the course of manufacture from one of these affiliated plants to another, but that no plants or industries are reached by its rails, as originally laid out, other than those of the Carnegie Steel Co.

and the American Steel & Wire Co., another subsidiary of the steel corporation.

Not only is this the case, but because of the topography of the valley there is no room for any outside industries on its original rails. The Carnegie plants lie on either side of the Monongahela river in a pocket in the hills, and the company has so occupied the banks of the river with its mills and furnaces and with the tracks that connect them together as to leave no room for outside interests. The industrial railroad, therefore, has no opportunity over these rails either to serve outside interests or the general public. The only exceptions to this general statement are a retail coal yard near the Homestead plant and a waterworks plant, both of which, as we understand the situation are already reasonably served by the line carriers.

The river has been one of the dumping grounds of the Carnegie Steel Co., and for approximately eight miles along its banks the rails connecting these plants rest upon a slag wall, varying from 20 to 40 feet in depth and built up out of the waste products of the mills of the company. As we have heretofore said, many producers of pig iron are put to a substantial industrial expense in disposing of the waste products of their mills and furnaces, but to the Carnegie Steel Co., through its ownership and capitalization of its plant railway and the enjoyment by the latter of divisions out of the rates of the line carriers, the slag pile has become a source of great profit.

The immense scope of the manufacturing operations of the Carnegie Steel Co. at this point is shown by the fact that it includes five plants that were formerly separately owned, all of which are now connected with each other by the tracks of the Union Railroad, and are operated as a unit and as one industry, each department or branch of which, to a greater or less extent, as the record shows, is dependent upon the other. The mere fact that these departments are somewhat more distant from one another than in some of the other cases before us is no ground, in our judgment, for according the Carnegie Steel Co. any results that are denied to its competitors. The record shows that it is one industrial operation with a plant railway joining its various departments together. As in other cases

the plant railway is used for the removal of the slag and other waste products of all these departments to the dumping grounds of the industry. By the same means the hot metal from the furnaces on the north side of the river is distributed to the various departments on the south side of the river and the bridges at Rankin and Port Perry are each equipped with protected tracks for this purpose. There is also a constant and necessary movement of material between the several departments or plants, such as hot metal, billets, pig iron, etc., to serve the processes of manufacture. The tracks leading from the Duquesne works of the steel company at one end of the line to the Howard Axle works of the steel company at the other end are constantly used, and shown of record to be necessary, for the movement of material between the departments on the south side of the river; and these fire departments or plants, as the record shows, could not be operated as they are now without the tracks of the Union Railroad.

All the track facilities of the Union Railroad are constructed and located for the convenience and economy of serving the manufacturing operations of the steel company. Its superintendent testified that the plants of the steel company located on the Union Railroad could not be operated as a unit without all its present tracks. On cross-examination this statement was somewhat qualified, and it was contended that the steel company's operations at this point ought to be considered as two units; but he admitted that the operations of the steel company as a whole could not be carried on without using all the tracks of the Union Railroad. From all the evidence and testimony adduced with respect to this situation we conclude and find that, whatever may have been the conditions before all these plants were consolidated into the Carnegie Steel Co., there can be no question that all its operations in this pocket in the hills, heretofore described, are an industrial unit and are conducted as such with the Union Railroad as a plant facility. The Monongahela Southern branch was acquired and extended mainly to make available, for many years to come, a convenient dumping ground for the waste material from all the furnaces and mills of the Carnegie company at this point, and the branch to North Bessemer is a necessary convenience for the movement

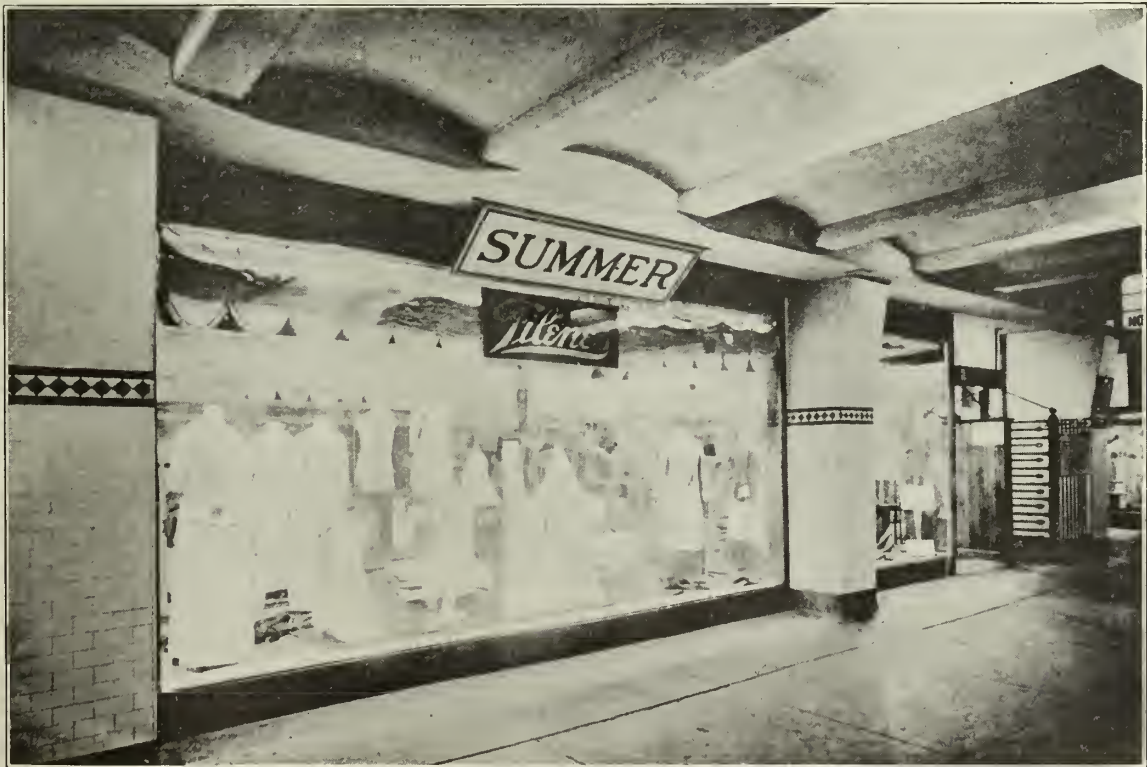


Fig. 7—Washington Street Tunnel, Summer Station. A Portion of the Show Windows in Basement of Filene Building and One of the Exits Into Store as Seen From Platform of Station.

of slag from the furnaces to the large cement plant of the steel corporation at Universal.

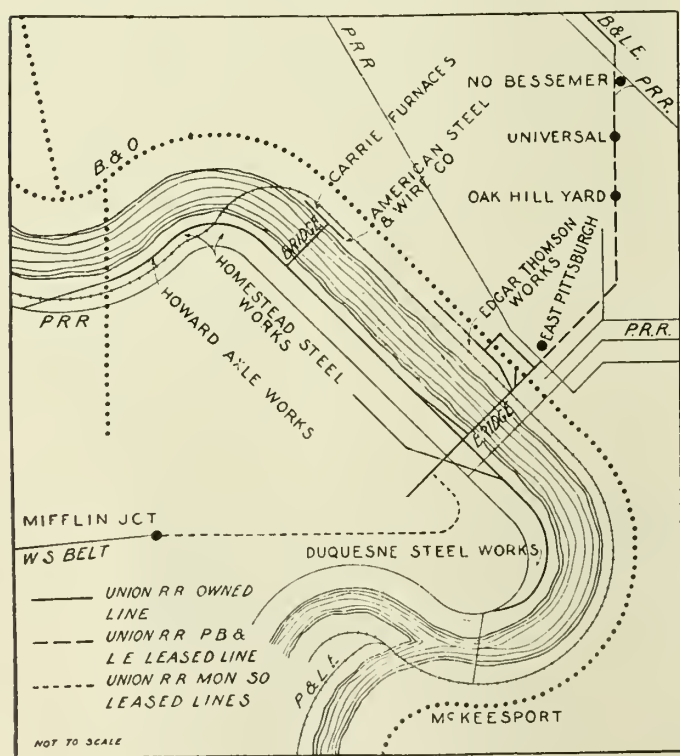
So far as the rails and tracks above mentioned are concerned, we conclude and find upon the evidence that they are plant facilities, and that no service over these rails, whether for any of the several departments of the Carnegie company or for others, is a service of transportation for which the Union Railroad may be compensated out of the rate of the line carriers. That service involves simply the use of what is the plant equipment of the Carnegie Steel Co. In this connection there are some features in this case, described at length in the appendix, that may well be mentioned at this point. The rails of the Pennsylvania not only extend through the Homestead works, but they adjoin the plant property of the Howard Axle mills, the Duquesne mills, and the Edgar Thomson works of the Carnegie company. The racks of the Pittsburgh & Lake Erie extend to the property line of the axle works, the Carrie furnace, the Edgar Thomson works, and the plants of the American Steel & Wire Co. That line originally passed directly through the Edgar Thomson plant, but the right of way was relocated and the tracks removed to a point outside the works. The Baltimore & Ohio also reaches the Carrie furnace and the wire plant, and

under such circumstances it makes but little difference in the results and consequences how the charges set up for the service are divided among the various component parts of the general investment. Nevertheless, the Bessemer & Lake Erie is operated as a common carrier and doubtless is justly entitled to be so considered, notwithstanding the fact that its tonnage is destined largely to the various plants of the steel corporation. The right of the Union Railroad to have divisions out of the rates must therefore be determined.

Just why the rails of the Bessemer & Lake Erie from North Bessemer to the bridge near East Pittsburgh have been leased to the Union Railroad is not satisfactorily explained of record. Except for this trackage right over those rails the Union Railroad, with respect to the large ore tonnage destined to these plants, would practically have no haul outside the combined plant. The controlling interests were doubtless not unmindful of this and of the need of some color for the claim that the Union Railroad performs a service of transportation, and there is a fair basis for the inference that this was the underlying purpose in making these arrangements between the industrial line and the Bessemer & Lake Erie. Without such a haul by the Union Railroad the Bessemer & Lake Erie would deliver all this traffic practically within the Edgar Thomson works, and that would sweep away even the appearance of the legality which the industry now asserts for allowances to its industrial railroad and for the very valuable results flowing to the industry from its per diem reclaims upon the trunk lines and the practical elimination of demurrage as a transportation charge against the industry.

At the point called Universal, on this leased line, the steel corporation has an immense cement plant, which, as heretofore stated, utilizes the slag of the Carnegie mills. The Carnegie company, by contract, has the right to run special trains to the cement plants for the exclusive use of its employees, but the Union Railroad conducts no general passenger traffic over these rails, that being done by the Bessemer & Lake Erie. There are two or three independent coal mines on these rails, one of which, as we understand, is no longer in operation, and the others will soon be worked out. But this traffic is wholly incidental to the service of the industrial road for the industry that owns it. The record, we think, makes it entirely clear that the Union Railroad has not solicited outside traffic, and has at no time shaped its policy so as to encourage outside traffic or to put its facilities at the service of the general public except to the extent that the controlling interests find helpful in giving it the color of being a servant of the general public. Carefully weighing the whole testimony, we find no basis of record for the contention that the Union Railroad Co. performs a service of transportation for the Carnegie company or its affiliated plant between North Bessemer and its own plant. On the contrary, we hold it to be entirely a plant facility which the proprietary interests use for their own benefit and convenience in their manufacturing operations, and the burden of which they alone lawfully may bear.

It is contended that the other branch of this industrial line, extending toward the south to a connection with the West Side Belt at Mifflin Junction, performs a carrier service in that it forms a link between the Wabash-Pittsburgh Terminal and the Bessemer & Lake Erie; but the record shows that the principal dumping grounds for slag and other waste from these furnaces and mills are located on this branch. There is on these rails a concern that manufactures slag products, utilizing for the purpose the slag of the Carnegie mills. There are also several coal mines. Their traffic, however, is almost negligible, and their output is used by the Union Railroad and the Carnegie mills. The service of this branch is confined very largely to the interchange of cars between the line carriers, including the Bessemer & Lake Erie. During the year 1911 about 36,000 cars are shown to have been handled by the Union Railroad between the con-



Map of the Union Railroad.

its tracks pass directly through the center of the Edgar Thomson works.

The two branch lines of the Union Railroad, however, need special consideration, and for convenience the reader may refer to the accompanying map, which is not drawn to scale but is sufficiently accurate for these purposes.

From North Bessemer to the bridge south of East Pittsburgh the Union Railroad has trackage rights over rails that belong to the Bessemer & Lake Erie R. R. The latter line extends to Conneaut Harbor on Lake Erie, a distance of about 160 miles, and also belongs in its entirety to the Carnegie Steel Co. The docks at Conneaut and the vessels that bring the ore to the docks are the property of the steel corporation, as is also the ore which forms their cargoes. In other words, the vessels, the ore, the docks, the rails and the equipment are equitably and beneficially the property of the steel corporation, this being also true of the mills and furnaces to which the ore is destined. Un-

necting lines. This is said to have been 3.89 per cent of its total tonnage and to have yielded it 5.50 per cent of its total revenues. More than 10,000 of these cars, however, contained ore of the steel corporation landed from its boats at Conneaut Harbor upon the docks of the steel corporation and carried over the rails of the Bessemer & Lake Erie to North Bessemer, thence, under trackage rights over the latter's rails, moved by the Union Railroad to Mifflin Junction, and thence delivered by the West Side Belt to the Clairton Steel Co., another constituent member of the steel corporation operated by the Carnegie Steel Co., where it was handled into the plant by the St. Clair Terminal Railroad, a mere plant facility, but which nevertheless enjoys a large allowance out of the rate.

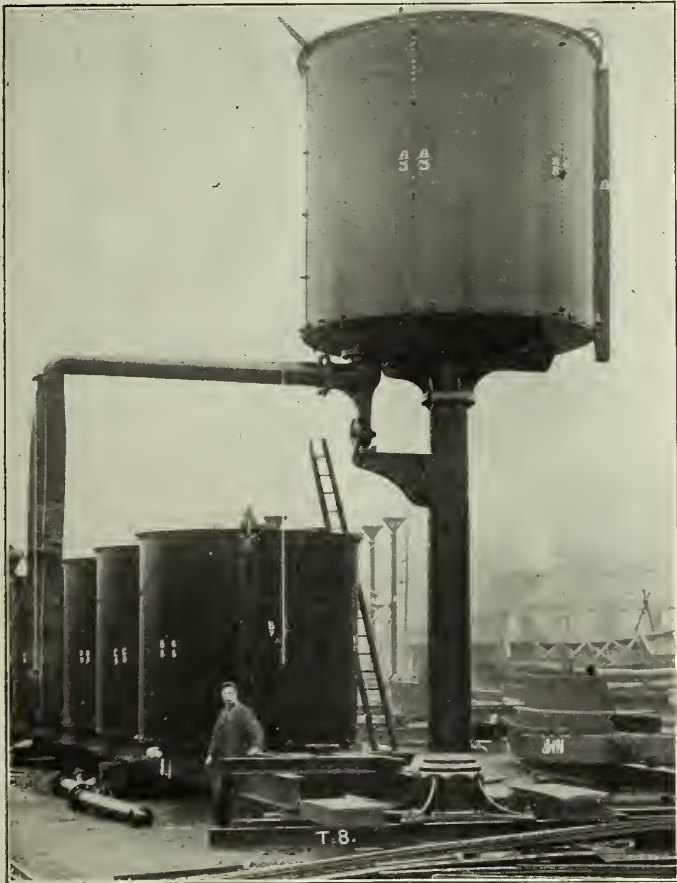
It is interesting to note from the record that out of the through rate of 96 cents a ton on ore, formerly in effect from shipside at Conneaut to the Clairton plant, the dock received 2 cents per ton, the Bessemer & Lake Erie 45.2 cents, the Union Railroad 17 cents and the St. Clair Terminal 16.8 cents, leaving

transportation is performed for which the Union Railroad is entitled to receive compensation out of the through rates. It is manifest, however, that to prevent discriminations and unlawful results we must reserve control over its divisions, and for that purpose this part of the record will remain before us for further examination and for a definite order.

Over this last-mentioned part of the rails of the Union Railroad, known as its Mifflin branch, very little steel-company traffic moves except coal; but, as we have just explained, a substantial volume of ore of the steel corporation does move over it to its subsidiary mills at Clairton. Originally this branch was acquired largely to open up to the industry a new dumping ground for its waste products, and it is still used for this purpose. It was finally connected up with the West Side Belt, largely for the purpose of securing the outside traffic just mentioned.

Water Tanks with Swivel Outlet.

The South African railways in English colonies use a swivel outlet at water tanks that is something different from the ball-and-socket arrangement so common in this country. The accompanying illustration shows one of 94 iron water tanks, each 8½ ft. in diameter and 8 ft. deep with supporting columns, and 6-in. swivel outlet with leather hose, constructed at Sheffield, England. The method of operation is apparent, the valve being operated by a chain, and the swivel outlet readily turned to the right or left, as desired. A remarkable thing about this plant is the single column support for the tank. It is to be considered, of course, that the capacity of the tank is small compared with that of tanks in ordinary service on American railroads.



Water Tank with Single Column Support and Swivel Spout, British South African Railways.

for the West Side Belt, which is the only facility in the through movement not belonging to the steel corporation, earnings of 15 cents per ton. By a subsequent order of the commission the 96-cent rate has now been reduced to 88 cents, but the divisions of it are not shown of record. Some coal is received by the Union Railroad at Mifflin Junction for movement northbound to points on the Bessemer & Lake Erie, mostly destined to Conneaut Harbor for lake ports. This is altogether outside traffic. It is our understanding also that arrangements are being made to extend the Montour Railroad of the Pittsburgh Coal Co. to Mifflin Junction, or to some other point on the Union Railroad. The plan underlying these arrangements is to fix through coal rates on a basis that will be an inducement to the coal company to use that route to the lake ports and thus give the Bessemer & Lake Erie a loading for its northbound empty ore cars. As to this traffic, we think it may fairly be said that a service of

German Government Railways Reflect Increasing Cost of Operation.

MOUNTING OPERATING RATIOS AND SLUMP IN TRAFFIC SHOW REMARKABLE SIMILARITY WITH UNITED STATES AND ENGLAND.

How universal has been the upward trend in railway expenses of operation against which American railways now are asking relief through more adequate compensation is reflected strikingly in a statement by the German Railroad Union, which speaks for the almost wholly government owned and operated railways of Germany, received in Chicago by the Bureau of Railway News and Statistics. That government operation even on the frequently lauded German state system, is far from a guaranty against advancing costs of operation, may be learned from the statement of the Railway Union itself, that the now available results for the fiscal year 1912 "show everywhere the growing revenue exhibitions of the year, but against them also a notable and decided growth in expenses, so that although the net has shown some gain, the operating ratios, after a relaxation from 1910 to 1911, have again soared into the heights." Following are the ratios of expenses to revenues on the various portions of the German state railways in the two years:

	1911	1912	Per Cent Increase
Prussian Hessian	65.23	66.30	1.7
Bavarian	67.92	70.00	2.8
Saxony	67.42	74.15	6.7
Wurttemberg	68.31	68.74	0.6
Baden	68.97	69.97	1.0
Alsace-Lorraine	70.44	67.22	*3.2
Mecklenburg	73.75	74.25	0.5
Oldenburg	74.60	77.58	3.0

*Decrease.

The single decrease in operating ratio, that of Alsace-

Lorraine, is attributed to unusual growth of traffic due to local expansion of the iron industry.

In view of such a showing doubt is expressed as to the outcome for 1913, during which year traffic reflected with remarkable similarity the late contraction which occurred in the United States.

"Perhaps there will be a continuance of the rising revenues," says the statement received by the Bureau, "though with smaller gains than in 1912, and also of the soaring expenses with resulting smaller netts and climbing operating ratios. Revenues both in passenger and freight traffic showed gains to the end of October. Even November brought a passenger traffic increase, but in freight there was a loss of two per cent against 1912. Apparently when revenue returns for all of 1913 are at hand they will show a decided slump in the second half year."

This universal drop in railway traffic and unchecked ex-

pense increase in the closing months of 1913, so decided in the United States and Germany, is further emphasized by reports received by the Bureau covering fifty British railway companies. Freight and passenger revenues of these roads for 1913, comprising all the important British mileage, reach the highest total of history at \$587,000,000, a gain of almost \$37,000,000 over either 1912 or 1911, practically all of the gain being even in the first three quarters of the year.

As in the United States, however, these record earnings do not mean prosperity for the carriers. "Unfortunately there is another side of the question to be borne in mind," says the London Railway News, "and the matter of expenses is nowadays fully as important as that of earning power. The dividend declarations for the first half of the year showed how seriously higher expenses had eaten into the larger revenue secured and we anticipate that the increase for the second half year will be fully as great."

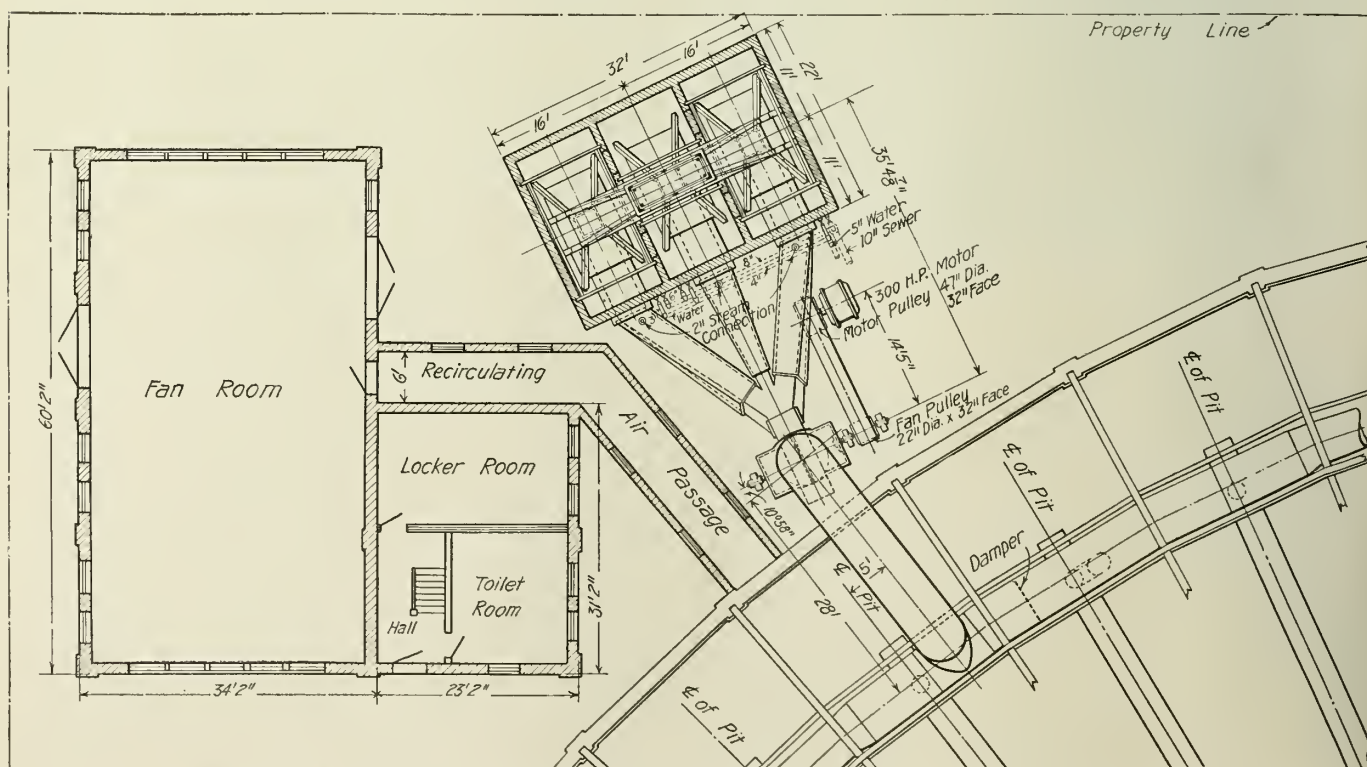
Smoke Washing Apparatus, Englewood Roundhouse, L. S. & M. S. Ry.

The new roundhouse of the Lake Shore & Michigan Southern Ry., at the Englewood engine terminal of that road in Chicago, is equipped with a smoke collecting and washing system which has been so far perfected that its operation enables the road fully to meet the requirements of the smoke-abatement ordinances of that city. The following account together with the illustrations, explains the construction and method of operation of this plant.

The agitation in favor of smoke abatement has prompted experiments with various means seeking to accomplish that end; particularly by those roads obliged by force of circumstances to comply with more or less drastic municipal ordinances aimed at the "smoke evil." One of these is the Lake Shore & Michigan Southern Ry., on which line a smoke washing apparatus has been undergoing development during

the past three years. So promising of results was the preliminary work on this device that when the new 30-stall engine house of the Lake Shore road was constructed at Englewood, in Chicago, during the summer of 1912, provision was made for the installation of an equipment capable of handling the stack gases from such number of locomotives as is likely to be quartered simultaneously in an engine house of this size.

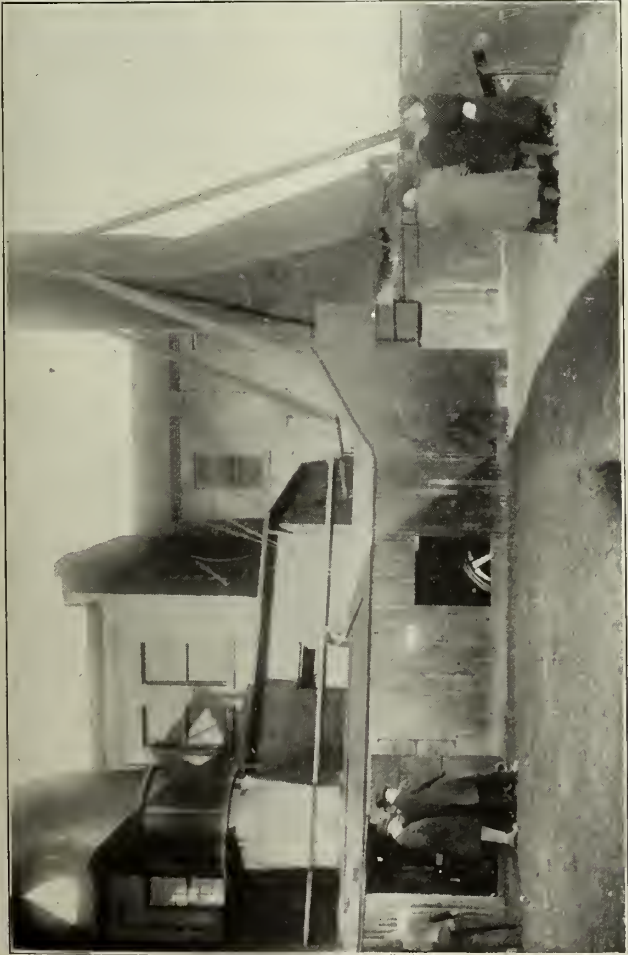
In carrying out this plan, there was constructed and suspended in the roof trusses of the building a smoke duct made of "Transite," this material being selected because of its imperviousness to the corrosive action of the gases emitted from the locomotive stacks. Connecting with the main duct, which varies from three feet in diameter at the extreme ends to six feet at the washer, are a series of 24 in branches, one



Plan Showing Relation of Smoke-Washing Plant to Roundhouse and Heating Plant, Englewood Roundhouse, Lake Shore & Michigan Southern Ry., Chicago, Ill.



Interior of Smoke-Washing Vat. Englewood Roundhouse L. S. & M. S. Ry.



Smoke-Washing Plant, Englewood Roundhouse, Lake Shore & Michigan Southern Ry.

for each stall, which connect with the locomotive stacks through the medium of telescopic jacks. The weight of the latter in each case is counterweighted by means of a lever to the outer end of which, near the wall of the building, is a line reaching down to the floor and by means of which the jacks can be lowered to make a close connection with the stack or may be lifted therefrom as required. Operating in harmony with the raising and lowering of the hood is a damper which closes off the uptake when same is not in use, thereby improving the quality of the induced draft through such other jacks as may be in use.

The gases collected by the smoke duct above referred to, are drawn through a motor-driven exhausting fan which in turn forces them through a triple discharge pipe, the termini of which are below water level in inverted tubs or hoods. These hoods are so arranged that the gases, in reaching the stack, must pass through a water bath which acts to remove the solid matter as well as portions of the objectionable fumes before allowing them to reach the atmosphere. From the illustrations, it will be seen that the washing apparatus consists of a concrete vat or tank 22 by 32 ft. outside dimensions. Concrete partitions divide this tank transversely into three compartments of approximately equal size. A branch of the discharge pipe is led into each of these compartments. The water in the tank being maintained at a higher level than the tops of these pipes, the gases are brought into intimate contact therewith. After this initial immersion they enter into an inverted tub whose edges are likewise below water level and to escape which they must again pass through the bath. Escaping the inverted tub they are collected by means of a hood, the edges of which also extend down into the water in each of the three compartments, and are thereby conducted through a 60-ft. stack to the atmosphere.

To facilitate the close intermingling of the gases and the water, live steam is blown into the discharge pipes at points near the entrances to the tank in such quantities as to keep the water, with the aid of the pressure of the gases themselves in a state of violent agitation. Water is admitted to each of the three compartments as needed through a three-inch line and likewise a six-inch drain to the sewer is provided in each case. At one end of the vat, is an overflow also connecting with the sewer. The smoke duct, beginning shortly after it leaves the fan, the hoods and other parts within the tank and likewise the stack are of wood construction, it having been found advisable to substitute wood for steel as was used in the early experiments, owing to the better acid-resisting qualities of the former material. In the stack is placed a series of baffles, the purpose being to arrest as much as possible any tendency of the condensation to be carried out with the gases.

On the occasion of a public demonstration of this apparatus some months ago the information was proffered that in the course of a day's operation with from 20 to 22 engines in the round-house, an average of about ten barrels of residue is skimmed off the surface of the water in the vat. This is placed in barrels having perforated bottoms, allowing quantities of the moisture to drain off, after which, with the residue approximately dry, the contents of the ten barrels can be reduced to the volume of three, which at 50 pounds per barrel, results in the collection of something like 150 pounds of solid matter each day. Analysis of this material has shown:

Carbon	82.6 per cent.
Sulphur	2.6 per cent.
Water (in combination)	3.9 per cent.
Iron oxide	8.7 per cent.
Silicon	1.8 per cent.
Other materials .....	.4 per cent.

2—Joints for Concrete Roads. Chairman: W. K. Hatt, Professor in Charge, School of Civil Engineering, Purdue University, Lafayette, Ind.

3—Methods and Cost of Repairing and Maintaining Concrete Roads. Chairman: Edward N. Hines, Chairman, Board of County Road Commissioners, Wayne County, Detroit, Mich.

4—Preparation and Treatment of Sub-Grade for Concrete Roads. Chairman: Ira O. Baker, Prof. of Civil Engineering, University of Illinois, Urbana, Ill.

5—Reinforcement of Concrete Roads. Chairman: Thomas H. McDonald, State Highway Engineer, Ames, Iowa.

6—Aggregates for Concrete Roads. Chairman: Sanford E. Thompson, Consulting Engineer, Newton Highlands, Mass.

7—Shoulders for Concrete Roads. Chairman: Walter Wilson Crosby, Baltimore, Md.

8—Bituminous Surfaces for Concrete Roads. Chairman: E. J. Mehren, Editor-in-Chief, Engineering Record, New York city.

9—Finishing and Curing Concrete Road Surfaces. Chairman: F. E. Turneure, Dean, College of Engineering, University of Wisconsin, Madison, Wis.

10—Economic Methods of Handling and Hauling Materials for Concrete Roads. Chairman: Halbert P. Gillette, Editor-in-Chief, Engineering & Contracting, Chicago.

11—Mixing and Placing Materials for Concrete Roads. Chairman: Paul D. Sargent, Chief Engineer, State Highway Commission, Augusta, Maine.

12—Cost of Constructing Concrete Roads. Chairman: A. N. Johnson, State Highway Engineer, Springfield, Ill.

13—Thickness, Crown and Grades for Concrete Roads. Chairman: Leonard S. Smith, in Charge of Roads and Pavements, University of Wisconsin, Madison, Wis.

14—Proportion and Consistency of Materials for Concrete Roads. Chairman: C. U. Boley, City Engineer, Sheboygan, Wis.

15—Form of Specifications for Concrete Roads. Chairman: A. Marston, Dean and Director, Division of Engineering, Iowa State College, Ames, Iowa.

A banquet was given under the auspices of the Highway Commissioners' Good Roads Association of Cook County at the Auditorium Hotel, Friday, Feb. 13, at 6:30 p. m.

Affairs of the New York, New Haven & Hartford R. R.

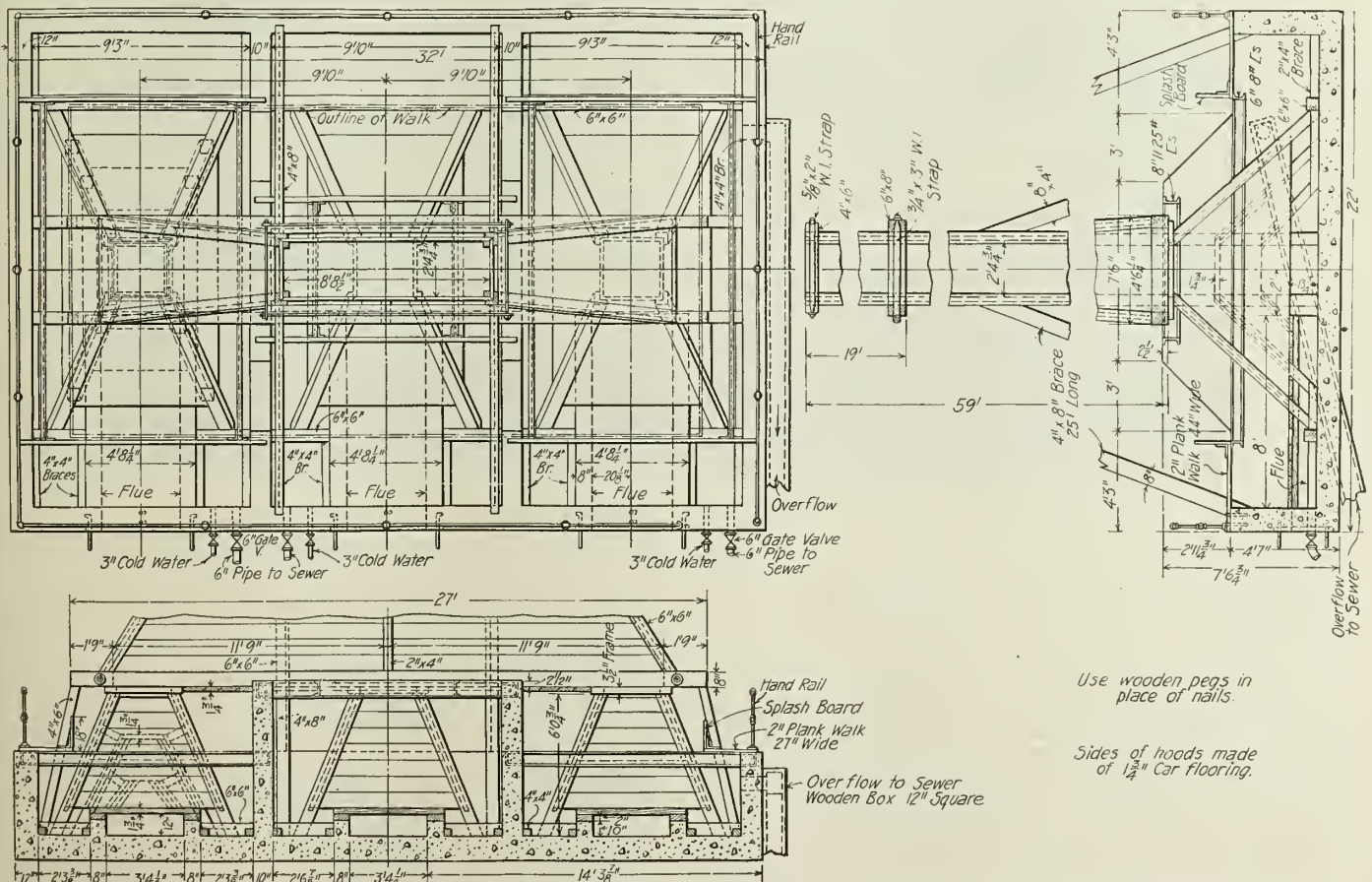
The United States senate passed, on February 7, a resolution introduced by Senator Norris, requesting the Interstate Commerce Commission to submit further information relative to its investigation of the financial affairs of the New York, New Haven & Hartford R. R. Following is the language of the resolution:

"Resolved, That the Interstate Commerce Commission be requested to make public the facts in its possession concerning the financial transactions of the New York, New Haven & Hartford Railroad Co., and so far as may be necessary, to get additional information to thoroughly cover the subject and to reopen its examination of the affairs of the company, and make a further investigation of its financial transactions with a view to ascertaining:

"(1.) What became of the funds of said company invested in the various enterprises and corporations mentioned in the opinion of the Interstate Commerce Commission No. 4805, entitled 'The New England investigation in the matter of rates, classification, regulations, and practices of carriers,' submitted May 20, 1913, and decided June 20, 1913.

"(2.) Whether the personal operation authorizing such investment of the funds of said company and the person or persons receiving the benefit thereof are liable to punishment under existing law.

"(3.) Whether under existing laws such funds so invested can be recovered on behalf of stockholders of said company.



Arrangement of Concrete Vat, Hoods and Stack, Smoke-Washing Plant, Englewood Roundhouse, Lake Shore & Michigan Southern Ry., Chicago, Ill.

"(4.) What legislation, if any, is necessary to prevent the recurrence of similar transactions."

The resolution was supported on the previous day in heated arguments by Senators Norris, Borah and Cummins. Senator Newlands, chairman of the committee on interstate commerce, read a letter that had been written by Judge Prouty, of Interstate Commerce Commission, in which the latter expressed doubt as to the wisdom of a further inquiry into the New Haven. In this letter Mr. Prouty asserted that the commission had in its possession all information it had been able to obtain with relation to the New Haven affairs; a senate committee, Mr. Prouty suggested, could accomplish more than the commission, because the latter had more jurisdiction over the construction companies and other companies which were involved in the railroad's deals. Due partly to this argument, the form of the resolution was modified in such manner as to leave it to the discretion of the commission whether or not it would re-open the previous investigation.

The commission took prompt action in accordance with the above resolution, and issued an order, on February 10, for the inquiry to begin immediately. Hearings may be held, but it was not decided when nor where, or whether they will be public. For the present the commission will conduct its inquiry by gathering from all available sources whatever information may throw light on the questions at issue. It may be three or four months before the commission is ready to proceed with hearings, in case it should decide that they are necessary.

Chairman Howard Elliott announced, February 6, after a meeting of the executive committee of the New York, New Haven & Hartford, that the road's attorneys had presented to

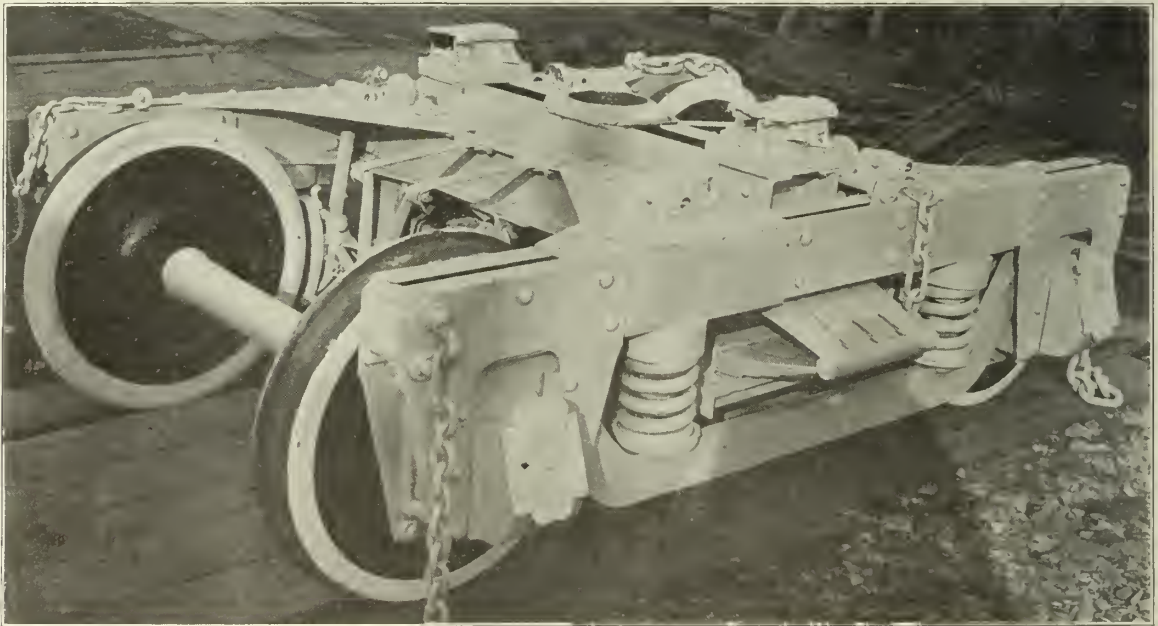
condition it was prior to the injury and such further sum as will compensate the owner for the diminution in the value of the use of the property during the continuance of the injury.

Structural Steel Passenger Car Trucks, Canadian Pacific Ry.

By R. W. Burnett.

In this article, Mr. Burnett, who is general master car builder of the Canadian Pacific Ry. describes four and six-wheel passenger car trucks designed by himself, and employing to as large an extent as possible, structural shapes and plates in their construction; castings and forgings being used to a very limited extent only. Some of the main points of advantage claimed for this design are: reduced weight; increased strength; ease of inspection; increased end clearance; cheapness of manufacture; low cost of maintenance; inside hung brakes, making trucks easier riding, easier to inspect, and facilitating the application of any desired form of axle lighting system; chilled iron wearing parts of pedestal, reducing wear on both pedestals and journal box, wrought pedestals, being stronger in themselves and adding strength to truck sides; and only two cotter pins to remove to change any pair of wheels.

On account of the faults which cause unsatisfactory service and high expense in maintenance, and which are common to all composite types of passenger car trucks, a design for a structural steel truck was prepared by the Canadian Pacific Ry., about three years ago, with a view of overcoming these defects. While all-metal trucks of cast steel construc-



Four-Wheel Passenger Car Truck with Structural Steel Frame, Canadian Pacific Ry.

Attorney General McReynolds the names of five men to act as trustees of the New Haven's holdings of Boston & Maine stock in connection with the plan for the dissolution of the New Haven system. He refused, however, to make the names known.

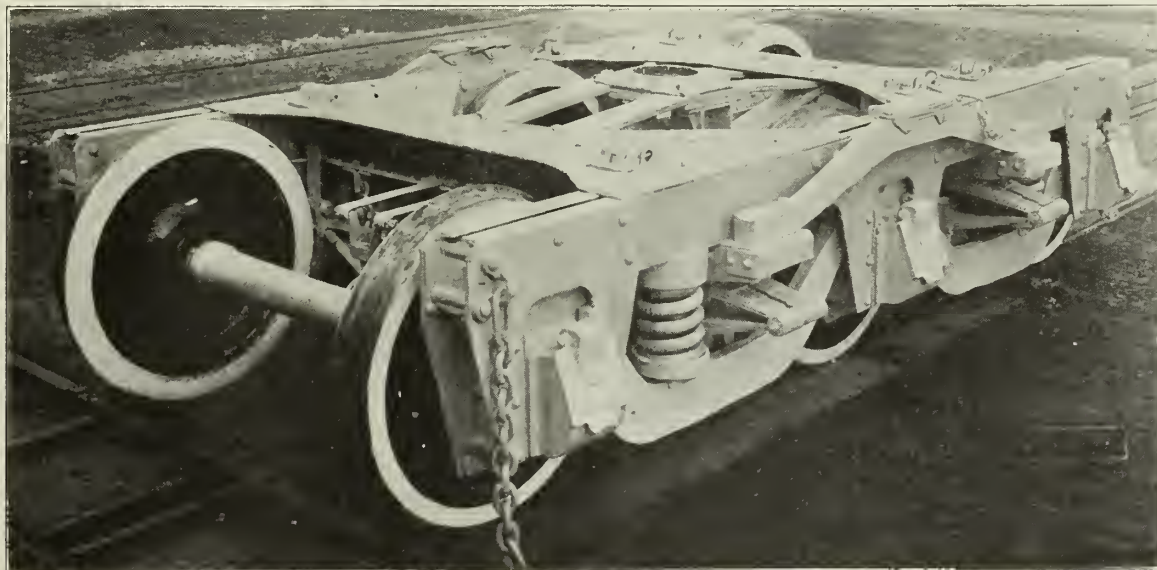
The Kentucky Court of Appeals has held, in the case of Lexington & Eastern R. R. vs. Baker, that where blasting operations result in a direct trespass or premises injured by causing soil and rocks to be thrown thereon, the liability of the company causing the injury is absolute, and the company must respond in damages irrespective of the question of negligence or want of skill; and that where a house and barn are injured by blasting, the measure of damages is a sufficient sum to restore the property to the

condition they were in prior to the injury. The structural steel truck herein described is considered the equal of the cast steel truck in point of service and offers the advantage of being somewhat cheaper in first cost. It is also much easier and cheaper to repair, as in case of breakage, for any cause, it is only necessary to replace the damaged part, whereas with a broken cast steel truck it is necessary to replace the entire truck frame.

In all attempts at truck design in the past, the side sill has been kept above the plane of the equalizer; at the same time it has been necessary to keep the transoms down to

clear the centre sills, draft rigging and brake gear, and also necessitating the use of an offset connection between the transoms and the side sills. On this truck, the side sills are each made of two channels with their flanges turned inwardly, the flanges being cut away to let the equalizers come up inside the housings thus formed. The cutting away of the flanges is compensated for by the extension of the wings on the pedestal plates. The housing of the equalizers inside of the side sills makes it possible to drop the side

not injured. The cast iron pedestals do not add strength to the truck but the plate pedestal can be extended to act as a reinforcement giving increased strength with reduction of weight. It was thought, when these pedestals were designed, that as a matter of course they would bend in case of wreck, but in wrecks that would have broken cast iron pedestals, these pedestals have always brought the car home. In manufacturing, these pedestals are punched out leaving $3/16$ inch inside of the jaw to be milled. About twenty are milled at



Six-Wheel Passenger Car Truck with Structural Steel Frame, Canadian Pacific Ry.

sills so that they are flush with the transoms; doing away with the offset connection which has been used heretofore and permitting the use of flat gusset plattes above and below side sills and transoms, thus greatly increasing the strength and giving more room for inspection.

The great trouble with composite trucks is because of the constant attention required by many parts bolted together, the necessity of frequent renewal of wooden parts, and the wear of the different members. A composite truck made new and of the strongest design will warp even before being placed in service, so that the pedestals are not plumb on the boxes, and after a year's service the pedestals are likely to be spread all distances up to two inches. This built-up truck is made perfectly square and plumb and remains so. It has been noted that it requires less than one-half the power to move this truck than is required to move a composite truck on account of the latter getting so badly out of square.

On this truck it has been found that there is ample strength without the use of end sills, which also allows the side sills to be made shorter and which gives better clearance at the steps and facilitates the inspection of trucks, platforms, and draft gear. This strength is provided in the side sill and by means of the clever arrangement of the gusset plates. The brakes are inside hung instead of outside hung, as with the ordinary six-wheel truck it gives a more effective brake, greatly reducing the tendency to tilt and surge, and leaves the ends free for inspection and allows room for any form of axle lighting system.

The frequent breakage and rapid wear of cast iron pedestals is an old story. Experience with cast steel pedestals has shown that they not only wear out rapidly but soon cut through the sides of the journal boxes. The built-up pedestal on this truck has a chilled iron filler rivetted between the two plates, and experience has shown that in two years there is no appreciable wear and that the journal boxes are

one time. Being drilled on a jig, they are perfectly interchangeable.

The pedestal strap, which formerly required so much attention in inspection and repairs and which caused so much annoyance when changing wheels, is not needed in this design on account of the strength of the side sills and pedestals. A small bar is pivoted on one arm of the back member of the pedestal and fastened to the other arm by means of a key bolt applied to prevent the box leaving the pedestal if the truck is jacked up or in case the car is derailed. The brake rigging being above the axles, there are no nuts and only two cotters to remove prior to changing any pair of wheels. Long truck hangers are used, the hangers on the four-wheel truck being pivoted on top of the gusset plate while on the six-wheel truck they are pivoted underneath the gusset plate. The truck hangers and brake hanger pivots are made of rolled steel bars cut to length without a head which avoids the necessity for heat treatment. They are carried in a casting, one end of which is open. A cotter is placed through the casting in front of the pin while in the other end of the casting is a small hole for the insertion of a drift to remove the pin. The long truck hanger is cheaper to manufacture than is the short one usually employed, is easier to inspect and gives an easier riding truck.

It will be noted that the brake beam release springs on the truck have been dispensed with, they having always been considered a detriment on account of being impossible to keep them properly adjusted. It will also be noted that these trucks are made almost entirely of rolled shapes and flat plates with practically no forging or pressing, which reduces the processes of manufacture almost to a question of mere shearing, drilling, punching and rivetting. These trucks are running under more than 700 cars and have been in service so long as to demonstrate that there is no trouble from rivets and that the cost of maintenance is reduced to a matter of changing wheels and brake shoes, and of lubrication.

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Office of Publication	- - - - -	1407 Ellsworth Bldg., Chicago
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Eastern Office, 30 Church St. (Hudson Terminal), New York
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SATURDAY, FEBRUARY 14, 1914.

The underground rumblings of the iron and steel industry betoken a general expansion of demand with slightly stronger prices. The fact that tin plate, sheet, pipe and some other mills have already passed the 80 per cent limit and tin plate mills are virtually at 90, points to better conditions in the heavier products. There are new indications along the horizon every week of rising requirements which if realized will call for a record mill output for 1914.

The vast amount of pertinent locomotive data which began to be available with the extensive series of locomotive tests made at the St. Louis Exposition in 1904, and which has been so ably continued by the Pennsylvania R. R. with its special equipment at Altoona, is believed to be showing its value in revised methods of proportioning essential parts in locomotive design. That such evolution is desirable has been evident from the fact that at various times beginning with 1907, the American Railway Master Mechanics' Association has considered the revision of the ratios formerly in vogue. These had gradually become obsolete through necessary deviations by which to arrive at the desired power in the most practicable manner. The Master Mechanics' Association still has

a committee at work, whose duties are to report on "design and construction of locomotive boilers," showing that, as an association, it has not yet arrived at a basis of design that it considers adequate either for present day requirements or for those that can reasonably be anticipated.

In view of the situation as outlined above, it is interesting to note the methods lately devised and at present employed by the American Locomotive Co. Information relative thereto has been made public in bulletin form by this company, and constitutes an interesting study for motive-power officers generally. Instead of basing design on certain arbitrary ratios between such factors as grate area, heating surface, cylinder volume, etc., which ratios seemed to be justified by precedent and experience up to fifteen years ago, the new method is to base these proportions entirely on cylinder horse-power. Data from various sources, particularly from the Altoona locomotive testing plant, and developed on engines modernly equipped, have enabled designers to assign more consistent values to firebox and tube heating surfaces, to superheater equipment, etc. These factors are given consideration in establishing the new ratios, without which modifications, no methods of arriving at boiler and engine proportions can be considered adequate for present day needs. An admirable feature of the American Locomotive Co.'s system lies in the fact that it is applicable to locomotives irrespective of type and character of service, which is a distinct mark of superiority over the methods hitherto in vogue.

The reasonableness of this method of design, it is believed, is such as to make it well worth the attention of the Master Mechanics' Association. By following the system in basic principle at least, the much desired revision of the association's recommendations on this subject should be made possible and in a manner that is more consistent with a modern understanding of the art.

Missouri, Kansas & Texas Ry. Settlement Sets New Precedents.

The legal struggle that has attended the attempt of the Missouri, Kansas & Texas Ry. to merge its Texas lines was ended on February 6, by a compromise agreement filed in the United States District court, at Austin. This settlement and the court's decree which accompanies it embody a consistent and far-reaching plan for assuring a certain measure of independence in control of the system, and in that way set new precedents in the present prevailing anti-monopolistic trend of thought.

The litigation thus settled arose about a year ago. The Kansas corporation of the Missouri, Kansas & Texas Ry. which is the parent corporation, was instrumental in having a bill passed by the Texas legislature which would allow it to reorganize and consolidate eight subsidiary Texas companies with the principal Texas corporation, the Missouri, Kansas & Texas Ry. Co. of Texas. These eight companies had all

been acquired in one way or another within two or three years previous, and comprised the following: The Texas Central Ry. Co.; the Dallas, Cleburne & Southwestern Ry. Co.; the Beaumont & Great Northern R. R.; the Wichita Falls & Southern Ry. Co. of Texas; and the Wichita Falls & Northwestern Ry. Co. of Oklahoma, which last named company, in turn, owned the stock of the Wichita Falls & Northwestern Ry. Co. of Texas, the Wichita Falls & Wellington Ry. Co. of Texas and the Wichita Falls Ry. Co. of Texas. This consolidation would have given the Missouri, Kansas & Texas Ry. Co. of Kansas, through the voting power of the stock, not only control of the Missouri, Kansas & Texas Ry. Co. of Texas, but of the eight subsidiaries as well, a measure which was interpreted in some quarters in the state as being contrary to the public policy of making Texas control dominant in Texas lines. Prompted by this sentiment and with the advice of his attorney general that the bill was unconstitutional, the governor, last February, vetoed the consolidation bill; but the legislature promptly re-passed it over his veto. The consolidations were carried out, and almost immediately Attorney General Looney brought a suit to dissolve the mergers and to enjoin future consolidations, and by subsequent amendments asking penalties amounting in the aggregate to fifteen million dollars. The case has been actively litigated until this time.

The present settlement is a comprehensive one, for it covers not only the points immediately at issue, but wipes the slate clean on several old quarrels between the state and the railway, and fixes for the future a status which is intended to cover the entire question of monopolistic control. And in conformity with the progressive program which is now opened to it, the railway binds itself to expend the sum of six million dollars within a period of six years, in betterment work on the system. As to the original contentions for dissolution of the subsidiary companies, the settlement provides for the contrary policy, for it sets forth the terms upon which the Texas company is to be reorganized and merged with the eight subsidiary corporations. However, the management of the Missouri, Kansas & Texas Ry. Co. of Texas is placed beyond the control of the Kansas company. The power to vote the stock of the Texas company is taken away from the Kansas company and vested forever in the persons who shall compose the board of directors of the Texas company, which board of directors is to be agreed upon by the state attorney general and the company.

This agreed board of directors is given the exclusive power both by the agreement and the accompanying decree of the court to vote the stock of the company, select their own successors and manage the affairs of the company. It is made the duty of the directors under the decree to operate the road and manage the properties as an independent railroad system, the inhibition against foreign control being in the following emphatic language: "It

is the order, judgment and decree of this court that each and all of the defendants herein, their officers and agents, be and they are hereby forbidden to do any act that will bring about a consolidation or the control or domination of either one or all of said Texas companies, with or by any railroad corporation chartered under the laws of another state, in violation of the laws and constitution of the state of Texas." It may be said substantially that the agreement and decree place the affairs of the Texas company beyond the power of control or domination, by the Missouri, Kansas & Texas Ry. Co. of Kansas, or any other company chartered by the laws of another state, and that it assures permanently to the Texas company a completely independent management.

All traffic operating agreements between the Missouri, Kansas & Texas Ry. Co. of Texas and the Missouri, Kansas & Texas Ry. Co. of Kansas and the Wichita Falls & Northwestern Ry. Co. of Oklahoma are required to be submitted to the railroad commission of Texas before becoming effective. This is a new and original authority given the railroad commission which they have never had or exercised before. The agreement and decree also provide for a complete audit of the accounts between the Kansas company and the Texas company, the auditors to be selected one by the attorney general and one by the defendants. It will be the duty of these auditors to audit the accounts between the two companies and make a report to the court for its consideration and approval. It is provided in the agreement that all claims of the Kansas company which are not found to be lawful and just obligations of the Missouri, Kansas & Texas Ry. Co. of Texas shall be at once canceled and annulled.

The agreement provides for the exercise by the attorney general of the visitatorial powers conferred by law, not only over the affairs of the Missouri, Kansas & Texas Ry. Co. of Texas, but over the records of the Kansas company which may be kept in Texas, and provides further that any information which can not be obtained within the state will be furnished by the Kansas company from its records outside of the state of Texas. The agreement also provides that should the attorney general find anything being done by any general officer of the Kansas company who is an officer of any railroad chartered under the laws of another state, the tendency of which is to construct the lines of the Texas company with a foreign company, in violation of the constitution and laws of the state, then he shall call the attention of the railroad commission thereto, and the commission shall make such orders as may be proper with reference to same, and if either the attorney general or the companies involved should be dissatisfied, then the matter shall be tried out before some court having jurisdiction.

In the agreement the Missouri, Kansas & Texas Ry. Co. of Texas agrees to expend within a period of six years from January 1, 1914, the sum of six million dollars on additions, extensions, betterments and terminals to or for its own line and the lines of the

other Texas companies involved in the litigation, exclusive of the cost of repairing the damage of the lines brought about by the floods of the year 1913, or any subsequent disaster. The manner and method of such expenditure is left to the discretion of the company, except that which is specified in supplemental agreement "A." This latter agreement has not been made public.

Screw Spikes.

The severe strains in track, imposed by the ever-increasing weight and loadings of rolling stock, have caused engineers to seek in every way possible to strengthen the track structure. For this they have looked not only to rails and ties and ballast, but to fastenings as well, and there has been no little agitation directed to the proposition of abandoning the use of the time-honored drive spike. As a substitute the screw spike has been the only device seriously considered, and a good deal of experimenting with this style of fastening has been done by several American railroads during some half dozen or more years past.

In his paper on "Protection of Ties From Mechanical Destruction," read before the recent convention of the American Wood Preservers' Association, and published in the *Railway Review* last week, Mr. Howard F. Weiss unreservedly recommends the screw spike in preference to the drive spike for "high-class construction." This conclusion certainly invites discussion, for it challenges standard track construction everywhere in this country and will not meet with general acceptance.

If the average result of experiments that have been made with the screw thus far has been correctly estimated, it comes far from being a satisfactory track fastening. While it shows up well in the laboratory, and even better than the drive spike in direct pulling tests, yet it is decidedly inferior to the drive spike from many considerations that have to do with maintenance economy—and it might as well be said maintenance efficiency. Considering, first of all, the point most frequently dwelt upon in laboratory tests, the superiority of the screw spike over the drive spike in its greater holding power against direct pulling, is not of much consequence, for in this respect drive spikes hold well enough for practical purposes. The test of the efficiency of a drive spike is its resistance to spreading under the lateral thrust of the rail, and this is something apart from its resistance to direct pulling out of the tie.

It will not do to sweepingly condemn the drive spike as an unsafe device, for if such were the case, American railroads were indeed in bad shape, for the percentage of railroad track in this country that is fastened with any other device is insignificant—almost 100 per cent of the mileage of track in this country is fastened with drive spikes. Wherever there is found a tendency for track to spread on curves, double

spiking may prevent it if the ties are of hard wood, or rail braces may be used. If the ties are of soft wood, the use of tie plates will generally enable the drive spikes to hold, and, in any case, tie plates are necessary wherever screw spikes are used. So far as injury to the fiber of the timber by driving is concerned, this can be prevented by boring a hole for the drive spike as well as for the screw spike; and no comparison of the two devices in this respect is fair where a hole is bored in advance of the driving in one case and not in the other.

The test of efficiency of the drive spike is whether it can maintain track to gage, as above stated, and if there are places where this cannot be done without the use of tie plates, such fact in itself is no conclusive reason for substituting the screw spike, because it is dearer in first cost and in cost of application than the drive spike, and if, in combination with tie plates, the drive spike can hold the gage, it is not likely to be displaced by the screw spike on American railroads.

Facility in the use of the drive spike is superior to that of the screw spike in many ways. For instance, it is readily adaptable to driving in a plugged hole after being pulled, should such become necessary in ties that are partly decayed, but such is not the case with the screw spike. It has been stated by several engineers who have experimented with screw spikes in this country, that, after such spikes become considerably corroded they do not hold well when reset in the same holes, for the reason that the thread is somewhat reduced in size, and the wall of wood fibre or female thread about the spike crumbles and loses its holding power in the process of withdrawing the screw, except where the wood is entirely sound. The fact that dowels, helical linings and other devices have been extensively applied on foreign railroads to enable the screw spike to stand up to its duty during the life of the tie, would make it appear that there is some foundation for this objection to the screw spike. Aside from this the screw is an inferior device, if not practically useless, where track must be regaged. On experimental track where the screw has been used and regaging became necessary, the drive spike has often been substituted for it.

Another practical objection to the use of the screw spike is the difficulty of withdrawing it in case of emergency. In most instances where it has been experimented with in this country it has been driven by machinery to a very snug fit. Perhaps it is not necessary to drive it as snugly as has been done in cases, but anyhow this is an important question, for some of these spikes have been set so tightly that they could not be withdrawn by hand with a box wrench. In one instance which has come to notice, a broken rail was found on a stretch of track fastened with screw spikes. The night was very cold and the ground solidly frozen, and it took the section crew two hours to draw or otherwise remove the screw spikes before the damaged rail could be taken out. Some of these spikes could not be turned with a box wrench under the utmost exertions of as many men as could get

hold of the tool. In some cases the heads were twisted off, while in other cases nothing would twist and the heads had to be cut off with hammer and track chisel. It is needless to say that when the new rail was put in a readier means of fastening was found than that of the screw spike. Had the rail, in the first place, been fastened with drive spikes these could have been drawn in a few minutes.

The result of corrosion from refrigerator car drippings is much worse with screw than with drive spikes for in many cases the screws become rusted fast and cannot be withdrawn from the tie. If, then, the head be broken off or twisted off, on a tie plate, it becomes

impossible to remove the stub and drive any kind of a spike in the same place, or in any other place unless the plate is double punched.

It is yet too early to draw final conclusions on the general merits of the screw spike, but the trend of experience with it in this country seems to be rather discouraging. Certain it is that the claim of its superiority to the drive spike is doubted by the majority of maintenance engineers. Some different method of application, or its use with some kind of an auxiliary device, as is the practice, to some extent, in Europe, may improve its serviceability, but proof of this must await the result of further experiments.

Mr. Prouty on Valuation of Railroads

From the address of Hon. C. A. Prouty, Interstate Commerce Commission, delivered before the second annual meeting of the Chamber of Commerce of the United States of America, in Washington, Feb. 11, 1914. "The thing to be done.—The time and expense required.—The benefit to be derived."

The Commission proceeds under a special act of congress of March 1, 1913. By the terms of that act the Commission is required to ascertain and report the cost of reproducing new the railroad and other property of every railway company in the United States, and the cost of reproduction less depreciation. Evidently, before it can be determined what it would cost to build a particular railroad as it to-day exists, we must know exactly where and what that railroad is. This means that as a preliminary to the work of valuation every railroad must furnish the Commission with maps and plans which will identify its property. Investigation shows that some few railroads in the United States have to-day such maps and plans; many railroads have maps and plans which contain a part of the information required, but not the whole; while many others possess nothing of this sort worth naming. So far as these plans already exist, even though not in the most desirable form, they will be used; in so far as present maps can be added to and extended this may be done, but where no maps exist new ones must be prepared. When this work is completed, there will be found in the office of the Commission at Washington an accurate map and inventory of the property of every railroad engaged in interstate business as of June 30, 1914, together with other maps and plans showing all subsequent additions to the property. This of itself is a work of great magnitude which must be done by the carriers as a part of the general undertaking. You as business men will agree that while some expense will be entailed upon our railroads it will be to them well worth the cost.

When the Commission has been furnished with this complete inventory by a railroad it must proceed to verify it; that is, it must ascertain whether the facts stated in the inventory are true. It must determine the number of yards of earthwork, the number of yards of rock, the culverts, the tunnels, the bridges, together with the character and cost of construction. It has been decided that this information cannot properly be obtained without sending a surveying party over every mile of the railroad. Sometimes the progress of this party can be comparatively rapid; at other times it will be slow; at all times the work must proceed with sufficient care and detail to make certain that the figures obtained are correct. If this valuation is to serve its purpose it must be so made that it will not be open to just criticism. The general public must feel that the work has been properly and thoroughly done, and that the result is reliable. This would not be if any fact which could be accurately ascertained were guessed at.

It will be necessary to note in the course of these surveys and to determine in various other ways the amount of depreciation, so that when the work is completed the records of the Commission will show the extent and character of the property of each of our railroads, the cost of rebuilding that railroad as it exists, and the amount of depreciation in the several articles which go into the railroad as well as in the railroad as a whole.

This is mainly an engineering task. The time and expense will be considerable; indeed, herein arises the major part of the outlay, but no serious difficulties are involved, nor should the result when ascertained be in serious doubt. It should be possible for the people of this country to know upon the completion of this work what it would cost to rebuild its railroads new and to what extent those properties have depreciated as compared to new.

This work is often referred to as a "physical valuation" of railways, and most people probably understand that this cost of reproduction, with or without depreciation, determines the value of the railway so that, having ascertained and reported these facts, the duty of the Commission has been discharged. But this is by no means true. Up to the present time the holding of the supreme court of the United States is that cost of reproduction new, or cost of reproduction less depreciation, are only factors entering into the final question of value. Many other things have been enumerated by that court as bearing upon the value of the property. The valuation act itself requires the Commission to ascertain and report the cost of construction, the amount of money which has been invested in the property, and the sources from which that money has been derived; to give, in short, a complete corporate and financial history of these properties; to take note of the earnings of the property, and, having all these facts before it, to determine from a just consideration what is the value of the property itself. I am not saying that it may not finally come to pass that the cost of reproduction will be the controlling factor; many people so insist. Others urge with equal earnestness that the true test of value, so far as it can be ascertained, is the money invested in the property. I express no opinion upon any of these property, and, having all these facts before it, to determine from Commission is required not merely to ascertain the cost of reproduction, but to state the value of the property, and that in attempting to do so many delicate and difficult questions may be encountered. Let me instance one or two of these as illustrative.

The first railroad which the Commission is proceeding to survey is in what is known as the Pacific district, is the San Pedro, Los Angeles & Salt Lake R. R., extending from San Pedro, Cal., to Salt Lake City, Utah, some 800 miles. Most of this road has been built in comparatively recent times, and

the circumstances and cost of construction are fairly well known.

The course of the road is for the most part through an arid desert. A certain section of it, when built, was located where no man thought it could ever be disturbed by floods, yet shortly after it was opened for operation the floods came and carried out this portion. It was at once reconstructed upon a new location supposed to be beyond all possible danger from a recurrence of the previous disaster, nevertheless the waters again came and washed away this same section; whereupon it was rebuilt upon a third location, beyond all possible reach of future trouble from this source.

Considering the nature of the road and the people who were interested in its construction, it seems probable that due caution was exercised in the original location; that is, that a reasonably prudent man building this railroad as those men did, to be operated by them as a railroad, would have located it as it was located. It is undoubtedly true that the second location was made with great care, and was believed to be beyond possible danger. It has cost a large sum more to rebuild this road than it would have originally cost to construct it where it is to-day. Now in determining the value of this property what, if any, allowance is to be made for this experimental outlay? If the government itself had constructed this railroad it probably would have had the same experience and would have expended the same amount of money which the owners actually did.

This illustration puts the question in a very striking form, but the same idea enters more or less into the valuation of most of the railroads of this country. There has of necessity been a certain amount of experiment before hitting on the right and proper thing. Does this development expense constitute an element of value which may be recognized to-day, or must the owners of these public utilities stand the loss of their mistakes in the same way that the owner of a private enterprise would? Vast sums of money are involved in the answer to that very simple question.

Take another illustration of a different character. Some years ago, in a case pending before the Commission, the Northern Pacific Ry. had occasion to prove the value of its property, and it did so by showing the cost of reproduction. For this purpose it gave the units which entered into that railroad as it then stood. Among other things it showed the amount of land upon which its right of way was located and what it would cost to acquire that land for railroad purposes at that time, claiming that this cost of reproduction was the value of its property.

The Northern Pacific runs through the city of Spokane. When the road was built that city was of small account, but it has come to be of much account, and in the process of development it has grown up on both sides of this railroad. The Northern Pacific claimed, and it may very well have been true, that the cost of acquiring its right of way through the heart of the city of Spokane at the time of the hearing would be at least five million dollars. The original cost to the railroad was nothing, the right of way having been entirely donated either by the government or by private benefaction. Now to whom belongs this five million dollars? Has the Northern Pacific the right to tax the public for a return upon that amount? Whether it has is a thing of great consequence, for nearly one-fourth of the entire value of the Northern Pacific Ry., as shown in that proceeding, was the value of its right of way, much of which was due, as in the city of Spokane, to increase in value over its original cost. This question of the unearned increment presents in the valuation of our railways a difficult problem.

Illustrations like those two might be indefinitely multiplied, but these are sufficient to exhibit the thought I wish to emphasize; namely, that this valuation of our railways is not a mere engineering problem, involving the cost of reproduction or the amount of depreciation alone. Indeed, it is not properly an engineering problem at all, but rather a social and economic problem: a legal problem: in its final analysis a political

problem. It is for the Commission, first of all, to ascertain all these facts and from them to deduce what in its opinion is the fair value of these properties. That conclusion may undoubtedly, in some respects and to some extent, be modified by the courts. In the final analysis it will be for the people to say what measure shall be meted out to these railways. While courts and commissions may influence and even temporarily determine questions of this kind, the will of the masses finally prevails, and it is therefore of first importance that the body of the people should have accurate information.

Looking to the work of the Commission alone, and answering the first division of my subject, the thing to be done is this: To marshal every fact obtainable with respect to the present condition and the past history of our railways, and from a just consideration of all these facts to determine the fair value of the properties to-day.

The valuation act became a law on March 1, 1913, and the Commission was required by its terms to begin the work within sixty days and to prosecute it with all due diligence. The Commission entered upon this task within the limit specified, but up to the present time no substantial progress has been made in the body of the work. While the Commission was permitted by executive order to employ ten engineers who will have general superintendence of the engineering work, our employees, both engineers and accountants, must be obtained through the Civil Service Commission. Since the government had never done any work of this character, that Commission had no rolls from which competent persons could be employed, and although the preparing of such registers was at once begun and has been prosecuted with all possible diligence, it is only within the last few weeks that they have been actually available.

For the purpose of making the surveys to which allusion has been made the country has been divided into five districts, by states, each containing approximately fifty thousand miles of railroad. Each of these districts will have an organization of its own which will conduct the surveys within those particular limits. Subsequently these surveys will be worked out, partly in the district and partly at the head office in Washington. Surveys began in all the districts except one about Feb. 1, and will begin in that district about Feb. 15.

It has seemed to the Commission the part of wisdom to proceed with caution until sure of its ground. In this view a railroad has been selected in each district upon which these surveys will proceed with deliberation and in such manner as to afford a kind of instruction school to all employees. This preliminary work will occupy three or four months, which means that we shall not be in position to rapidly develop our organization until about July 1. Beginning then, or slightly before, our force can be rapidly increased.

While it is somewhat hazardous to make an estimate of the time required without more experience than we have had, it is my opinion that the field surveys ought to be concluded in from four to six years from July 1 next. It is hoped that the accounting and other work will keep pace with our field surveys. The putting together of these facts, that is, the actual valuation will necessarily lag, somewhat behind the obtaining of the facts themselves. The Commission will in the near future have all the data with respect to some railroads, but whether a valuation will be at once announced in such cases must depend upon the method which the Commission selects for determining the various questions which will arise and to which reference has been made.

Any estimate of the expense must be even more unreliable than that of the time. Railroads have been valued both by public authority and by themselves, and the cost of these valuations has run all the way from two dollars to seventy-five dollars per mile. I have already said to you that this work, in order to meet its purpose, must be thoroughly done, and this will require a larger outlay upon the part of the federal gov-

ernment than has usually been made by the states. Moreover the work required by this act is much more comprehensive than has ever been undertaken by any state. Knowing what must be done, the methods which must be followed, the rate of accomplishment which has been attainable in other places, I should say, basing my estimate upon the experience of state commissions, that fifteen dollars per mile would be sufficient to cover the engineering part of the work and ten dollars per mile the accounting and other features. This would aggregate for the entire 250,000 miles between six and seven million dollars.

If the experience of railroads be consulted an entirely different conclusion is reached. The cost, as reported to us, of valuations conducted by the carriers themselves runs from forty to eighty dollars per mile. It is true that in this work by the railways certain things are included which will not be done by the Commission, but to offset this most carriers have ascertained simply the cost of reproduction, with no reference to depreciation, and with but little accounting work. If our information is correct and if the government cannot do this work cheaper than the railroads themselves, it will cost at least fifty dollars a mile to complete the work. I told the appropriations committee of the House last July that from what I knew about the subject then I should not advise Congress to enter upon this undertaking unless it was ready to expend at least twelve millions, and another six months' reflection has not changed that opinion.

While, however, this is a large sum, and much more than Congress contemplated when the act itself was passed, it is the merest trifle compared to the enormous values involved. The capitalization of our railroads at the present time aggregates nearly twenty billions of dollars. It has been recently estimated that these securities at their present market value are worth from fourteen to fifteen billions. The cost of this work, therefore, cannot exceed from one-tenth to one-twentieth of one per cent of the value ascertained, a sum utterly insignificant in proportion to the magnitude of the thing dealt with.

Look at this from another standpoint. One purpose—to some minds the principal purpose—of this valuation is to determine the amount upon which the public should be required to pay a return to the owners of these public utilities. Assume that this valuation varies the amount upon which such return should be paid by only five per cent. Five per cent of twenty billions is one billion, and a return of six per cent upon one billion is sixty millions annually. The difference to either the public or the railroad may therefore well be, for every year, five times the entire cost of the valuation itself. Certainly there is nothing in the expense which should deter the people from demanding the prosecution and completion of this undertaking in a thorough and competent fashion.

THE BENEFIT.

What, finally, is the purpose of and the benefit to be derived from all this outlay of money and of energy? There are many advantages, some of which I shall refer to without thereby intending to minimize the others. And first let me call your attention to the incidental benefit to the investing public.

Many persons seem to hold the opinion that the government in dealing with monopolies like the railroad owes nothing to the investing public. *Caveat emptor*—let the buyer take care of himself—such has never been my own thought. The investor is a necessary part of the well-balanced state, and is often in need of protection from public authority. It is the duty of the government within reasonable limits to see to it that the would-be investor is not hoodwinked in the making of his investment and that the value of his investment, when once made, is not improperly destroyed.

In railway investment the public has a more immediate interest. Just in proportion as railway securities commend themselves to the investing public it is possible for the railway to obtain the money with which to make necessary improvements

to its property. Whatever benefits the credit of our railways; whatever gives to railway securities the investment quality with bank stocks and municipal bonds; whatever, in a word, takes from railroad stocks the speculative and uncertain element, indirectly reduces the cost of furnishing railway service and thereby inures to the benefit of the general public.

Now when any investor can know from reliable sources the exact character of his investment; how much it would cost to reproduce the property; in what state of efficiency that property is being maintained; above all, what is the value of that property for use as a railroad, there has been injected into railroad securities an element of certainty and of permanency which does not now exist. It seems to me therefore that this work of valuation will be of incidental benefit to the railway investor and so to the general public. While this has not been generally, perhaps not at all remarked upon as an advantage, it will turn out to be a substantial one.

To the general apprehension the object of this valuation is to determine what rates our railways should be allowed to charge for their services to the public. While the property invested in our railroads and other public utilities is private property, the government has, in consideration of the nature of the service rendered, the right to impose upon this property the terms and conditions under which it shall be used. It may, in the case of a railroad, determine the character of its equipment, the schedules upon which its trains shall run, and in general may control the operation of the property in so far as the public has an interest therein. It may fix the rates to be charged by that railroad for the transportation of persons and of property and for any other service which it renders to the public. To this power of the government over such private property there is this important qualification: Under the constitution of the United States, as interpreted by the supreme court of the United States, such property must be allowed a fair return upon the fair value of the investment.

What is a fair rate of return depends, probably, to some extent upon the character of the property and its location. The relative functions of the legislative and judicial branches in the fixing of that rate are not yet clearly defined. All just men concede that it should be substantially the same as the return obtainable from private investment having the same incidents. Manifestly it is not a difficult thing to determine the rate of return to which this property is entitled. There still remains, however, the value upon which this rate is to be computed, and until that value is known it is impossible to determine what total income the property is entitled to earn and, therefore, to fix the charge which may be justly made against the public.

The rates of public utilities are at the present day usually fixed by commissions, both state and federal. It is perhaps the natural inference that when the value of the property has been determined and the rate of return fixed the work of the commission in establishing the charge of the public utility is comparatively easy. It is only necessary to multiply the value by the rate and to allow a charge which will yield that income.

And this, with some important qualifications, is true as to certain kinds of public utilities. Take, for instance, a water plant or a gas plant. This serves a single community. As a rule it meets no competition in that service. The amount of its business is known or can be forecast with reasonable accuracy. Even matters of depreciation and such like have come to be pretty accurately understood. It is possible, therefore, to fix with some confidence the rates of such a utility when the value of the investment is known.

With the railroad, however, this is entirely different, for the reason that it seldom happens that a single railroad can be considered by itself. The greater part of the business of the railways of the United States is subject to competitive conditions of one sort and another which are largely controlling, so that the rates of one are necessarily bound up with those of another. A moment's thought will show the extent to which this is true.

Nearly every station at which considerable quantities of traffic originate or are delivered is served by more than one railroad. It is possible, for example, under present switching absorption tariffs in force at the city of Chicago to reach any point within the switching limits of that city at the same rate by any line which reaches the city. The same is in substance true of the city of New York and the great industrial district of which New York is the center. It is also true that while two given points may each be served by but two railways a great variety of routes between those points can be found by choosing different intermediate carriers. For example, lumber from almost any point of production in the south can reach Chicago by a variety of routes through the various Ohio River gateways. Now while it may occasionally happen that the rate by one route is different from that of another, broadly speaking the rate by competing rail lines is the same. Whatever charge is made by one line between New York and Chicago must be made by all; whatever charge is imposed for hauling lumber to Chicago by one route must be the same by all competing routes.

Nor is direct competition of this kind the only competitive force of controlling influence. An examination of conditions in almost any agricultural state like Iowa, for example, will show that the farm upon which the corn or the wheat is grown lies midway between two lines of railroad, so that the product of the same can be sent to market by two, and often by three, different carriers. Manifestly the rate made by each of these carriers for the transportation of this farm produce must be substantially the same. If the farm of Mr. A is five miles from the Northwestern and the same distance from the Rock Island, the rate of transportation under which his wheat and corn and live stock can reach Chicago must be the same by both lines, and the financial necessities of either line are not of the slightest significance. This kind of competition, which is sometimes denominated by railroad men "cross-country competition," powerfully influences and often absolutely controls the rates upon certain commodities which furnish large amounts of traffic.

Still further, it often happens that where the service is purely local and can be rendered by only one railroad, still the rate which must be applied is dictated by competitive conditions. A coal mine may be served by a single carrier, but that carrier cannot therefore impose whatever rate it sees fit upon the product of that mine, for, unless the charge to the point of consummation is as favorable as that from some competing mine by some other carrier, the mine itself cannot do business and the railway loses the traffic. This sort of competition is of universal application and of tremendous influence.

Without further pursuing this subject, which of itself is a broad one, it will be seen that the railroads of this country are so bound up together that their rates are largely interdependent. It is impossible to shake a single railroad free from every other and fix its charges upon the basis of a fair return upon its fair value as you would in case of a gas or water plant. The rate established for one, of necessity influences and frequently absolutely determines the rate of all, a fact which must never be forgotten in discussing this subject.

Now it is evident that if the Commission should select that road most advantageously situated, that road the business of which is the largest and upon which the conditions of operation are the most favorable, and should so adjust its rates as to yield a return of six per cent upon its value, every other railroad standing in competition with it would receive less than a six per cent return and some railroads might receive nothing whatever. The schedules under which one carrier would earn a fair return upon its investment might not even pay the operating expenses of its competitor. Upon the other hand, if that road laboring under the greatest disadvantage were to be selected and such rates established as would permit it to make a return of six per cent upon its investment, its competitors would one and all be receiving an undue return upon their investment.

A certain amount of traffic is strictly non-competitive. What proportion this may bear to the whole I have no idea; the percentage would be small. Theoretically it might be possible for railroads to take up the slack, so to speak, between what would be a fair rate for one and that for another by an adjustment of rates upon this local business. In the Minnesota Rate Case and cognate cases, recently decided by the supreme court, it was held that while the principal railroad systems involved had not established confiscation and must therefore submit to the rates prescribed, certain roads of minor importance had made out their case. These lines, in so far as they could, were allowed to charge higher local rates than the others.

The effect of this would be to establish extremely high local charges upon certain lines and extremely low local charges upon others. Upon main lines and upon lines of dense traffic, rates would be low; upon branch lines and those with less traffic, charges would be high. The general effect would be to concentrate business into certain localities, whereas it has always seemed to me that the aim should be to so adjust transportation charges as to secure a general diffusion of values and of business. If this government operated its railways rates would be generally the same upon all lines in given sections.

While, however, I wish to make it perfectly plain that the problem of establishing railway rates will not be solved by this valuation, I desire to say with even greater emphasis that that problem will be enormously simplified. It can be known with certainty whether the general level of rates is or is not too high, and in establishing the charges to be observed by a single carrier, even in fixing the rate upon a single commodity, it will be of much benefit to know the value of the property involved. Every railroad commissioner will join with me in saying that here is the only solid foundation upon which he can stand; that the determination of these values is indispensable to the just and intelligent administration of his work.

While this valuation will be of incidental benefit to the investor, while it is essential to the work of the rate-making tribunal, it seems to me that its greatest immediate value is political. The state of the public mind toward our railways is such that this information is absolutely necessary.

Some years ago the Commission had occasion to examine the reasonableness of rates to points upon the Pecos Valley line of the Santa Fe System. The railroad under consideration runs from Amarillo, Texas, into and through what was then the territory of New Mexico. That part of the line in Texas had been constructed under a Texas charter, and therefore in conformity with the Texas stock-and-bond law, under which the capitalization could not exceed the investment in the property. The railroad in New Mexico had been built under a charter from that territory without any limitation upon the amount of securities which could be issued. The cost of the road was substantially the same in Texas and New Mexico—perhaps slightly greater in New Mexico. The capitalization of the Texas company was \$8000 per mile; that of the New Mexico company \$42,000 per mile.

This is a somewhat striking instance of what has happened at certain times in certain parts of this country in the building and capitalizing of our railroads. From what is known of such operations there has come to be a deep-seated conviction in the minds of many people that our railroads as a whole are enormously over-capitalized and that the public is paying interest and dividends upon securities which represent no actual value.

Upon the other hand, it appeared in the Eastern rate advance case, decided in 1910, that the Pennsylvania R. R. had in the ten years preceding that investigation put into its properties east of Pittsburgh more than 200 million dollars from earnings, which, therefore, was not represented in the capital account of that company. It is well known that many other railroads have improved their property out of earnings without any corresponding increase in their capital accounts. This leads many to the

conviction that while individual railroads may be over-capitalized our railroads as a whole are worth more than their stocks and bonds.

Consider the developments of the investigation into the affairs of the St. Louis & San Francisco system, conducted by the Interstate Commerce Commission. Consider conditions in New England to-day, where the fate both of the Boston & Maine and the New Haven systems is trembling in the balance. None of

these questions can be answered; none of these situations can be justly dealt with until we know the actual value of these properties. This is the question which arises before the student of this railway problem at every angle. This is the question which must be answered before this problem can be intelligently discussed. For this reason, above all, it is important that this work should be pressed to a completion in the most expeditious and the most trustworthy manner possible.

Steaming Process for Ties and Timber

Digest of information secured by the committee on miscellaneous subjects, American Wood Preservers' Association; chairman, J. H. Waterman, superintendent timber preservation, C. B. & Q. R. R., Galesburg, Ill. Extracted from report presented at the annual meeting, New Orleans, La., Jan. 21, 1914.

In order to arrive at some conclusion as to the prevailing American methods and to enable the committee to base its report upon facts and not theories, a series of questions was prepared and sent to each of 94 wood-preserving plants in the United States and Canada. These questions were to be answered by the men in actual charge of the operation of the plants. Although only about one-third replied to the circular letter, yet a majority of these came from the foremost and best equipped timber treating plants in America, and the committee is thus enabled to present a report which it believes is practically as complete and reliable as if answers had been received from all of them.

DISCUSSION OF REPLIES TO QUESTIONS.

The answers to the various questions have been reviewed and, in the following, a resume and summary of the general tenor of the answer is given:

Question 1: Is your plant equipped to steam ties and timbers?

All replied in the affirmative with the exception of four plants. Two of these report that their plants treat paving blocks only and their method does not require steaming; and the other two plants, situated on the Pacific coast, treat ties and timbers by the "boiling in oil process" exclusively, which takes the place of steaming.

The proceedings of the Wood Preservers' Association indicate that 31 plants in the United States and Canada are equipped to treat by process "B" (preliminary steaming-vacuum pressure), while 13 plants are equipped to treat by process "C" (boiling in creosote oil). As the boiling in oil practically performs the same functions as steaming, no equipment is required to perform the latter. Of the remaining 50 plants, perhaps, one-third to one-half are equipped in some crude fashion to steam material whenever occasion demands. Broadly speaking, about three-fourths of the treating plants in America are more or less completely equipped for steaming material prior to impregnation.

Question 2: How is the steam introduced into the retort? Kindly furnish rough sketch of piping arrangement with size of piping and openings.

Replies to this question indicate various ways of introducing steam into the retorts. Several plants are scientifically equipped for steaming, while a large proportion of them are imperfectly equipped. Among the latter we observe that the arrangement is simply a pipe, two to three inches in diameter, conveying the steam from the boiler and connected with the retort at or near the middle of the same, as illustrated in Fig. 1, accompanying.

Some plants introduce the steam in a similar manner, through the lower dome.

Considerable improvement has been made on these primitive methods of introducing the steam into the retorts. This was

accomplished by feeding the retort with steam through several inlets. Figure 2 illustrates one of these methods. The retort is 165 feet long by 9 ft. 6 ins. in diameter and is equipped for the treatment of material by the steaming process. The connections to the retort are so arranged that both live and superheated steam may be used. Steam is introduced into the retort from the bottom, through eight 2-in. connections. The retort is also equipped with two additional 2-in. pipe connections, which enter the retort at center of bottom and which are connected to perforated pipes within.

Another method of introducing steam into the retort which seems to meet with favor, is by means of an inlet near the middle, the steam being distributed in the retort through perforated pipes lying in the bottom and extending the full length of the retorts as illustrated by Fig. 3, or by means of two inlets, one at each quarter length of the retort, the steam being distributed also through perforated pipes, as illustrated by Fig. 4. Where the Card process (creosote oil and chloride of zinc solution) is used these perforated pipes are made to serve a double purpose: that of distributing steam in the retort and in connection with centrifugal pumps keep the two preservatives in agitation while being injected into the wood. In the case of Fig. 4, the perforated pipe is laid with the perforations downward, in other words, the pipe is perforated only on the lower side so that the steam is not thrown directly on the ties or timbers.

The number of inlets and sizes of steam pipes is obviously governed by the diameter and length of the retorts and the function which they have to perform, so that each case must be considered by itself in designing the equipment. Either the second or third methods above described may be successfully employed, whether the Card process is used or not, or whether the steaming is done in the impregnating retorts or, as in the Goltra process, in separate steaming cylinders. The principle is the same in both of them, that is, the distribution of the steam in the retort is accomplished by means of perforated pipes in the bottom of the cylinders. We object to the fourth method for the reason that it cuts holes in the cylinders.

Question 3: (a) Do you consider steaming ties to be injurious to the fibre? (b) Do you consider steaming timber to be injurious to the fibre?

It is the unanimous opinion of all those who reported and whose plants are equipped to steam ties and timbers, that it is not injurious to the fibre of the wood if properly done. Steaming of ties and timbers is an art which can only be learned by practice and experience. It is effectual on both hardwoods and softwoods. Some timbers can only with the greatest difficulty be impregnated by the aid of steam; without not at all.

No iron clad rule or specification for steaming can be drawn to cover the handling of every timber condition in every part of the country. Only careful observation and experience coupled with good judgment will meet each and every case. Experiments under varying conditions indicate that ties, timbers, piling, etc., may be steamed at 20 pounds gage pressure for as much as four hours without material depreciation of strength.

Question 4. What is the maximum limit of temperature at which live steam should be introduced?

The consensus of opinion is that the maximum temperature should not exceed 258 degrees Fahr., equivalent to twenty pounds of steam gage pressure. Several fix the maximum at 300 degrees Fahr., equivalent to nearly 50 pounds of steam pressure. One operator reports that steam is introduced at 45 pounds, or 292 degrees Fahr., and maintained for one hour, then thirty pounds or 274 degrees during the second hour, and 20 pounds, or 258 degrees Fahr., until the operation is completed.

The condition of the material, whether green or semi-seasoned, apparently influences the degree of temperature applied. One plant fixes the maximum temperature at 300 degrees for green or wet material and 250 degrees for ordinary conditions. The character and condition of the wood must be taken into consideration in determining the pressure or temperature that will produce the best results.

The efficiency of the operation is largely a matter of judgment with the further aid of actual tests when put through the process.

Question 5. For an ordinary condition of wood, please state the number of hours a maximum temperature of — degrees should be maintained; the number of hours minimum temperature of — degrees should be maintained?

The duration of steaming depends upon several factors, such as, character, size, and condition of wood, also upon the season of the year. The object of steaming is to secure the maximum penetration with the desired amount of preservative.

Piling and heavy dimension timbers usually require longer period of steaming than cross ties, again hardwoods require more steaming than softwoods. The minimum duration reported is one hour, and the maximum 15 hours; the minimum temperature being 225 degrees Fahr., and the maximum 300 degrees Fahr.

Usually the operator can judge very closely when the timber juices are exhausted. The duration of the steaming process should be continued until the heat has penetrated the interior of the timber. No definite rule can be given; it must be left to the judgment of the operator. The color of the drainage

affords an index to the progress of the penetration of the steam in the wood. At first the condensation runs off fairly clear and colorless, but later it gets much darker and discolored and has a peculiar woody smell from the extracts dissolved. Steaming is continued until this stage is passed and the condensation again runs clear and colorless, showing that the saps have been dissolved, and withdrawn to the fullest extent possible. An experienced operator can judge very closely when the timber juices are exhausted and avoid wasteful continuance of steaming. With most timbers three to four hours, with varying degrees of temperature to suit conditions, is sufficient.

Question 6: Kindly estimate what it costs to steam, per tie and per cubic foot of timber?

The cost for steaming ties and timbers depends upon the cost of fuel and the duration of the operation. The estimates range from $\frac{1}{4}$ cent to three cents each for cross ties and 50 cents to 90 cents per 1000 feet b.m. for lumber and large timbers. However, a majority of those who have replied to this question estimate the cost as follows:

Cross ties containing approximately three cubic feet of wood, $\frac{3}{4}$ to 1 cent each.

Lumber, 50 to 75 cents per 1000 ft. b.m.

Large dimensions timbers, piling, 60 to 90 cents per 1000 ft. b.m.

These estimates do not include any overhead charges, depreciation, labor, etc., but fuel only, and that costing \$2.00 per ton, delivered at the plant.

Apparently it costs more per cubic foot to steam large dimension timbers, piling and even lumber than it does for cross ties.

Conclusions and Recommendations.

Summing up the advantages of steaming, the committee submits the following conclusions and recommendations:

1. All efficient plants should be equipped to steam material when occasion requires and the best method of introducing and distributing steam in the retort or cylinder, is by means of perforated pipes.

2. Steaming of ties, timber, and lumber is apparently not injurious to the wood, if the work is conducted intelligently and within certain limits of temperature and duration.

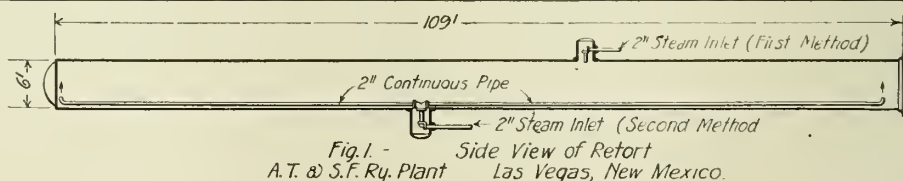


Fig. 2. - Top View, Lower Half of Retort.
International Creosoting & Construction Co. Plant, Texarkana, Ark.

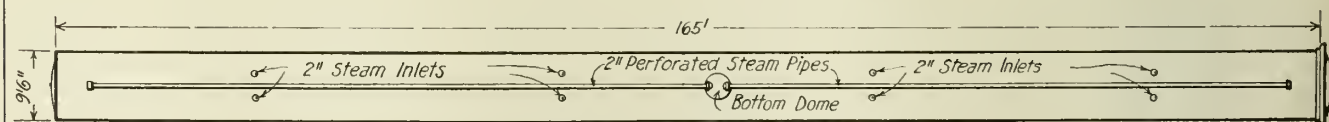


Fig. 3. - Side View of Retort.
C.B. & Q.R.R. Plant - Galesburg, Illinois.

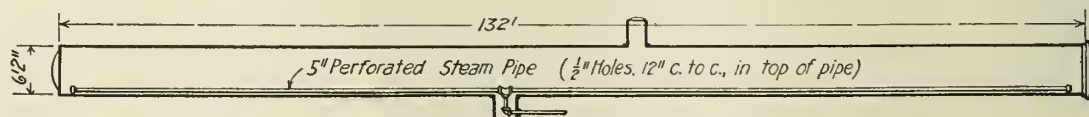
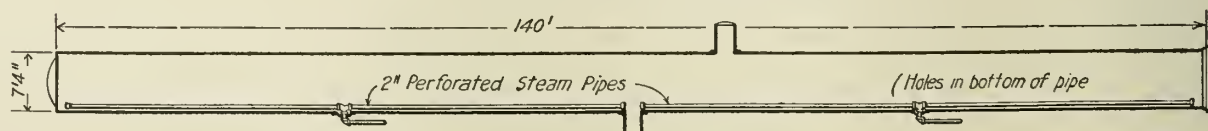


Fig. 4. - Side View of Retort.
C.R.R. of N.J. - P.&R. Ry. Plant, Port Reading, New Jersey.



Piping Systems, Steaming Process for Ties and Timbers.

3. It is difficult to inject any considerable quantity of preservative into green ties and timbers unless given a preliminary steaming or boiling in oil. One of the principal factors influencing the absorption of any kind of preservative is the moisture content of the wood—the drier the wood, the more it will absorb, consequently, the more thorough the treatment.

4. The object of steaming is to put the wood in a condition to secure the maximum penetration with the desired amount of preservative and admits of the immediate treatment of green or fresh cut material.

5. Theoretically, steaming of green material preliminary to air seasoning should materially reduce the period of air seasoning.

6. A maximum steam temperature of 280 degrees Fahr. should not be exceeded. The maximum steam temperature of 280 degrees Fahr. should not be maintained for a longer period than three hours. The maximum temperature of the steam should be reduced after a period of three hours, to not more than 250 degrees Fahr., and maintained at this temperature, or less, for the remainder of the steaming period.

7. Under like conditions, chloride of zinc will penetrate the wood considerably more readily than creosote oil.

8. During the process of steaming a considerable amount of condensed steam remains in the wood which to some extent resists the entrance of the fluid. The liberating of this condensation, after steaming, may be accomplished by subsequent drying in open air or in drying ovens.

9. Inasmuch as it has been claimed to have been demonstrated in actual practice that lumber given a preliminary steaming, seasons in open air or in drying kilns in one-third less time than is required when not steamed, therefore, we recommend that the Forest Service and members of the association make tests and experiments during the current year to determine what influence steaming ties and timbers has on the rate of seasoning when subsequently piled in open air or dried in drying ovens, keeping a careful record of details of the effects produced by preliminary steaming, and cost of same; also conduct simultaneously a series of tests without preliminary steaming for purpose of comparison.

Freight Train Handling

Slack Action and Break-in Twos

BY F. B. FARMER.

The following is adapted from a paper read at a meeting of the Western Railway Club on January 20, 1914. The paper partook mainly of the nature of a code of instructions for trainmen, including both engineers and conductors, concerning the methods of handling long and complicated trains to best advantage. Accompanying the paper were two blank forms, reproduced herewith, illustrating the means employed on certain roads whereby to secure detailed information relative to breaking-in-two of freight trains so that systematic effort can be made seeking to prevent the recurrence of such accidents. Roads employing this method are able to report very appreciable benefits both through being enabled to attack this problem intelligently and through the moral effect it has on the train crews who are required to make out the reports.

The secret of smooth train handling lies in ability to control the slack by preventing it from running in or out harshly. Where properly controlled no draft gear in fair to good condition need be damaged. Slack action cannot be prevented, but by engineers acquiring knowledge of the various causes for it and exercising forethought in the use of steam, train brakes, independent engine brakes, and sand, it can generally be controlled, even to the extent of avoiding further injury to damaged draft gear. The heavier the locomotive and the longer the train the greater is the care required. In train handling harsh running out of slack is the usual trouble, proven by the fact that about 40 per cent of all break-in-twos occur within ten cars of the engine. Slack is run out by the use of steam as well as of the brakes.

Comparative records of engineers and conductors in the same class of service, where all must at times have trains requiring more than usual care to avoid draft gear damage, prove that much of the damage which some experience can be avoided. To effect and maintain an improvement the co-operation of all concerned, including switchmen and car men, is required. Intelligent observance of the following factors will aid greatly:

Time: Slack cannot be changed both *gently* and *quickly*; therefore, it is imperative to "make haste slowly" when steam, grade or brake action is changing the slack, either in stopping or starting trains. That is, where any one of these is changing the slack, ample time must be allowed for the change to be com-

pleted before doing anything that would hasten it. Also, the engineer should not endeavor to start until the gage indicates sufficient brake pipe pressure to give reasonable assurance that all brakes are released.

As one illustration, when releasing the train brakes while running, the engineer should not commence to use steam until certain the slack has had ample time to run out, and even then its use should be started gradually. Another is where, when running forward, steam is shut off and brakes are applied; ample time must be allowed for the slack to run in before applying the brakes. Even then a slight reduction must be made if the speed is low. The following is an example of insufficient time and results. Where a long train has just been started, and while the engine is working heavily, if steam is shut off suddenly and a heavy service application is made at once, there is liability of driving in couplers or even of "jack-knifing" any weak car near or ahead of the middle of the train.

Slack Control: There are two kinds of slack, loose slack and spring slack. They work together. Loose slack is that which can be run in or out without compressing the draft gear springs. It merely *permits* of shocks. Spring slack is the *additional* amount that can be had, in or out, when these springs are compressed, and which helps to *drive* the slack in the opposite direction and thereby increase the shocks. The first of the following illustrations gives an example of this draft gear spring action. These springs are compressed with slack either *in* or *out* heavily, and at such times their action must be considered as well as that of steam, the brakes or the track.

With no slack and good draft rigging trains could not be broken in two. The same can be said with slack either all in or all out and held so. The damage arises from its sudden change. When slack runs in or out rapidly one part of the train gradually attains a lower speed than the other and the shock is the result of the draft rigging having to suddenly make the speed uniform on the instant the slack is all in or out. How heavy the shock will be depends mainly on the difference in speed that must instantly be made uniform and on the weight that must suddenly be altered in speed. Weight is important, as with a heavy locomotive or loaded cars, but change in speed is more so, as changing it suddenly three miles per hour will

RAILROAD				
Engineer's Break-in-Two Report				
Train	Direction	Date	Eng. No.	Condr.
Total Cars Coupled Loads		Empties	Number Empties behind Loads	
Time	Delay Hrs.	Min.	Nearest mile post or station (Give branch letter)	
Was train Starting, Stopping, Running, Backing, Switching				
If Starting was slack taken? How?				
Was steam being used? Light Heavy Speed at break-in-two				
Were brakes being released? If so, at what speed?				
Were engine or train brakes being used? Speed when shutting off?				
How long before brakes applied Am't. first red'n Speed then				
Am't. final reduction How far from stop Total reduced just before final reduction				
(Note: Where engine brakes, independent or straight-air used, give brake cylinder pressure where reduction asked for.)				
Any previous severe shocks? Where? Cause?				
No. of cars from engine where break occurred?				
State fully your reason for break-in-two:				
Engineer				
Make reports in duplicate and mail original to Traveling Engineer and duplicate to Train Master				

Form of Engineer's Train Break-In-Two Report.

cause nine times the shock than will a similar quick change of one mile per hour.

To illustrate, suppose that on an ascending grade, steep enough to alone start the cars back, a long train were stopped with the engine brake only, fully applied as the speed became low and held on after stopping. The compressed draft gear springs would help the grade to start the rear end back and when all slack had run out the rear half of the train could easily be moving at three or four miles per hour. If the engine brakes could be released on the instant all slack had run out, the jerk necessary to instantly bring the standing engine to a speed of three or four miles per hour would be more than the draft rigging could stand, yet it would be worse if the engine brakes were applied.

Had the engine braking power been gradually reduced as speed became low and entirely released shortly before the stop was completed, the compressed draft gear springs would have gradually run out the slack. Then the grade would have started the entire train back with little or no slack action and a light application of either the train or the engine brakes would have stopped it without damage.

Again, assume a long train, having empties behind loads and stopped with the train brakes on a level grade, from a speed of 25 miles per hour; that the first reduction and leakage had reduced the speed to six miles per hour; and that at this time, when the brakes on the empties had the slack pulled out heavily a further reduction of, say, seven pounds were made. The head brakes would feel it first and start the slack in. Just as this would stop the loads from pulling on the empties, the latter would feel the reduction. At low speed, brake shoe friction is high. Hence, the empties would "anchor", and by the time they had run out the slack, the majority of the train would be three or four miles per hour lower in speed than the engine, meaning that the latter must instantly be reduced in speed that much. Draft rigging could not stand this and a break-in-two would follow.

Had no reduction been made at six miles per hour, the slack would not have changed except to draw out a little more. It could not run out as the only additional slack possible would require more compression of the draft gear springs. These are compressed with slack pulled out as well as when it is pushed in. Hence, there could be no bad jerk, merely a hard pull and, possibly, a light jerk. But even this would be avoided if, when within 40 feet of stopped, an additional reduction of six or seven pounds were made. The forward brakes would feel it first and would start the slack in, but the train would be stopped before the rear brakes could respond to this reduction and run the slack out again.

Yet another illustration: assume the same train being backed at low speed, engine working heavily, draft gear springs thereby compressed; then, that steam were shut off and, say, a service reduction of eight lbs. were made. The brakes on and near the engine would feel it first and start the slack out, the coupler spring would help to run it out faster and by the time it was all out there would be a similar difference of three or four miles per hour in speed between the ends of the train. While the shock would be severe, possibly enough to cause damage, it would be less than with the loads at the rear and even then much below that in the fore part of the previous illustration because of the lesser weight to be suddenly reduced in speed.

If, when backing, steam had been used somewhat lighter at first, then heavier from the time the brake application was begun, if the reduction had been but six lbs., and if the engine brake had been prevented from applying, no serious shock would have occurred at the rear end because the lighter reduction would have had less effect. The heavier use of steam then, and the preventing of the engine brakes applying would have largely offset the effect of the earlier response of the head brakes as compared with those at the rear.

With sufficient time, another method would produce equally good results. That is, shutting off steam, waiting for the compressed coupler springs to drift out the slack, applying the en-

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Conductor's Break-in-Two Report																																																														
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Form for Conductor's Train Break-In-Two Report.

gine brakes lightly to stretch the slack further, and then making the reduction of six lbs. and at the same time releasing the engine brakes. However, this would take more time than is generally had, is a more complicated procedure and therefore the other method is better.

The foregoing illustrations of the wrong and the right methods of handling trains demonstrate that the main cause for damaging shocks in train handling is slack action, and that it can be controlled. While showing that the use of steam can help to prevent harsh slack action, by opposing the tendency of the brake action to change it, it is plain that if used in the same direction as the brakes tend to run it, the slack will be increased. It should be borne in mind, though, that if the slack is either in or out heavily, any brake action that tends to run it in the *same* direction cannot cause any severe shock; therefore, that, when running ahead, slack *in* is generally more favorable for applying brakes, as slack *out* is for releasing. The foregoing illustrations will almost invariably enable any engineer, who has the knowledge he is supposed to have and who exercises judgment and forethought, to avoid damaging shocks from slack action.

Decision on Fabrication-in-Transit Charges.

The Interstate Commerce Commission undertook, on Nov. 5, 1913, an investigation into the propriety of increased charges at certain points in Central Freight Association territory for the service of stopping shipments of structural steel to be fabricated in transit, and of changes in the rules governing transit. These changes were proposed in tariffs published by railroads of the central states and affected transit privileges at the following points: Allegheny, Claysville, Rankin, Greenville, Economy, Morado, Rochester, Canonsburg, and Carnegie, Pa.; Canton, Cleveland, Toledo, Martins Ferry, Mount Vernon, Cincinnati, Bellefontaine, Elmwood, Kenton, Bedford, Cleveland Pier, Euclid Avenue, Wason Street, Woodland Avenue, Massillon, Brookville, Columbus and Ivorydale, Ohio; Buffalo, N. Y.; Wheeling, W. Va.; Detroit, Mich.; Indianapolis, Muncie, Columbus, La Fayette, Newcastle, Rochester, Elkhart, Winamac, and Attica, Ind.; Chicago, Bloomington, and Washington Heights, Ill. At all of these points the charge for fabrication in transit service was 1½ cents per 100 pounds, which it was proposed to raise to 2½ cents per 100 pounds. While in some instances no further change was contemplated in the tariffs under suspension, in others it was proposed to change the rules governing the transit service.

Protests were filed by a number of fabricating firms, and the American Bridge Co. was allowed to intervene. The new tariffs were suspended, first to Sept. 12, 1913, and by subsequent order to March 12, 1914. The commission has now handed down its decision refusing the proposed increases. It holds as follows:

"1. Cost figures submitted by respondents as corrected do not justify the proposed increase in the charge for the fabrication-in-transit service. Rate comparisons show that the increase can not be permitted to become effective if a substantial rate equality—one of the chief purposes of transit—at fabricating points is to be maintained. Rather than permit a variance in the charge for the stoppage in transit at the many fabricating points, the additional expense incident to the service, if not at present adequately covered, may be reflected in the general level of rates on the article which enjoys the service. Respondents required to cancel the tariffs under suspension and to maintain for the statutory period the present charge of 1½ cents per 100 pounds.

"2. Under section 6 of the act it is unlawful for a common carrier to allow substitution without clearly specifying in its tariffs the right to substitute.

"3. Taken collectively, the rate, the transit service specified, and the regulations governing it are a unit, representing definite duties and obligations.

"4. Under the circumstances of this case respondents should change their transit rules and regulations so as to specifically provide for substitution of material drawn from the lines of different carriers and different territories, and should provide for proper accounting, and the cancellation of inbound billing to cover outbound shipments, local consumption, waste, or shrinkage; frequent checking of unfabricated and fabricated material with billing in hand; and the cancellation of billing in excess of the fabricated and unfabricated material on hand, requiring the use of the oldest billing for that purpose.

"5. Respondents' tariff should be uniform in their provisions with regard to substitution.

"6. The list of articles upon which fabrication in transit is permitted should include all articles that are necessary for the fabrication of sections of bridges and buildings, and should be made uniform in respondents' tariffs.

"7. Uniformity should be established in the time limit within which to fabricate under the transit rate.

"8. The fundamental basis and chief justification of transit is the equalization of rates and the prevention of discriminations which could not otherwise be avoided."

New Pacific Dissolution Suit Filed.

The United States Department of Justice filed a suit in the federal court at Salt Lake City, February 11, under the Sherman law, seeking to break the Southern Pacific's control over the Central Pacific Ry. and its subsidiary Pacific coast state lines. Cancellation of the Southern Pacific's ninety-nine year lease and a perpetual injunction are asked. In addition to the two railroads other defendants named are the Union Trust Co. of New York (trustee for the Southern Pacific under a mortgage and holder of the stock for the Central Pacific), William Sproule, Julius Kruttschnitt, Robert Goelet, Cornelius N. Bliss, Walter P. Bliss, Henry W. De Forest, J. Horace Harding, Charles W. Harkness, Henry E. Huntington, James N. Jarvie, Ogden Mills and L. F. Loree. The petition bears the names of Attorney General McReynolds and J. W. Orr, the special assistant in the case, and alleges that the two roads are operated under the same management, that there is discrimination by them in favor of each other, against other and competitive roads, and that those conditions are in restraint of trade. It charges also that the alleged combination exists in violation of the so-called Pacific railroad laws, which it sets forth were designed by congress to secure a continuous, connected line from the Missouri river to the Pacific coast with equal advantages to all other roads. It is declared that the Southern Pacific and the Central Pacific are competitive lines; it is pointed out that the lines of the Central Pacific form a natural through connection at Ogden for the Union Pacific and that a restoration of competitive conditions would give the Union Pacific a through route for transcontinental traffic and for traffic to the Orient, by steamship connections at San Francisco. The decree asked for, the petition avers, would restore competition to portions of California, Arizona, New Mexico, Texas and Louisiana.

The intention of Attorney General McReynolds to bring such a suit has been a matter of common knowledge for some time. The action is taken contrary to the wishes and strong representations of Pacific Coast business interests. On the day previous to the filing of the suit the attorney general listened to arguments by the California delegation in congress and business men from San Francisco and Los

Angeles, urging non-interference with the present conditions.

Railway and Engineering Literature.

The annual review number of the "Railroad Red Book", published by the Denver & Rio Grande R. R., has made its appearance. It contains much information of value to persons interested materially or otherwise in the Rocky Mountain and Pacific Coast regions. A feature of the issue is the publication of telegrams sent by the editors of the leading dailies of Denver, Colorado Springs, Pueblo, Santa Fe, Salt Lake City, Ogden, Wells, Elko, Winnemucca, Sacramento, Oakland and San Francisco in answer to a request for information as to the business outlook in the near future. There is an optimistic ring to every one of the telegrams, and the consensus of opinion is that the outlook for 1914 is very encouraging. The governors of Colorado, Utah, New Mexico, Nevada and California, have contributed signed articles on the growth and development of their respective states during the year just passed.

* * *

The American Locomotive Co. has issued as Bulletin No. 1017 a discussion on Locomotive Ratios by F. J. Cole, chief consulting engineer of the company. Changes in the conditions under which locomotives operate have necessitated important deviations from the rules formerly followed in arriving at the proportions of locomotives, and in this bulletin there is given an explanation of the methods at present employed by the above company. Notable among the improvements are the changes which permit of assigning proper values to firebox, tube, arch tube, and combustion-chamber heating surfaces.

* * *

In bulletin No. 18A, dealing with National Reamed and Drifted Pipe, the National Tube Co. gives a complete description of this product, together with a short introduction explaining the process of well drilling, and information relative to the various accessories necessary for the drilling and pumping of wells. Copies of this bulletin may be had by addressing the company at its office in the Frick building, Pittsburgh.

* * *

The new catalog of the Cleveland Car Specialty Co., Cleveland, O., shows in detail the large variety of pressed steel carlines which that company is prepared to furnish, in addition to a variety of pressed steel end ties, end plates, spring planks for freight cars, and special shapes adaptable to passenger car construction.

* * *

Catalog 89, by the Watson-Stillman Co., New York, illustrates and describes the large variety of heating, chilling and die presses manufactured by that firm for use in such operation as require pressure and temperature combinations. These vary in size from hand presses of one ton capacity to power presses of 4000 tons capacity. A synopsis of each of the several other catalogs issued by the Watson-Stillman Co. is an interesting feature of the catalog in question.

* * *

The National Malleable Castings Co. has an electric furnace of the Heroult type in operation producing electric steel castings, at its works at Sharon, Pa. Steel produced by the electric furnace possesses certain characteristics and advantages to a degree not found in the ordinary processes, thus making it an excellent material for castings in which the highest degree of uniformity combined with great toughness, strength and ductility are requisite. The company has issued a pamphlet upon this subject.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The annual banquet of the Engineers' Society of Western Pennsylvania was held at the Hotel Schenley, Pittsburgh, Pa., the evening of February 6, with 725 at the tables. John Mapes Dodge, editor of St. Nicholas Magazine, acted as toastmaster. Major General Leonard S. Wood, chief of staff, United States army, was to have been the principal speaker,

but was kept in Washington by important army measures coming up in Congress. Rear Admiral S. A. Staunton, U. S. N.; President Alfred H. Smith, of the New York Central R. R., and Dr. S. A. Bolles, president of Haverford college, were among the speakers. Admiral Staunton devoted his talk exclusively to the development of the navy. President Smith paid tribute to the members of the society, praising their work in the development of the railroads of the world and of their activities in all branches of industrial progress. He deprecated the criticism of all railroads because of the sins of the few and said that next to agriculture the railroad had done more for the development of the nation than any other single factor. He inveighed against government ownership of utilities and said the experience of France in this respect should teach a lesson.

Dr. Bolles compared the new currency law with the original national bank enactment. He was doubtful if the several regional banks would be able to obtain as much gold as may be needed to afford relief when desired. The act, he said, was a distinct improvement over the Aldrich system. The ideal banking system, he declared, would exist only after the federal government took complete control of the central bank.

Among those at the speakers' table were: Alva C. Dinkey, president of the Carnegie Steel Co.; Congressman James Francis Burke; E. M. Herr, general manager of the Westinghouse Machine Co.; J. M. Dodge, Philadelphia; A. R. Raymer, president, the Engineers' Society; Colonel J. M. Schoonmaker, vice-president, Pittsburgh & Lake Erie R. R.

The program for the February session of the St. Louis Railway Club, Friday evening, February 13, in the auditorium on the eleventh floor of the American Hotel Annex, St. Louis, Mo., included an address by Slason Thompson, director of the Bureau of Railway News and Statistics, Chicago, on "Misinformation About American Railways."

At a meeting of the Canadian Society of Civil Engineers, in Montreal, Que., February 5, P. B. Motley, engineer of bridges, Canadian Pacific Ry., described the rebuilding of the old Canadian Pacific bridge over the St. Lawrence river, at Lachine, which was erected as a single-track structure in 1885, into a double-track bridge, without interference with traffic.

On February 9, Colonel J. M. Schoonmaker, vice-president of the Pittsburgh & Lake Erie R. R., and executive head of the company in Pittsburgh, Pa., had a quiet celebration with some of his staff, in observance of the 35th anniversary of the road's entry into Pittsburgh. It was 35 years ago, on February 9, that the first train from Youngstown to Pittsburgh pulled into the P. & L. E. depot at the south end of the Smithfield street bridge.

A veteran employees' association including all classes of service is being organized by men who have been in the employ of the Baltimore & Ohio system for 20 years or more. Branches have already been established in Baltimore with 279 members, and in Philadelphia with 369 members. An organization will soon be accomplished in Pittsburgh with 400 members; Brunswick, Md., 180; Cumberland, Md., 100; Newark, O., 100; Grafton, W. Va. 100; Wheeling, W. Va., 75; Chicago Junction, O., 125, and Garrett, Ind., 60. After these branches have been organized the association will be extended to the Baltimore & Ohio Southwestern, Cincinnati, Hamilton & Dayton and the Staten Island lines. Under the plan of organization thousands of employees will be eligible, while several hundred will have served the regulation time within a few years. The seniority rule will apply to the

credit of the members of the association, so that employees who have been in the railroad service for 20 years or more, but whose period of service began before the line became

affiliated with the Baltimore & Ohio, will enjoy the same privileges as those whose service has been entirely with the parent company.

The Railway Supply Man's Point of View

A Feast or a Famine.

A feast or a famine is something that is handed down to us from our pre-historic ancestors. With the savage, uncivilized races, it is always a feast or a famine. The reason for this is very apparent. The savage,—the untutored,—the uneducated,—the inexperienced, are naturally improvident. They make no plans for the future. They have a very little idea of time. It is a hand to mouth existence for them, and living from one day to the next. Very naturally from them we should expect just this mode of life. Feast one week and starve the next.

We should expect a gradual elimination of such a condition in the progress of the race. We are apt to feel in this twentieth century of ours that we have progressed a very long way even from the civilization of Greece and Rome, to say nothing of the barbaric days which preceded the semi-civilization of that period. But we are confronted today with the same old problem that has confronted the race since it left the trees to go into caves. Our commercial life is a very good illustration of the fact that the feast or famine is with us today as much as it ever has been. This is particularly true in our own special field,—that of the railway supply manufacturing business. Today it is a famine,—a year ago, a feast.

The savage becomes so accustomed to the conditions surrounding his life that he is able to gorge himself in a way that would kill a civilized man, and then endure starvation, and still live. He takes it as a matter of course. It is a part of his existence, and he makes no very special or strenuous efforts to avoid this condition;—makes no plans for the morrow;—lets the morrow take care of itself. If there is food in sight, he goes after it strenuously enough, but further than that all effort ceases. He makes not even feeble attempts toward making some arrangement whereby food can be supplied with tolerable regularity.

Perhaps we are not quite so badly off as this in the railway supply business, but we certainly spend a good deal more time, and thought and energy, in going after what business may be in sight than laying any plans for keeping business in sight with some little degree of regularity. It is true that the Railway Business Association has done some good work in this direction, but their limited membership is mighty good evidence that there are only a very small proportion of the thousand or more concerns who sell railroads who are at all vitally interested in the problem, and the majority are a good deal in the position of the uncivilized man who takes what comes as a matter of course. Until practically every railway supply manufacturer has been educated up to the necessity for co-operative action through affiliation with some association, feast or famine in the railway supply business is bound to continue.

There are of course some very good natural reasons for a feast or famine in a business such as we are engaged in. This is especially true in certain particular lines of the railway supply business. A purchase of railway equipment is determined of course very largely by the condition of railway earnings, and on this is dependent, of course, the borrowing power of the railroads,—their ability to get money for improvements. When conditions are such that one road is in a position where it has the money necessary for equipment, the chances are that other roads will be in the same position, which causes a heavier buying of equipment than at other times, meaning a feast for the railway supply manufacturer, and the reverse of these conditions naturally means a famine in the railway supply business.

It is a big question for the individual railway supply man as to what part he is going to take in eradicating this very evident evil, and as it is something greatly to his advantage to have the railroads buy with regularity, it would seem that more railway supply manufacturers would feel impressed with the necessity of doing something. It is a well established fact that a plant which can be run regularly is not only more profitable to the owner who has something to sell, but also more profitable to the man or company who buys the uniform output. It costs more money to turn out the finished material in a certain quantity in six months than it does in twelve months. Six months of feast and six months of famine for the railway supply manufacturer mean less profit for him and a higher cost to the railroad than the same quantity turned out evenly during a period of twelve months.

What's going to be done about it? From the railway supply man's point of view, something ought to be done, he is the one that is directly affected by the "Feast or the Famine."

Railway Service as a Training School for Railway Business—VI.

J. R. CARDWELL.

In connection with the photograph of Mr. J. R. Cardwell, which is reproduced herewith, just a word about his career, for we are more interested in telling what a man is than in the tabulating of dates. Mr. Cardwell graduated from the



J. R. Cardwell.

Manual Training School of the Washington University in 1893. He worked as car inspector, car foreman and master car builder for the American Cotton Oil Co. until 1905, at which time he developed the Cardwell friction draft gear. He organized the Cardwell Manufacturing Co., and became its president, which position he still holds. In 1909 the Union

Draft Gear Co. was organized, and he has been the president of that corporation since its organization.

Mr. Cardwell is a man with a host of friends because of his genuineness. His personality is such that he has gathered around him an organization that in their loyalty is just as deeply interested in the success of the Cardwell friction draft gear as the man who invented it.

Mr. Cardwell became interested in the draft gear problem because in his every day occupation he was brought constantly face to face with the growing necessity for doing something to protect cars from damage. It was out of the desire to afford proper protection to cars that the Cardwell friction draft gear was evolved. The Cardwell gear has won its way because of its recognized superiority. It has been one of those things which has been successful because of the intrinsic merit which it possesses.

Journal of the American Society Mechanical Engineers.

The Journal of the American Society of Mechanical Engineers beginning with the issue for Jan 1, 1914, appears in an enlarged form. The page will hereafter be 9 by 12 inches in size and the magazine is characterized by an increased quantity and a revised arrangement of the material presented. It is proposed hereafter to avoid the duplicate publication of papers and discussions first in the Journal and later in the transactions, by presenting the transactions in the pages of the Journal itself. Under the new plan, papers for the annual and spring meetings are to be printed in pamphlet form, complete, in advance of the meeting, but not published in the Journal except in abstract, prior to the meeting. Copies of the complete papers, in pamphlet form on any subject however, will be sent gratis to members desiring them in advance and the meetings, on request. Papers and discussion will be published together in the issues of the Journal following the meetings at which they are presented.

Among other things, the department of foreign review will be considerably extended and there will also be added a department of review of the proceedings of engineering societies. As an example of what may be anticipated in further issues the January 1914 number contains a list

of something like 140 references on the subject of powdered coal and the various means of utilizing same. These date back as far as 1875. About half of them date prior to 1900 and are mainly from German sources. Since that date very live interest in the subject seems to have prevailed in this country as most of the later references are to articles which have appeared in the American standard technical journals. Railway mechanical engineers concerned with the problem of perfecting means whereby powdered coal can be utilized as locomotive fuel, will undoubtedly find here a complete catalog of all available information on the subject.

SUPPLY TRADE NOTES.

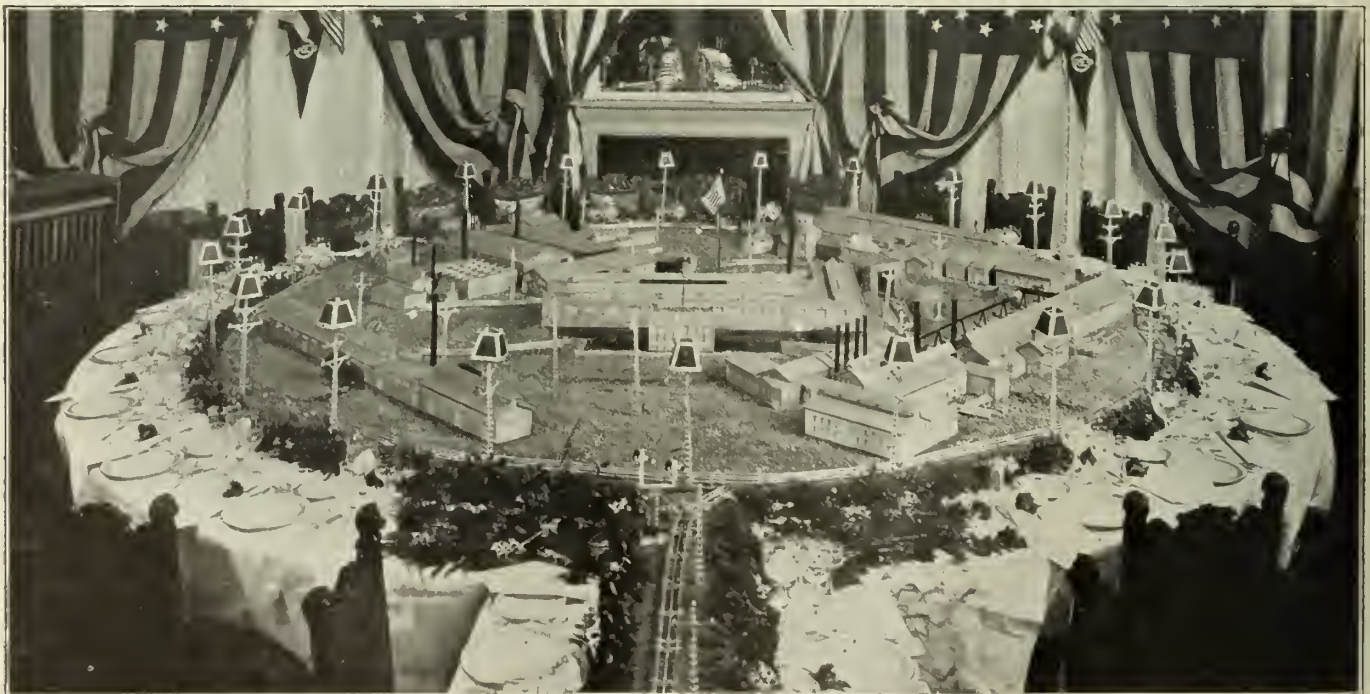
—The board of directors of the Eveland Engineering & Mfg. Co. 2324-26-28 Market street, Philadelphia, has authorized an increase in its capital stock from \$100,000 to \$2,000,000 for the purpose of extending its business of manufacturing machine tools, riveters, etc.

—The Des Moines Bridge & Iron Co. of Pittsburgh, Pa., has changed its name to the Pittsburgh-Des Moines Steel Co. This indicates no change in the policy of the organization.

—The report of the American Steel Foundries for the year ended December 31, 1913, shows net earnings of \$2,031,271, an increase of \$487,433 over 1912. The year's surplus after allowing for depreciation and other charges amounted to \$1,489,950, a gain of \$712,194.

—Charles A. Carscadin, who for several years was associated with the Globe Seamless Steel Tubes Co., has been elected president of the National Car Equipment Co. This company was recently organized with offices in the Railway Exchange, Chicago, and will handle car specialties. George A. Woodman, formerly of the Kirby Equipment Co., is general manager.

—The Ross-Wortham Company has been organized to sell railroad supplies and has opened offices in the McCormick building, Chicago. The new organization is made up as follows: George H. Ross, president, formerly executive vice-president of the Chicago & Alton, the Toledo, St. Louis & Western, the Minneapolis & St. Louis and the Iowa Cen-



Creco Annual Dinner, Union League Club, Chicago, Feb. 3, 1914.

tral; E. S. Wortham, vice-president, formerly manager of purchases and supplies of the Chicago & Alton; and Thomas H. Garland, car ventilating engineer, who is patentee and owner of the Garland car ventilating systems.

—A. C. Adams, formerly superintendent of motive power of the Spokane, Portland & Seattle Ry., Oregon Electric, and United railways, has taken service with the General Brake Shoe & Supply Co., of Chicago, as their Pacific Coast general agent, office and headquarters, 907-908 Wilcox building, Portland, Ore.

RAILWAY NEWS.

Atlantic Northern & Southern.—Judge Thomas Arthur of the district court at Atlantic, Iowa, on February 6, issued an order closing the receivership of the Atlantic, Northern & Southern railroad which has been in the courts for more than three years. The road is a little less than 100 miles in length and now is being operated partly by bondholders and the Atlantic Southern R. R.

Cape Girardeau Northern.—See Railway News under St. Louis & San Francisco R. R.

Chicago & North Western.—The Chicago & North Western Ry. has applied to the Illinois public utilities commission for permission to issue \$10,000,000 in equipment trust certificates and two issues of bonds, one for \$9,184,000 and the other for \$2,000,000.

Chicago, Milwaukee & St. Paul.—Regrading and bridging on 275 miles of the improvement work started by the Chicago, Milwaukee & St. Paul Ry. on its Chicago-Council Bluffs line in April of 1912 has been completed. Second track has been laid and is now in operation over 182 miles of the division—between Lost Nation and Elberon, and between Capron and Coon Rapids. That remaining to be done this year is between Green Island and Lost Nation, Elberon and Capron, and Coon Rapids and Manilla. The revision, in many instances, has taken the line away from old town sites, or transferred it from one side of a town to the opposite. Where the line touches the opposite side of a town, the company has or is preparing to remove the station buildings and facilities to the new location. In some places, notably at Aspinwall and at Cambridge, the new grade lies 20 feet above the old depot, and an incline will be necessary to reach the level of the yards at those points. The depots will be raised to the new elevation. The track laying was done without the aid of a machine, under the supervision of the roadmasters on their respective districts. Ninety-pound rail was used. When the revision work is completed the road will have the shortest line between Chicago and Omaha.

Permission has been given the Chicago, Milwaukee & St. Paul Ry. to issue \$30,000,000 bonds for improvements, the interest not to exceed 6 per cent. The issue will include \$17,000,000, the proceeds of which the company already has used for double-tracking and new rolling stock.

Chicago, Rock Island & Pacific.—Phelps, Dodge & Co. have given out a statement denying ownership of Rock Island shares. The statement reads as follows: "As numerous articles have recently appeared in the daily papers, connecting Phelps, Dodge & Co. with the Rock Island Railroad Co., and intimating that Phelps, Dodge & Co. had not only been large buyers of Rock Island stocks, but had obtained the control of the property, we therefore consider it only right and proper to advise our stockholders officially that Phelps, Dodge & Co. has never had a single share of Rock Island stock, or invested one dollar of money in any of these securities. The El Paso & Southwestern Co., in which some of our stockholders are interested, purchased some years ago a small minority interest in Rock Island preferred stock, and has never increased or diminished its holdings since that date."

El Paso & Southwestern System.—See Railway News under Chicago, Rock Island & Pacific Ry.

Grand Trunk.—The House of Commons railways committee has passed a bill authorizing the Grand Trunk Ry. to issue and sell a new series of four per cent, consolidated debenture stock to the extent of \$12,500,000. The bill authorizes the company to pay semi-annual interim dividends, when earned, before the audit covering the first half of the year has been made, and it authorizes the company to hold only one general meeting a year, in March instead of two.

The program of work which has yet to be carried out by the Grand Trunk Pacific Ry. before the line reaches com-

pletion, includes 116 miles of the main line to be built; 26 miles on the Brandon branch; 15 miles on the Weyburn branch; 24 miles on the Prince Albert branch; 18 miles from Moose Jaw northwest; and 16 miles on the Battleford-Wainwright branch. An interlocking plant will be built at Edmonton, a 26-lever interlocking plant at Weyburn, and another at Calgary. There are 12 steel bridges to be built on main line in various sections, including British Columbia.

Missouri, Kansas & Texas.—One of the conditions under which the suit of the State of Texas against the Missouri, Kansas & Texas Ry. has just been settled, requires the railroad company to expend within a period of six years from January 1, 1914, the sum of \$6,000,000 on additions, extensions, betterments and terminal improvements to or for its own line or lines of the other Texas companies involved in the litigation, exclusive of the cost of repairing the damage wrought by floods of 1913 or any subsequent disaster. A supplement to the agreement, which has not been made public, specifies more exactly what improvements shall be made.

As a result of the agreement, it is said that the railroad will provide its own passenger and freight stations at Austin and San Antonio, Tex. Speculation as to other work leads a Texas newspaper to the prediction that the railroad will construct the long desired direct line south of Austin to connect with its Houston-Smithville-San Antonio line, giving the Missouri, Kansas & Texas a short line to Houston in competition with the Houston & Texas Central R. R.; likewise a route north and south over its own rails instead of using the International & Great Northern Ry. between Austin and San Marcos. Other extensions thought to be contemplated have been mentioned as being a line from McKinney to Denton and a connection with Waco or other point on the main line with its lines in East Texas—the Beaumont & Great Northern R. R. and the old line from Trinity to Colmesneil, and the latter line most probably extended into Beaumont.

New Iberia & Northern.—See Railway News under St. Louis & San Francisco R. R.

New York Central Lines.—The Interstate Commerce Commission has set February 18 and 19 for hearing on the proposed \$167,000,000 bond issue by the New York Central Lines. A senate resolution led to the inquiry.

Norfolk Southern.—The Norfolk Southern R. R. recently sold \$600,000 first and refunding 5 per cent Harris, Forbes & Co. to provide funds to cover the purchase of new equipment.

Portland, Eugene & Eastern.—Electric service was inaugurated January 17, on the Yamhill line of the Portland, Eugene & Eastern Ry.

St. Louis & San Francisco.—It is reported that the purchase by the St. Louis & San Francisco R. R. of the New Iberia & Northern R. R. will be completely rescinded if negotiations now under way between the receivers, St. Louis & San Francisco, and the St. Louis Union Trust Co. are successful. The plan provides that the New Iberia & Northern be turned back to the syndicate which built it, and that Frisco obligations, totaling more than \$3,500,000, be canceled. The amounts owing to the St. Louis Union Trust also would be paid off before the property was turned back to the syndicate. It has been stated that two railroads in that territory would like to acquire the New Iberia property, which extends 88 miles from Port Barre to Shadyside and a transfer to one of these companies is likely to be effected. The agreement for the purchase of the New Iberia by the St. Louis & San Francisco was made just three days before the Frisco went into the receivership.

A demand that a contract alleged to have been made between the St. Louis & San Francisco and Louis Houck of Cape Girardeau, Mo., be carried out by the receivers of the Frisco was made in a petition filed with the federal district court at St. Louis, February 4. The petition claims that the Frisco before the receivership bought four railroads in Southeastern Missouri with a total of 150 miles. The roads are the Cape Girardeau & Northern Ry., the Cape Girardeau & Thebes Bridge Terminal R. R., the Cape Girardeau & Chester R. R. and the Saline Valley R. R.

Southern Pacific.—Directors of the Southern Pacific Co. have authorized an increase of \$20,000,000 in the capital stock in order to supply sufficient stock for conversion of all of the \$55,000,000 convertible bonds which are soon to be offered to stockholders. The proceeds will provide for payment of one-year 5-per-cent notes due June 15 and of other current indebtedness, \$30,500,000; additions and betterments, \$21,500,000; equipments, \$3,000,000.

Texas & Pacific.—The Texas & Pacific Ry. is preparing to do a large amount of ballasting work in Texas and Louisi-

ana, where approximately \$75,000 will be expended for road-bed improvement. Beginning at Whitesboro, Tex., on the joint track, there is about 170 miles of roadbed to be ballasted into Texarkana, Ark. This will cost about \$30,000. The Natchitoches branch, about 85 miles between Shreveport, La., and Cypress, La., will be rebalasted from a sand pit at Natchitoches.

PERSONALS.

E. E. Kerwin, formerly superintendent of the New Jersey Central and Lehigh & Susquehanna divisions of the Central R. R. of New Jersey, at Jersey City, N. J., has been appointed general superintendent of the Minneapolis & St. Louis R. R., with headquarters at Minneapolis, Minn., succeeding C. H. Lake, resigned to take service with another company.

W. R. Scott, general manager of the Southern Pacific Co., with office at San Francisco, Cal., has been elected vice-president and general manager of the company; succeeding E. E. Calvin in the former office. Mr. Scott will have headquarters at San Francisco.

H. V. Platt, general superintendent of the Southern district of the Southern Pacific Co., at Los Angeles, Cal. has been appointed assistant general manager, with headquarters at Los Angeles.

D. W. Campbell, general superintendent of the Northern district of the Southern Pacific Co., at Portland, Ore., has been appointed assistant general manager, with headquarters at Portland.

C. F. Hopkins superintendent of the Red River division of the St. Louis & San Francisco R. R., at Francis, Okla., has been appointed superintendent of the Southwestern division, with headquarters at Sapulpa, Okla., succeeding S. T., Cantrell, resigned.

J. M. Chandler, superintendent of the Western division of the St. Louis & San Francisco R. R., has been appointed superintendent of the Red River division, with headquarters at Francis, Okla., succeeding C. F. Hopkins, transferred.

C. T. Mason, assistant superintendent of the St. Louis & San Francisco R. R., at Springfield, Mo., has been appointed superintendent of the Red River division, with headquarters at Enid, Okla., succeeding J. M. Chandler, transferred.

J. H. Jackson, having resigned as superintendent of the Southeastern division of the St. Louis & San Francisco R. R., at Birmingham, Ala., the duties of superintendent, will be assumed temporarily by J. H. Doughty, general agent, with title of acting superintendent.

A. B. Newell has been elected president of the Toledo Terminal R. R. His headquarters will be at Detroit, Mich.

F. L. McCaffery has been appointed auditor of disbursements of the Southern Pacific Co., with office at San Francisco, Cal., vice G. W. Mulks, transferred.

G. W. Mulks, auditor of disbursements of the Southern Pacific Co., at San Francisco, Cal., has been appointed assistant controller, with office at New York, succeeding C. C. Barry, resigned to accept service with another company.

R. J. Dillon has been appointed auditor of the Houston & Brazos Valley R. R., with office at Freeport, Tex., succeeding C. C. Moore, resigned to take service with another company.

H. C. Bixler, assistant superintendent of the Pennsylvania Railroad at West Philadelphia, Pa., has been appointed acting superintendent of the Philadelphia terminal division, with headquarters at West Philadelphia, succeeding J. B. Baker, deceased.

J. E. McMahon, superintendent of the Pecos division of the Atchison, Topeka & Santa Fe Ry., has been appointed superintendent of the Colorado division, with headquarters at Pueblo, Colo., succeeding C. H. Bristol, promoted.

F. J. Evans, trainmaster of the Atchison, Topeka & Santa Fe Ry., at Clovis, N. Mex., has been appointed superintendent of the Pecos division, with headquarters at Clovis, succeeding J. E. McMahon, promoted.

C. W. Akers, superintendent of the Central division of the Norfolk Southern R. R., at New Bern, N. C., has been appointed superintendent of the Western division, with headquarters at Raleigh, N. C., succeeding G. A. Bradley, resigned.

J. A. Fox, division superintendent of the Chesapeake & Ohio Ry. at Covington, Ky., has had his jurisdiction ex-

tended over the Ashland division and his headquarters are removed to Ashland, Ky.

C. L. Hinkle, whose appointment as general superintendent of the Toledo, St. Louis & Western R. R. was noted in the Railway Review of January 10, began his railroad career at the age of 16 and from 1883 to 1888 served as operator, station agent and billing clerk with the Evansville & Terre



C. L. Hinkle, Who Has Recently Been Appointed General Superintendent of the Toledo, St. Louis & Western Railroad.

Haute R. R. From 1889 to 1891 Mr. Hinkle was clerk and chief clerk in the mechanical department of the Chicago & Eastern Illinois R. R. and from 1891 to 1893, general storekeeper of that company. He was storekeeper and chief clerk, mechanical department, of the Ohio Southern railway for nearly seven years and then went with the Detroit, Toledo & Ironton Ry. He was with that company from 1900 to 1903, holding the positions of chief clerk to chief engineer, traveling auditor and chief clerk to superintendent. Mr. Hinkle took service with the Toledo, St. Louis & Western R. R. in 1903 as chief clerk to the general superintendent and he has since then been continuously with that company and the Chicago & Alton R. R. during the time these lines were affiliated. From 1907 to 1910, chief clerk to general manager and vice-president in charge of operating and maintenance; and 1910 to March 1912, assistant to general manager. He was appointed superintendent March 18, 1912, and general superintendent January 1, 1914.

George Le Boutillier, whose appointment as division superintendent of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. has been noted in these columns, was born at Cincinnati, Ohio, February 2, 1876. He was graduated from the University of Cincinnati, class of 1897. Mr. LeBoutillier has been with the Pennsylvania Lines West of Pittsburgh, since 1895. From August 1, 1895, to November 1, 1900, he was rodman and levelman; November 1, 1900, to August 1, 1901, assistant engineer of the Richmond division; August 1, 1901, to June 30, 1903, assistant engineer, Cleveland & Pittsburgh Ry.; July 1, 1903, to March 15, 1905, engineer maintenance of way, Cleveland & Pittsburgh Ry., Cleveland, Ohio; March 15, 1905, to November 1, 1912, engineer maintenance of way, Cincinnati division of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry., Cincinnati, Ohio, and November 1, 1912, to Jan. 31, 1914, division engineer, of the same road at Pittsburgh, Pa. Mr. LeBoutillier was appointed superintendent of the Richmond division of the Pittsburgh, Cincinnati, Chicago & St. Louis, with headquarters at Richmond, Ind., on February 1.

Henry Clay Hall, whose appointment as a member of the Interstate Commerce Commission was noted in our previous issue, was born January 3, 1860, in New York city. Mr. Hall is a graduate of Amherst college and Columbia Law School. He was admitted to the practice of law in New York in 1883, later practiced law in Paris, France, and from 1885 to 1892 was counsel to the United States Legation. He

returned to this country and located at Colorado Springs, Colo., and has since been general attorney of the Arkansas, Louisiana & Gulf Ry., and other corporations, mayor of Colorado Springs and president of the Colorado State Bar Association.

Winthrop M. Daniels, whose appointment as a member of the Interstate Commerce Commission has been announced



Henry Clay Hall, of Colorado, Appointed a Member of the Interstate Commerce Commission.

in a previous issue, was born at Dayton, Ohio, September 30, 1867. He is a graduate of Princeton, class of 1888. Mr. Daniels returned to Princeton four years later as an instructor, finally becoming professor of economics and public finance, on which subjects he has written textbooks in use in many colleges. When Mr. Wilson became governor of New Jersey in 1911, he appointed Professor Daniels to the public utilities commission of New Jersey, of which he was later made chairman.

M. Magiff, car accountant and superintendent of telegraph of the Central Vermont Ry. at St. Albans, Vt., has been appointed superintendent of car service in charge of car service and car accounting.

S. S. Russell, general superintendent of transportation of the Central Vermont Ry., has been appointed superintendent of the Northern division, with headquarters at St. Albans, Vt., succeeding J. F. Keefe. The position of general superintendent of transportation has been abolished.

J. F. Keefe has been appointed assistant superintendent of the Northern division of the Central Vermont Ry., with office at St. Albans, Vt.

J. C. Lewis, trainmaster of the Norfolk Southern R. R. at New Bern, N. C., has been appointed acting superintendent of the Central division, with headquarters at New Bern, succeeding C. W. Akers, transferred.

C. E. Burr, acting general superintendent of transportation of the Delaware & Hudson Co. at Albany, N. Y., has been appointed general superintendent of transportation, with office at Albany, succeeding C. E. McKim, assigned to other duties.

C. C. Berry, assistant comptroller of the Southern Pacific Co., with office in New York, has been appointed auditor of the San Pedro, Los Angeles & Salt Lake R. R., with office at Los Angeles, Cal.

TRAFFIC.

J. B. Macpherson, effective February 16, is appointed chief of tariff bureau, of lines east of Detroit and St. Clair rivers, of the Grand Trunk Ry. system, with office at Montreal, Que.

J. M. Crute has been appointed assistant general freight and passenger agent of the Ocilla Southern R. R., with headquarters at Ocilla, Ga.

J. W. Howe has been appointed coal freight agent of the Chesapeake & Ohio Ry. and the Chesapeake & Ohio Ry. of Indiana, with office at Richmond, Va.

D. W. Bird has been appointed commercial agent of the Louisiana & Arkansas Ry., with office at Little Rock, Ark.

H. E. Arnold has been appointed commercial agent of the New York Central & Hudson River R. R. and the West Shore R. R., with office at Lowell, Mass. John P. Collins and George E. Mace are appointed traveling freight agents with office at Lowell, and F. H. Owen, traveling freight agent at Greenfield, Mass., reporting to Mr. Arnold.

E. L. Duncan in addition to his duties as manager mail traffic of the Chicago & Eastern Illinois R. R., is appointed general baggage agent, with office at Chicago at, vice L. S. Winslow, assigned to other duties.

R. M. Chastain has been appointed commercial freight agent of the Missouri Pacific, St. Louis, Iron & Southern, Denver & Rio Grande and Western Pacific railways, at Monroe, La., succeeding S. W. Bradford, transferred.

S. W. Bradford has been appointed commercial agent of the Missouri Pacific, Iron Mountain & Southern, Denver & Rio Grande and Western Pacific railways, with office at Texarkana, Ark.-Tex., succeeding R. M. Chastain.

MECHANICAL.

C. A. Bingaman, engineer of tests of the Philadelphia & Reading Ry., has been appointed assistant engineer motive power, with headquarters at Reading, Pa.

R. B. Rasbridge, chief car inspector of the Philadelphia & Reading Ry., has been appointed superintendent car department, with headquarters at Reading, Pa.

T. E. Hessenbruch, general inspector of the Philadelphia & Reading Ry., has been appointed assistant general car inspector at Reading, Pa.

W. E. Grove has been appointed inspector car department of the Philadelphia & Reading Ry., with headquarters at Reading, Pa.

R. D. Wilson has been appointed general car inspector of the Philadelphia & Reading Ry., at Reading, Pa.

C. C. Elmes, road foreman of engines of the Philadelphia & Reading Ry. at Tamaqua, Pa., has been appointed assistant



Winthrop M. Daniels, of New Jersey, Appointed a Member of the Interstate Commerce Commission.

engineer motive power of the Reading companies, with headquarters at Reading, Pa.

H. Osborne has been appointed assistant mechanical superintendent of the Canadian Pacific Ry., with headquarters at Montreal, Que.

E. I. Partlow has been appointed road foreman of engines of the Indianapolis division of the Cincinnati, Hamilton & Dayton Ry., succeeding R. W. Brown.

T. W. Heintzelman, superintendent of motive power of the Southern Pacific Co., has been appointed general superintendent of motive power, with headquarters at San Francisco, Cal., succeeding H. J. Small.

T. W. Younger, superintendent of motive power of the Southern Pacific Co. at Portland, Ore., has been appointed superintendent of motive power at Sacramento, Cal., succeeding T. W. Heintzelman, promoted.

O. G. Hartmann has been appointed mechanical foreman of the Wisconsin & Michigan Ry., with headquarters at Peshtigo, Wis., succeeding to the duties of C. H. Stroud, master mechanic, resigned.

W. E. Woodhouse, assistant superintendent of motive power of the Canadian Pacific Ry., with headquarters at Winnipeg, Man., has been appointed superintendent of motive power of the Eastern lines, with headquarters at Montreal, Que.

A. P. Prendergast, whose appointment as superintendent machinery of the Texas & Pacific Ry. has been noted in these columns, was formerly superintendent of motive power of the Baltimore & Ohio railroad system. He started as an apprentice with that road after receiving a public school education in West Virginia; served as machinist, foreman, master mechanic, shop superintendent and district superintendent of motive power. His service with the Baltimore & Ohio covered a period of 20 years. He has now entered the service of the Texas & Pacific in his 36th year,



A. P. Prendergast, Former Baltimore & Ohio Official, Appointed Superintendent Machinery, Texas & Pacific Railway.

thoroughly equipped by experience in the practical work of the mechanical department. Mr. Prendergast was selected for superintendent of motive power of the Baltimore & Ohio Southwestern, as well as superintendent of motive power of the Cincinnati, Hamilton & Dayton Ry. at a period when both roads were suffering from labor difficulties of an acute nature, some of which had been of long standing. After this situation was cleaned up, he was appointed superintendent of motive power of the entire Baltimore & Ohio system. His appointment as superintendent of machinery of the Texas & Pacific Ry. was effective February 1.

ENGINEERING.

F. H. Watts has been appointed division engineer of the Pittsburgh division of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, Pa., to succeed G. LeBoultillier, promoted. Mr. Watts was formerly division engineer at Columbus, Ohio.

L. B. Allen, assistant chief engineer of the Chesapeake & Ohio Ry. and the Chesapeake & Ohio Ry. of Indiana at Richmond, Va., having been transferred to other duties, the position of assistant chief engineer will remain vacant until further notice.

C. W. Johns, engineer maintenance of way of the Chesapeake & Ohio Ry., has been appointed engineer of branch lines, with office at Richmond, Va., succeeding R. B. Burks.

F. G. White, formerly signal inspector of the Great Northern Ry. at St. Paul, Minn., effective February 7, was appointed signal engineer of the Chicago Great Western R. R., with office at Chicago, succeeding J. Beaumont, resigned to accept service with the Division of Valuation, Interstate Commerce Commission.

OBITUARY.

August C. Stonegrave, Canadian freight agent of the Central Vermont Ry. at Montreal, Que., died in St. Albans, Vt., February 7, aged 71 years.

John H. Jones, formerly general coal freight agent of the Philadelphia & Reading Ry., died at his home in Germantown, Pa., February 4, aged 76 years.

J. B. Marshel, commercial agent of the Chicago, Milwaukee & St. Paul Ry., at Dallas, Tex., died suddenly in that city, February 8, aged 70 years.

John W. Callahan, general manager of the Chicago Tunnel Co. and formerly superintendent of the Indiana Harbor Belt R. R., died in Chicago February 12. Mr. Callahan was born in Salem, Ohio, November 11, 1862.

W. J. Gilmartin, superintendent of the Chihuahua division of the Mexico Northwestern Ry., at Pearson, Mex., formerly assistant superintendent of the Buffalo & Susquehanna R. R., at Du Bois, Pa., is mentioned as one of those who met death in the Cumbre tunnel in Mexico. An account of the outrage, the wrecking of a passenger train by Mexican bandits, will be found on a previous page.

B. A. Scofield, superintendent of terminals of the Mexico Northwestern Ry., at Ciudad Juarez, Mex., was one of those on board the ill-fated passenger train which was wrecked last week by Mexican bandits. An account of the outrage will be found on a previous page.

NEW ROADS AND PROJECTS.

Alberta.—See New Roads and Projects under Manitoba.

British Columbia.—The Vancouver Railway & Ocean Terminal Co. has applied for a special act of parliament for incorporation. The company proposes to build and operate an independent deep water terminal and railway at Vancouver. B. C. Deacon, Deacon & Wilson, Vancouver, are attorneys for the applicants.

Colorado.—The San Miguel Development Co. of which C. B. Schley, of Colorado Springs, Colo., is president and Bulkley Wells, of Denver, Colo., is vice-president and general manager, has completed surveys and locations for a railroad which will connect the carnotite, or radium fields, in San Miguel county, Colo., with the narrow gauge line of the Denver & Rio Grande R. R., at Placerville. The road will be 76 miles long and will cost \$2,000,000.

Idaho.—The Nezperce & Idaho R. R. is resuming construction on the proposed line from Lewiston, Idaho, to Vollmer. Twelve miles of track, according to the company's plans, will be laid this year.

Kentucky.—See New Roads and Projects under Mississippi.

Louisiana.—See New Roads and Projects under Mississippi.

Manitoba.—The Greater Winnipeg Water District, S. H. Reynolds, chairman of commissioners, Winnipeg, Man., is opening bids this week for tools and material, except ties, rails and sundry steel, for the building of grade and laying track for 85 miles of railway.

The House of Commons at Ottawa, Ont., passed a bill incorporating the Central Western Canada Railway Co. with a capital of \$80,000,000. The road will run from Winnipeg, Man., to Edmonton, Alta., a distance of 780 miles, through Yorkton, Saskatoon and Battleford, and will open a large territory now without railroad facilities. Toronto and English capitalists are responsible for the enterprise.

Mississippi.—A press report states that bondholders and stockholders of the New Orleans, Mobile & Chicago R. R. propose to extend the road from Beaumont, Miss., to Ansley, Miss., to a connection with the Louisville & Nashville R. R., and thus secure entrance into New Orleans. It is also stated that it is planned to extend the line from Middleton, Tenn., to Paducah, Ky. A proposed extension from Middleton to Jackson, Tenn., has been considered for some

time. The road has been in the hands of a receiver since December 13, 1913.

New York.—The Newark, Williamson & Northern R. R., with a capitalization of \$150,000, has been incorporated. The road, which is to be an extension of the Newark & Marion Ry., will run from Newark, N. Y., across Wayne county to Williamson, on Lake Ontario. It will tap the Wayne county fruit country. Business men in Syracuse and Williamson, N. Y., are its organizers.

Saskatchewan.—See New Roads and Projects under Manitoba.

Tennessee.—See New Roads and Projects under Mississippi.

Texas.—See Railway News under Missouri, Kansas & Texas Ry.

Utah.—A tap line, which the San Pedro, Los Angeles & Salt Lake R. R. is building leaves the main line of that road at Delta, Utah, and runs 15 miles northwest into a district where 50,000 acres of land have recently been put under irrigation. It is stated that efforts will be made to have the line completed in time to handle the crops of the coming season. The right of way for this line was donated by the ranchers of the district. About half a mile of the grading work on the new branch has been completed. The farmers of that section are to do the grading, while the railroad company will lay the steel. As soon as the grading is completed to the Sevier river, about one mile from Delta, the company will lay track and begin the construction of the 800 foot bridge across the Sevier.

Washington.—Articles of incorporation have been drawn up for the Richland Northern Ry., capitalized at \$1,000,000, to build a line from Richland, Benton county, Washington, northerly to a connection with the Chicago, Milwaukee & St. Paul Ry. It is presumed that the connection point will be at Hanford, to where the Milwaukee already has built. The Milwaukee is known to have surveys between Hanford and Kennewick. The articles of the new company give Manly F. Haynes, F. J. O'Brien and B. F. Knapp as incorporators and Seattle, Wash., as the principal place of business.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Lake Erie, Franklin & Clarion R. R. has ordered from the American Locomotive Co. 1 ten-wheel (4-6-0) passenger locomotive, with 18½x26 in. cylinders, 63 in. driving wheels, total weight in working order, 144,000 lbs.

—The Detroit Terminal R. R. has ordered 2 six-wheel switching locomotives (0-6-0-S type) from the American Locomotive Co. These engines will have cylinders 21x28 in., driving wheels 57 in. and will each weigh 170,000 lbs. in working order.

—Dolese & Shepard have ordered 1 four-wheel (0-4-0) switching locomotive from the American Locomotive Co. Cylinders will be 18x24 in. driving wheels 47 in. and the engine in working order will weigh 103,000 lbs.

—The Texas & Pacific Ry will soon be in the market for 15 or 20 locomotives.

—The Wabash Railroad is closing contracts this week for 50 mikado (2-8-2) and 10 Pacific (4-6-2) locomotives, mentioned in the Railway Review of January 24.

—The Buffalo, Rochester & Pittsburgh Ry. is placing orders for 5 Mallet locomotives and 10 mikado locomotives.

—The New Orleans & Northeastern R. R. is in the market for 4 Pacific (4-6-2) type and 6 Mikado (2-8-2) type locomotives.

—The Canadian Pacific Ry. is said to be in the market for 70 locomotives.

—The Buffalo Creek R. R. is inquiring for 3 switching (0-6-0) locomotives.

—The Yueh Han Ry. has ordered 2 consolidation (2-8-0) locomotives from the American Locomotive Co.

—The Tennessee Central R. R. is reported in the market for 2 consolidation (2-8-0) locomotives.

—The Georgia Southern & Florida Ry. is in the market for 6 ten-wheel (4-6-0) locomotives.

—The Birmingham Southern R. R. is in the market for 2 consolidation (2-8-0) and 3 switching (0-6-0) locomotives.

—The Michigan Central R. R. has purchased for the Detroit River tunnel 4 120-ton electric locomotives from the General Electric Co.

Freight Cars.

—The Denver & Rio Grande R. R. is in the market for 500 box cars, and from 500 to 1000 gondola cars.

—The Richmond, Fredericksburg & Potomac R. R., it is said, has ordered 15 steel ballast cars from the Rodger Ballast Car Co.

—The Buffalo, Rochester & Pittsburgh Ry. has ordered 500 steel underframe box cars and 500 gondola cars, 100,000 lbs. capacity, from the Standard Steel Car Co.

—The Chesapeake & Ohio Ry. has ordered 1000 gondola cars from the Pressed Steel Car Co. and 1000 hopper cars from the Standard Steel Car Co. This is a correction of an item in our issue of February 7.

—The Cuba Company has ordered 350 freight cars from the American Car & Foundry Co.

—The Southern Railway is said to have prepared specifications for 3500 freight cars.

—The Hocking Valley Ry., says a report, may purchase 1000 gondolas in addition to orders recently placed.

—The Texas & Pacific Ry. is expected to issue inquiries within a short time for 1500 to 2000 gondolas and box cars.

—The Northern Pacific Ry. has ordered 250 all-steel ore cars from the Western Steel Car & Foundry Co.

Passenger Cars.

—The Great Northern Ry. has ordered 30 coaches from the Barney & Smith Car Co.

—The Atlantic & West Point R. R. is inquiring for 2 passenger coaches.

—The Southern Railway, according to report, is about to issue inquiries for 50 passenger cars.

—The Cuba Company has ordered 12 passenger cars from the American Car & Foundry Co.

Iron and Steel.

—The Pennsylvania R. R. is expected to issue inquiries within a few days covering its rail requirements for 1914. It is said that these will not exceed 150,000 tons.

—The Baltimore & Ohio R. R. is in the market for about 35,000 kegs of spikes.

—The St. Louis & San Francisco R. R. has ordered 6000 tons of 85-lb. rails from the Tennessee Coal, Iron and Railroad Co.

Buildings, Terminals, Etc.

—The J. J. Hill building is to be erected at Minneapolis, Minn., to be used as a banking building and for the offices of the Minneapolis, St. Paul & Sault Ste. Marie Ry. The proposed structure will take 3500 tons of steel.

—The Oregon Short Line R. R. will commence work on the proposed new station at Pocatello, Idaho, not later than May 1. An expenditure of \$200,000 has been authorized.

—See New Roads and Projects under British Columbia.

—The Louisville & Nashville R. R. will build repair shops at South Louisville, Ky., requiring about 660 tons structural shapes, contract for which has been let to the McClintic-Marshall Co.

—The Illinois Central R. R. has let contract to Bates & Rogers Construction Co., Chicago, to erect a building at Memphis, Tenn., to be occupied by American and United States Express companies. The building will cost about \$70,000, exclusive of equipment.

—See Railway News under Missouri, Kansas & Texas Ry.

—Plans for a new union station at Spartanburg, S. C., are said to have been approved. The proposed structure would provide facilities for the Southern Railway, Charleston & Western Carolina Ry. and the Carolina, Clinchfield & Ohio Ry. The plans, it is stated, provide for lowering the tracks and the erection of a building of two stories, with waiting-rooms on the upper floor. Magnolia street will be carried over the tracks by a viaduct. Baggage room, express office and telegraph office will be on the track floor.

—The Missouri, Kansas & Texas Ry. has had tentative plans prepared for railway terminals, including passenger station, freight station and warehouses, tracks, yards, etc., at San Antonio, Tex., but has not yet authorized construction, which will cost \$1,000,000 to \$1,250,000.

—A three-story brick structure containing the baggage room, laundry and commissary of the Illinois Central R. R. at Chicago was destroyed by fire on February 11. A loss of \$50,000 is reported.

—The Illinois Central R. R. will shortly begin the construction of a \$300,000 freight depot and warehouse at St. Louis, Mo.

—General Manager D. C. Moon of the Lake Shore & Michigan Southern Ry. has been quoted as saying that the renovation of the old union station at Cleveland, Ohio, will begin within a few days. The work will cost about \$150,000 and will enable the terminal to be used until a new union depot is erected.

—The National Transcontinental Ry. of Canada has awarded contract to Roberts & Shaefer Co. for six reinforced concrete locomotive coaling plants, using the Holmen type coal bucket. Contract price, approximately. \$115,000.

—The St. Louis & San Francisco R. R. is reported as planning to begin the erection of a freight depot and office building at Tulsa, Okla., about March 1.

Bridges.

—The Louisville & Nashville R. R. is considering the construction of a viaduct over Eastern Parkway between First and Floyd streets, in Louisville, Ky.

—The Southern Railway, Charleston & Western Carolina Ry. and Carolina, Clinchfield & Ohio Ry., it is said, will construct a viaduct over their tracks at Magnolia street, Spartanburg, S. C.

—The Chicago, Rock Island & Pacific Ry. and the Union Pacific R. R. are said to have reached an agreement with the city authorities of Kansas City, Kan., in regard to building the \$10,000 viaduct over the companies' tracks at Eighteenth street. The plans, which will be submitted to the two railroads for approval, call for steel structure, 1000 ft. long, to extend from Muncie boulevard to McAlpine avenue, to have a 28-ft. roadway and a 6-ft. sidewalk.

—The Long Island R. R. and the New York Consolidated R. R. have let contract for the construction of a new highway bridge to carry Eighth avenue, Brooklyn, over the tracks of those two railroads between 61st and 62nd streets, to Parsons & Lantry, at \$46,257. The city will pay half the cost.

—Contract for the construction of 16 viaducts for the Great Northern Ry. from the east line of Montana to the Charlotte boulevard, Rochester, N. Y.

—The San Pedro, Los Angeles & Salt Lake R. R. will erect Pacific coast has been awarded to McCreary & Williard, Spokane, Wash.

—The Buffalo, Rochester & Pittsburgh Ry. will build several concrete and steel bridges on its Buffalo division. A new span will be erected across the Rochester Belt Line at a bridge over the Sevier river, on the Delta branch now being constructed in Utah.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, FEB. 3, 1914.

Rail joint, 1,085,589—Silas D. Bell, Childress, Tex. Filed Sept. 18, 1913.
Telephone signaling for railways, 1,085,621—Mike Lutemberger, Blocton, Ala.
Mechanical stoker, 1,085,630—George B. Rait, Minneapolis, Minn.
Car construction, 1,085,645—William James Tollerton, Chicago, Ill.
Cableway for constructing railway embankments, 1,085,649—Samuel S. Webber, Trenton, N. J., assignor to The Trenton Iron Co., Trenton, N. J.
Sliding door hanger, 1,085,654—Richard C. Williams, Kansas City, Mo.
Lateral motion car truck, 1,085,655—William H. Wilson, St. Paul, Minn.
Valve gear, 1,085,661—William Sherman Brown, Knoxville, Tenn.
Rail joint, 1,085,672—Reimer N. Dithmer, Chicago, Ill.
Railway safety device, 1,085,694—William Joseph Meenaghan, Amarillo, Tex.
Machine for truing locomotive driving wheels, 1,085,710—Joseph C. Tyler, John A. Behrends, and Lake Parks, Abilene, Tex.
Locomotive, 1,085,715—Carl J. E. Waxbom, Columbus, Ohio, assignor to The Jeffrey Manufacturing Co., Columbus, Ohio.
Combined tie and fastener, 1,085,720—Joseph Thomas B. Andrews, Truxno, La.

Metallic railway tie, 1,085,725—William T. Cody, San Bernardino, Cal.
Railway signal, 1,085,726—John P. Coleman, Edgewood borough, Pa., assignor to The Union Switch & Signal Co., Swissvale, Pa.
Screw jack locomotive hoist, 1,085,734—Clement A. Hardy, Chicago, Ill., assignor to Whiting Foundry Equipment Co., Harvey, Ill.
Apron mounting, 1,085,738—James H. Kearns, Francis, Okla.
Combined car door and partition, 1,085,753—Robert E. Moore, St. Louis, Mo.
Feed valve for air brake systems, 1,085,763—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Percy E. Donner, Pittsburgh, Pa.
Triple Valve, 1,085,764—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Percy E. Donner, Pittsburgh, Pa.
Construction of railway lines, 1,085,770—Karl Trnka, Sofia, Bulgaria.
Fluid pressure brake, 1,085,771—Walter V. Turner, Edgewood, Pa., assignor to Westinghouse Air Brake Co., Pittsburgh, Pa.
Rail fastening device, 1,085,797—Raymond L. Clark, Rochester, N. Y.
System of bolting for car doors, 1,085,822—Benoit Reviron, Paris, France.
Rail torpedo, 1,085,830—Bird G. Vinson, Roseburg, Oregon.
Railway tie, 1,085,841—Clyde Bailey, Penland, N. C.
Railroad closet tank, 1,085,850—Harrison Taylor Cronk, New York, N. Y.
Tongue switch, 1,085,870—John D. McPherson, Hillburn, N. Y.
Track fastener, 1,085,880 to 1,085,882 inclusive—John W. Stephenson, Toledo, Ohio, assignor to the National Malleable Castings Co., Cleveland, Ohio.
Car door bracket, 1,085,924—Fred Mathews, Chicago, Ill., assignor to Clinton C. Murphy, Chicago, Ill.
Uncoupling device for cars, 1,085,940—Lester S. Quensel, Evanston, Ill.
Hand hole cover for boilers, 1,085,965 and 1,085,966—Walter Brown, Evanston, Ill.
Stay bolt cutter, 1,085,967—Walter Brown, Webster Groves, Mo., assignor to A. B. Birge, St. Louis, Mo.
Station indicator, 1,085,980—Jonathan D. Harvey and Henry L. Goodwin, Minneapolis, Minn.
Railway tie and fastening, 1,085,996—Reinholt Schramm, Elkton, S. D.
Journal box lid, 1,086,008—George A. Woodman, Chicago, Ill., assignor to Kirby Equipment Co., Chicago, Ill.
Railway tie, 1,086,013—Thomas H. Beacom, Elreno, Okla.
Valve gear, 1,086,018—William Sherman Brown, Knoxville, Tenn.
Uncoupling device, 1,086,025—Charles A. Carscadin and George A. Woodman, Chicago, Ill.
Rail chair, 1,086,046—Paul Hebert, Benrath, Germany.
Ballast car, 1,086,051—Frank Hartwell Hopkins, Montreal, Quebec, Canada, assignor to Rodger Ballast Car Co., Chicago, Ill.
Safety appliance for railway cars, 1,086,069 and 1,086,070—Charles M. Mock and Arthur U. Gerber, Chicago, Ill.
Draw-bar yoke and draw-bar yoke connection for draft rigging, 1,086,073—Charles J. Nash, Chicago, Ill., assignor, to William H. Miner, Chicago, Ill.
Friction draft gear, 1,086,075—John F. O'Connor, Chicago, Ill., assignor, to William H. Miner, Chicago, Ill.
Automatic Stop for Railway trains, 1,086,087—Frederick J. Schneider and Frank W. Bauer, Dayton, Ohio.
Railway tie, 1,086,091—Rudolph W. Schulz, Waterloo, Iowa.
Method of making car wheels, 1,086,137 and 1,086,138—Samuel P. Bush, Columbus, Ohio, assignor to The Buckeye Steel Castings Co., Columbus, Ohio.
Stay bolt, 1,086,144 and 1,086,145—Ethan I. Dodds, Central Valley, N. Y., assignor to Flannery Bolt Co., Pittsburgh, Pa.
Means for way billing, 1,086,203—James A. Murphey, Germantown, Pa.
Machine for grooving railway sleepers, 1,086,209—Alois Pankl, Vienna, Austria-Hungary, assignor to The Firm of Kommanditgesellschaft Guido Rütgers, Vienna, Austria-Hungary.
Railway tie, 1,086,262—Thaddeus D. Allen, Youngstown, Ohio.
Train order deliverer, 1,086,282 and 1,086,283—Frank Dutcher, Versailles, Pa., assignor to Central Railway Signal Co., Pittsburgh, Pa.
Car window, 1,086,284 and 1,086,316 to 1,086,321 inclusive—George H. Forsyth, Chicago, Ill.
Railway tie, 1,086,328—Andrew Kruger, Holland, Iowa.

RAILWAY REVIEW

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Annual Meeting of the American Society for Testing Materials.

The executive committee has authorized the announcement that the seventeenth annual meeting of this society will be held at Atlantic City, N. J., on June 30-July 4, 1914, with headquarters at the Hotel Traymore. The usual detailed announcement as to accommodations, rates, etc., will be made in due course. The secretary reports the present membership in the society to be 1649, as compared with 1574 at the last annual meeting.

Western Railway Club.

The regular monthly meeting of the Western Railway Club was held in the assembly room of the Karpen building, Chicago, on Tuesday evening, February 17. The paper presented at that meeting was entitled "Important Milling Machine Methods in Connection with Railroad and General Shop Work," and was contributed by A. J. Baker, engineer for the Marshall & Huschart Machinery Co. The meeting was well attended and a thorough discussion of the subject was developed.

Resolution to Investigate Rock Island Financial History.

A resolution introduced in congress, February 17, by Representative Green, of Iowa, asks for a complete and thorough investigation of the financial status of the Rock Island system along the lines followed in the recent investigation of the affairs of the St. Louis & San Francisco. The resolution directs the Interstate Commerce Commission to investigate the Rock Island holding companies. It is aimed particularly at Daniel C. Reid, Edward B. Leeds and William B. More, who were the moving spirits in the investigation of the Rock Island's holding companies. The resolution asks for a disclosure of all profits made by Mr. Reid and his associates in the financing of the Rock Island. The resolution was referred to the house committee on interstate and foreign commerce and Mr. Green plans to address the house next week on the subject of the Rock Island conditions. He will endeavor to convince the house that the investigation is necessary.

Yellowstone Park at San Francisco.

The Union Pacific system will be represented at the Panama-Pacific International Exposition in a unique and educational manner by a reproduction of the main features of Yellowstone Park. Four acres of space have been allotted to this concession directly to the right of the Van Ness Avenue entrance. The front view will be imposing, representing some of the mountain peaks of the Park. On the left of the entrance a view can be had to the farther end, over 500 ft. away, where the "Old Faithful Inn," may be seen. It will be on a scale almost as large as the original, and will be operated as the de luxe restaurant of the exposition. In the center of the space between the inn and the mountains in the foreground will be the Yellowstone Gardens, and here will be shown the "Top of the World." The visitor is taken up a circular platform 230 ft. in diameter and, looking down upon the "Top of the World," sees Yellowstone

Park with its roadways, hotels, geysers, lakes, rivers, falls, canyons, etc. Looking across from the main entrance of the "Old Faithful Inn" may be seen the Falls of the Yellowstone, picturing a sheet of water tumbling down the canyon. On the stage will be presented many of the great natural wonders of the Yellowstone Park, including an exact reproduction of "Old Faithful Geyser," one of the wonderful phenomena in the Park. It is estimated that the total expense of building and conducting this concession will be between \$400,000 and \$500,000.

Catching Up with the Flood.

All of the steel bridges on the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton lines that were destroyed or damaged by the floods last spring have been rebuilt or repaired. The last bridges to be put in operation were at Hamilton, O., and Lawrenceburg, Ind. Other bridges on the Baltimore & Ohio system put out of service were at Zanesville and Marietta, O., over the Muskingum river; Washington, Ind., over the West Fork of the White river; Brownsville, Ind., over the East Fork of the White river, and Morristown, Ind., over the Blue river.

New Haven Manslaughter Indictment Quashed.

Manslaughter indictment standing against five officials of the New York, New Haven & Hartford R. R., at Bridgeport, Conn., were quashed by the state's attorney, February 16, but that official refused to annul the indictment against former President Charles S. Mellen. The indictment grew out of the wreck at West Port, Conn., October 3, 1912, in which seven persons were killed. Officials of the road, past and present, against whom indictments were quashed, are: C. H. McHenry and Henry J. Horn, former vice-presidents; B. R. Pollock, former general manager; C. N. Woodward, general superintendent, and Laurance J. C. Carmalt, former engineer maintenance of way.

Passage of Alaskan Railroad Bill.

The Alaskan railroad bill authorizing the president to construct a railroad from the south coast of Alaska to interior coal fields was passed by the house of representatives at Washington on Feb. 18. A similar measure already has passed the senate, and it is expected that the bills will be taken up at once in conference between the two branches of the legislature with a view to sending it promptly to the president, who has signified his intention of signing it. Before finally passing it, the house eliminated from the bill as reported by the territories committee, a provision authorizing a bond issue of \$35,000,000 to finance the road and to be paid off by the proceeds of government land sales in Alaska. The senate bill provided for a \$40,000,000 bond issue. Under the amended measure the project is to be financed out of the current funds in the treasury, the president being limited \$35,000,000 and \$1,000,000 being appropriated for immediate expenses. Congress is expected to appropriate each year the amount estimated to be necessary for the construction of the road. The bill provides for the construction of a road "not to exceed 1,000 miles, to be so located as to connect one or more of the open Pacific ocean harbors on the southern coast of Alaska, and with a coal field or fields yielding coal sufficient in quality and quantity for naval use, so as to best aid in the development of the agricultural and mineral or other resources in Alaska."

To Honor the Late W. W. Finley.

As a fitting memorial to the late President Finley and in recognition of his interest in agricultural education in the South, President Fairfax Harrison, of the Southern Railway, has addressed a letter to the heads of each of the nine

state agricultural colleges in South suggesting that the agricultural scholarships which President Finley inaugurated in the early part of 1912 be designated: "Southern Railway Scholarships: William Wilson Finley Foundation." These scholarships, which offer complete courses in agriculture to deserving farmer boys who live in counties traversed by Southern Railway and affiliated lines and who would be unable to secure the advantages of such an education without this aid, are maintained in the following institutions: Kentucky State University, Lexington, Ky.; State College of Agriculture and Mechanic Arts, Raleigh, N. C.; University of Tennessee, Knoxville, Tenn.; University of Florida, Gainesville, Fla.; Georgia State College of Agriculture and Mechanic Arts, Athens, Ga.; Mississippi Agricultural & Mechanical College, Agricultural College, Miss.; Alabama Polytechnic Institute, Auburn, Ala.; Clemson Agricultural College, Clemson College, S. C.; and Virginia Polytechnic Institute, Blacksburg, Va. In inaugurating these scholarships, the late President Finley was following his policy of lending every practical aid in the agricultural development of the territory served by the Southern Railway and affiliated companies. Each young man accepting a scholarship must agree to engage in agricultural work, to teach agriculture, or to work on an experiment farm for at least three years in territory touched by one of the lines making the offer. The details as to the conditions under which the scholarships are awarded are in the hands of the college heads.

New Car Ferry for the National Transcontinental Ry.

A car ferry ordered by the Canadian government for use in maintaining a service across the St. Lawrence river at Quebec, pending the completion of the Quebec bridge, has just been completed at the Birkenhead, England, works of Cammel, Laird & Co. She will be brought to Quebec early in the spring. The vessel will make possible the through shipment of freight to the Atlantic seaboard over the National Transcontinental Ry., the eastern end of the Grand Trunk Pacific. The boat, which has been named the Leonard, is equipped with an ice-breaker, 326 ft. long, 65-ft. beam and draws 15 ft. She is provided with a tidal-wave deck to cope with the conditions in Quebec harbor, where there is a heavy tide. This deck can be raised or lowered 20 ft. The boat has three car tracks and is capable of carrying trains weighing 1400 tons.

Loblolly Pine Adapted to Forestry.

That farmers and other land owners in Delaware, Maryland, and Virginia can put their worn-out or poorly drained land to profitable use by growing loblolly pine, is the statement made by the department of agriculture in a recent bulletin. For several generations, says the department, it will probably be better to grow timber on such areas, at little outlay, than to incur the heavy expense of making them fit for crops. At the same time, intensive agriculture can be practiced on the limited areas best adapted to it. Loblolly pine, the department goes on to say, is easily the leading tree for commercial timber growing on the coastal plain of these three states, because of the ease with which it reproduces itself and forms pure, well-stocked stands, its rapid growth and the wide range of sites on which it will grow, the many uses to which its wood is adapted, the comparative cheapness of logging and milling the timber, and the good prices which its lumber brings. The best stands of loblolly ought to yield a money return of anywhere between 4.5 and 10 per cent, on a 20-year rotation. On a 40-year rotation the best stands should bring in not less than 6 per cent, and perhaps 8 or 9. The range of uses for loblolly is wide, and it is sold throughout the eastern and central states and exported to Europe and Central America. In building construction it is used for

interior finish, flooring, ceiling, sashes, wainscoting, weather boarding, joists, lath and shingles. It also finds wide use for boxes, slack barrels, cheap furniture, woodenware and toys. In addition, it is used in bridge and trestle work and for freight cars. A good deal of loblolly pine is cut for cross-ties, which are given a preservative treatment. The wood is very easy to treat with chemical preservatives, and the recent development of wood impregnation processes and plants is rapidly increasing its use for many purposes. Few pines exceed it in use for fuel, and immense quantities of cordwood find a sale in cities as far north as Philadelphia. A report of the woods in Maryland in 1909 shows loblolly as exceeding all other woods combined in the manufacture of boxes and crates, and as standing second in cooperage and basket making. According to the department, loblolly pine can be grown successfully in Kent and Sussex counties, Delaware, throughout eastern and southern Maryland, and in eastern Virginia.

Resolution to Move Interstate Commerce Commission to Chicago.

Senator Kenyon of Iowa introduced a bill in the United States senate, on February 19, which, if enacted into a law, will remove the headquarters of the Interstate Commerce Commission to Chicago. The bill proposes to enlarge the commission to sixteen members and to divide the country into five sections, over each of which three commissioners shall have jurisdiction. Not more than three commissioners shall be appointed for any one section or more than eight from any one political party. No commissioner shall serve in his home district or more than four years in any district. The terms of office are made eight years. The railroads shall have the right of appeal from a decision by a section board to the whole commission. The central office of the commission shall be located at Chicago with division headquarters at Washington, Atlanta, Chicago, Kansas City and San Francisco.

Roads Will Cancel Privileges of Industrial Lines.

At a meeting held in Chicago, February 18, executive officers of the eastern railroads unanimously voted to cut off switching and other allowances to all Chicago industrial roads on and after April 1. The action follows the suggestion of the Interstate Commerce Commission in connection with the industrial lines decision and conforms to the inference that applications for rate increases are inconsistent while extensive favors are being granted by railroads in the form of allowances to big industrial shippers. Many of the large industries in and around Chicago have taken up the plan of incorporating a short stretch of switching track and getting an allowance from the connecting railroad for the service of switching cars. Officers of the western roads met with the eastern executives, and agreed to similar action, but no date was set. Railroads in the eastern territory have informed the Interstate Commerce Commission that they desire to shut off the privileges heretofore extended through the medium of industrial lines. As soon as the new tariffs can be printed and filed all rates and concessions granted by carriers in official classification territory to industrial railroads will be canceled. It is expected that the change will go into effect about April 1.

Burlington Wage Dispute Arbitrated.

The board of arbitration which has been sitting in the case of the wage demands of trainmen of the Chicago, Burlington & Quincy R. R. returned its final report, in Chicago, February 19, after four months of deliberation. The decision gives increases aggregating more than \$100,000 annually, distributed among 5000 employees. The board's award grants full pay to trainmen for services performed, either in miles or hours, but denies in

practically all instances requests for extra payments for services incidental to regular duties. In no instance was a reduction in wages made. For the first time in the history of railroading in the United States a minimum monthly wage for trainmen was established. The new scale is as follows: Conductors, \$134.20; baggagemen, \$80.85; brakemen and flagmen, \$74.80. The minimum monthly pay for Chicago suburban trainmen was increased to the following: Conductors, \$112.80; collectors, \$85; brakemen, \$72. With few exceptions, the award places the compensation of way freight trainmen on the mileage basis, conductors to receive 4.75 cents and brakemen 3.25 cents per mile,

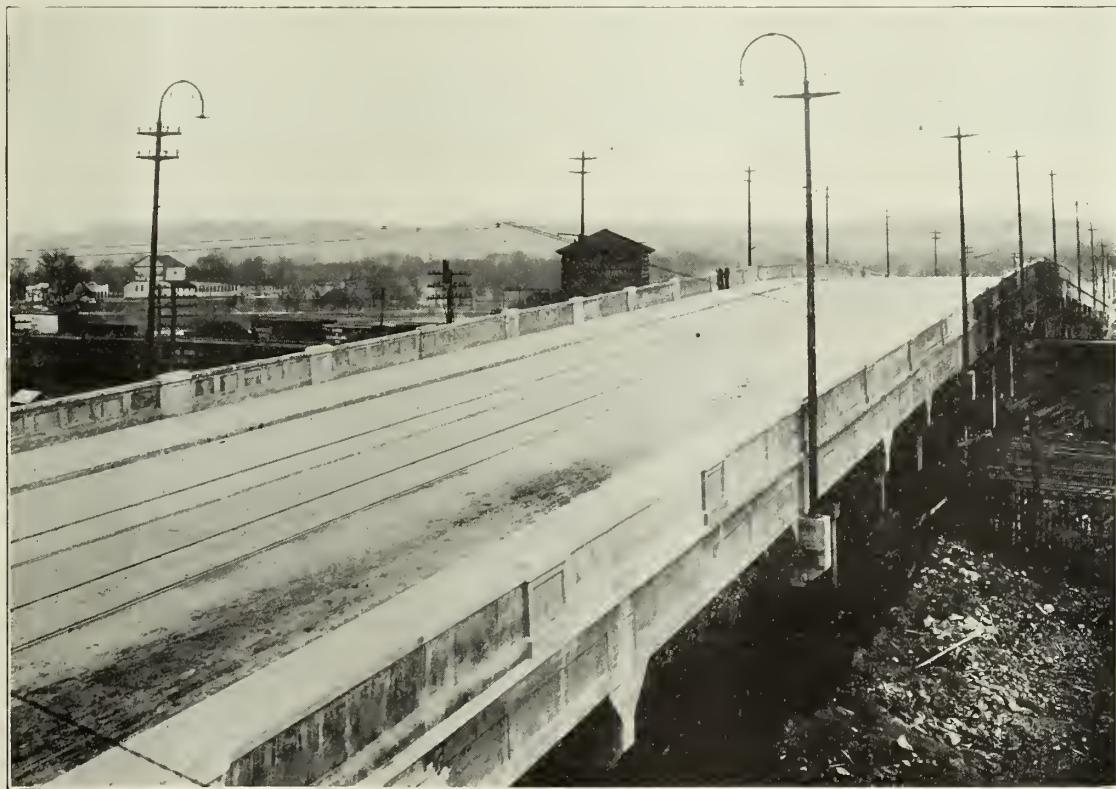
100 miles or less, ten hours or less to constitute a day. The grant preserved for the employees all existing rates which may be higher. The award is the result of fourteen months of effort on the part of the trainmen to obtain a revision of working rules and an increase in wages. In December, 1912, they presented a proposition to the railroad involving more than 150 rules. It was found impossible to agree on 39 rules, and in accordance with the Newlands act the United States commissioner of mediation was invited to attempt to adjust the differences. He was unsuccessful, and an arbitration board was agreed upon.

Separation of Grade Crossings at Chattanooga, Tenn.

One of the most serious questions that faces any city which is a railroad center, after it begins to enjoy any size and degree of rapid growth, is that of grade crossings, of which there are almost necessarily a number in the important railroad cities of the country. One step in the solution of this problem in Chattanooga, Tenn., has been accomplished in a fine, modern viaduct just completed over one of the worst grade crossings, taking the place of an inadequate and exposed steel and frame affair. Another viaduct, at an equally important point, where there has never been any type of overpass, has been decided

The new structure is adequate to all the demands that will be put upon it for many years to come, and an ornament to the neighborhood. It immediately adjoins, in fact partly borders, Warner Park, Chattanooga's 43-acre playground, said to be the largest of its kind in the country. The avenue of which the viaduct is a part is a main artery of traffic between the city and its outlying eastern tributary territory, leading directly to historic Missionary ridge, and thence to Chickamauga Park and Fort Oglethorpe.

The other viaduct referred to, which will be built this sum-



McCallie Avenue Viaduct, in Chattanooga, Tenn.

upon; and the Tennessee supreme court has held that the railroads are to build viaducts at their own expense where such structures are needed.

In building the new McCallie Avenue viaduct, which is the one here referred to, the city of Chattanooga agreed to pay \$20,000, in order to facilitate the work, there being at that time no court decision to fall back upon. The Chattanooga Railway & Light Co., which has a double-track line across the viaduct, paid about \$8000, and the balance of \$100,000, the reputed total cost, was borne by the Cincinnati, New Orleans & Texas Pacific and the Nashville, Chattanooga & St. Louis roads.

mer, will provide an outlet to the east and south without crossing any railroads at grade.

Approximately 10,000 tons of concrete went into the viaduct, which is 735.5 ft. long, made up of 21 spans. In width it is 60 ft., divided as follows: Roadway, 40 ft.; sidewalk on each side, 10 ft. There is 12 ft. of clear vehicle roadway between the outer car rail and curb on either side. The entire roadway is paved with brick. Ornamental posts, carrying trolley wire and lights, are placed on either side of the structure. These posts are of the standard type used by railway companies. Each is made up of three sections, one 7 ins. in diameter, another 6 ins. and the third 5 ins. Each post terminates

at the top in a half turn from the extremity of which is suspended one 108-watt mazda lamp. There are fourteen of these posts, seven on each side.

The viaduct is all flat-span work. The pilasters and hand rail, of course, were set in place by hand. The steel reinforcement in the beams is two inches off the bottom, so as to render most remote the possibility of smoke fumes getting to the steel by wearing away of the concrete. In the floor slabs the steel is $1\frac{1}{2}$ ins. off bottom. The 500 tons of twisted steel used for reinforcement was furnished by the Corrugated Bar Co., Buffalo, N. Y., and varied in dimensions from $\frac{1}{4}$ to $1\frac{1}{2}$ ins., according to the way it was to be used.

The longest span in the viaduct is 30 ft., and the piers are from 12 to 30 ft. high, including footings. The grade of the eastern approach of the viaduct is 5.3 per cent, and of the western approach, 5.5 per cent. Twelve tracks pass under the viaduct at an angle of about 70 deg., so it was necessary to set eight piers askew. Over the tracks the viaduct rises to a maximum height of 26 ft.; at either end it is about 18 ft. from natural ground, as the street approaches it on a fill. About midway of the viaduct there is a private stairway, built at instance of the C., N. O. & T. P. Ry. operating department, for benefit of its yard force.

Operations of the Police Department, Baltimore & Ohio R. R.

The annual report of the police department of the Baltimore & Ohio system shows that 13,129 arrests were made during 1913, as compared with 10,417 arrests during 1912, an apparent showing that crimes committed against railroads are increasing. There were 8449 convictions in 1913, while in 1912 the number of convictions was 6515. This increase in crime added materially

to the expense of the railroad for doing business during the year.

The report of G. A. Ogle, superintendent of police, covers all classes of criminal offenses, from petty larceny and disorderly conduct to train wrecking, highway robbery and murder. The most frequent offenders were those who "violated railroad laws," for which 8303 arrests of tramps and others unlawfully using the railroad property were made. Arrests for intoxication and disorder numbered 2526, with 1567 arrests for larceny, 176 for burglary and 3 for murder. For receiving goods stolen from the railroad there were 67 arrests.

Commenting upon the large number of arrests of trespassers, Superintendent Ogle says: "It is evident that the number of persons unlawfully riding over the railroads and trespassing upon the property in other ways is on the increase, but the officials have been badly handicapped in coping with this evil on account of the lack of co-operation on the part of authorities. The courts will handle a few offenders, but it is continually impressed upon the railroads police department that the arrests to trespassers must be held to the minimum because the cities, towns and counties are unwilling to bear the expense of harboring this class of offenders in jails and other institutions of detention. In sections of Pennsylvania, West Virginia and Ohio, however, where sentences to work on county roads and at other hard labor have been imposed, trespassing is not so general as in other territory where the road operates."

The police officials of the Baltimore & Ohio are hopeful that the Maryland legislature will act favorably upon the recommendation of Governor Goldsborough, that stringent laws be enacted against trespassing upon railroad property. A report was made to Governor Goldsborough recently by the legal department of the Baltimore & Ohio, in which the difficulties ex-

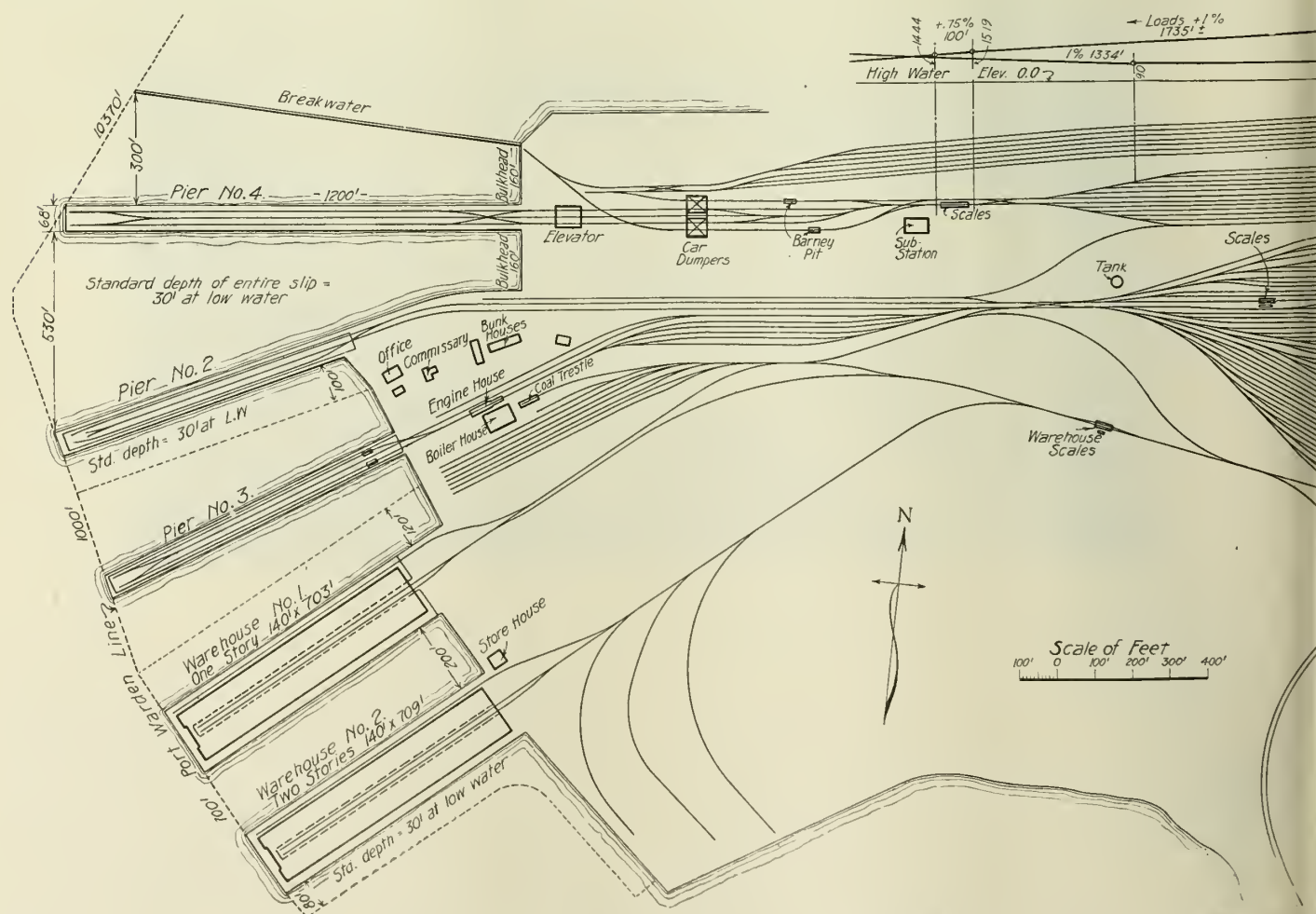


FIG. 1—General Layout of Lamberts Point Terminal, Norfolk & Western

perienced in operating the railroad, due to molestation by tramps and other vicious characters who steal shipments, wreck trains and commit other crimes were pointed out; and this presentation of the subject was made the basis of the governor's message to the legislature.

The head of the police department further states that in numerous instances where reports were made of obstructions having been placed on rails, missiles thrown at trains, etc., it was found that "very small children were often guilty of these offenses," and the railroad officers frequently brought the cases to the attention of parents in an effort to correct the trouble.

Convictions were secured under the Carlin act, a federal law, for the robbery of cars on the Baltimore & Ohio lines and heavy penalties were imposed for such crimes.

Reference is made in the report of the police department to the recovery of a shipment of valuable rugs which was washed out of the freight station at Zanesville, O., during the spring floods. The rugs, 14 in number and valued at \$9000, were gathered up in the flood debris and when recovered were being used as kitchen carpets and as doormats in small houses in the flood district, regardless of the fact that some of the rugs cost as much as \$1500 each.

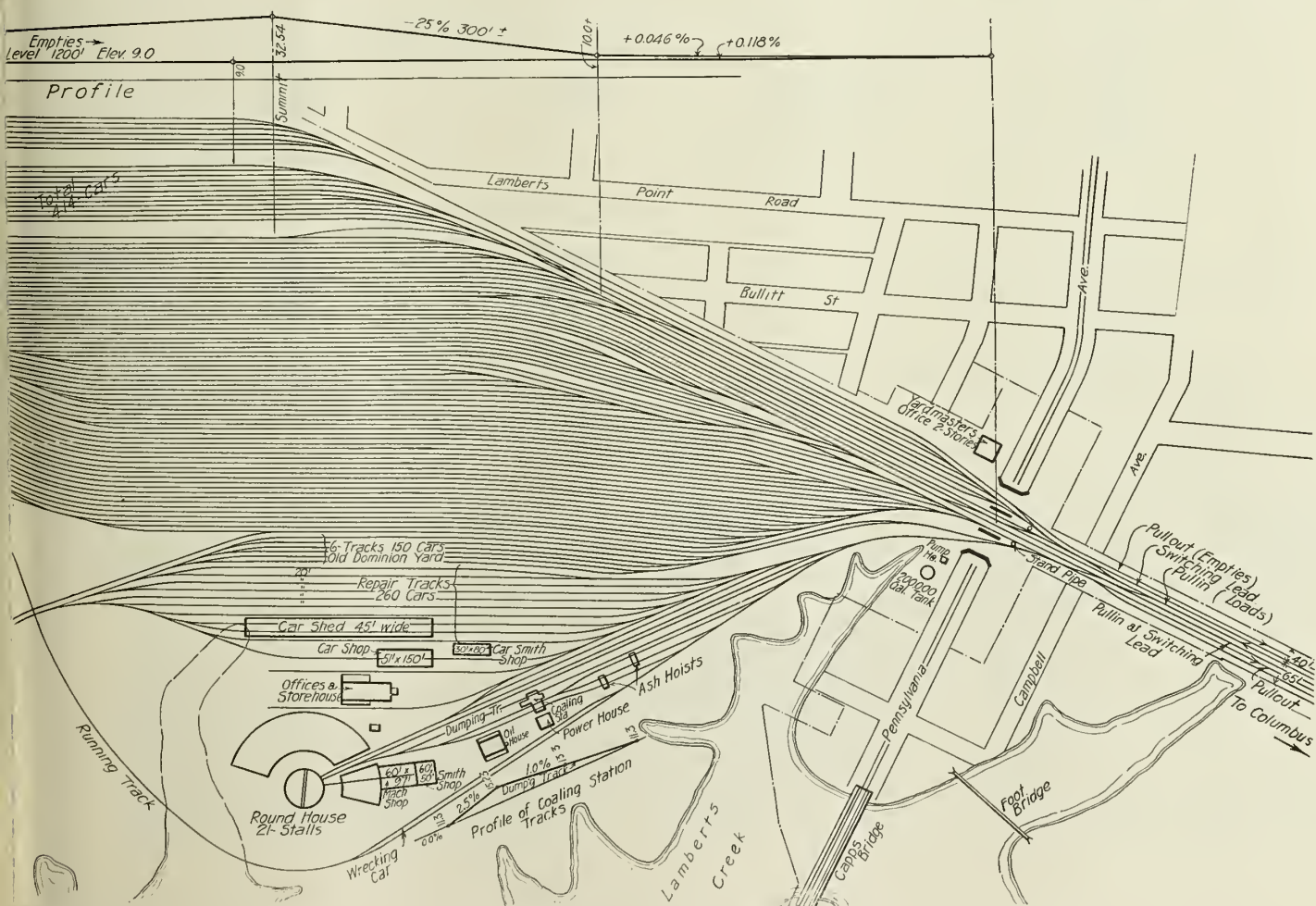
New Coal Pier for the Norfolk & Western Ry., at Norfolk, Va.

A new coal pier for the Norfolk & Western Railway, at Lamberts Point, Norfolk, Va., just recently completed. It is a steel structure 1200 feet long and 90 feet high, with gravity switching tracks, car dumpers, transfer cars and elevators, with capacity for loading ships at the rate of 100 tons per minute. Deep pile driving in the foundation work. Electrically operated.

To increase its facilities at Lamberts Point, in Norfolk harbor, for transferring coal from cars to vessels, the Norfolk & Western Railway has just completed a steel pier of large size, fully equipped for mechanical operation. The existing terminal at this point prior to the recent improvements comprised a large storage yard, with classification and other switching tracks, roundhouse and other locomotive facilities, two warehouses and three coaling piers, on slips dredged to standard depth of 30 feet of water. These existing coal piers are of timber construction, and two of them will be retained in service. They have inclines for pulling cars to the top of the pier, where the coal is dumped from the cars into pockets, from which chutes

lead to the holds of the ships. It having become necessary to increase the coaling capacity of the terminal, it was decided to build the new structure of steel, and of such length that a vessel tied up alongside could be loaded with several classifications of coal without moving the vessel. For this purpose the pier was designed to be 1200 feet long, with double rows of pockets, so that vessels could be loaded simultaneously on both sides of the pier.

The new pier, known as No. 4, is located as shown on the general layout drawing, Fig. 1. The yard was also extended by constructing a new gravity set of 12 tracks, with a total capacity of 414 cars, for holding cars loaded with coal about to be transferred to vessels. North of this set of tracks there is a somewhat longer set of 7 tracks, to receive the empty cars, after they have dumped their loads. To make room for these tracks the site of the roundhouse and other locomotive facilities was moved to the south side of the yard, where a new structure of 21 stalls was built, with machine shop, blacksmith shop, oil



Ry. at Norfolk, Va., including Storage Yard, Warehouses and Coal Piers.

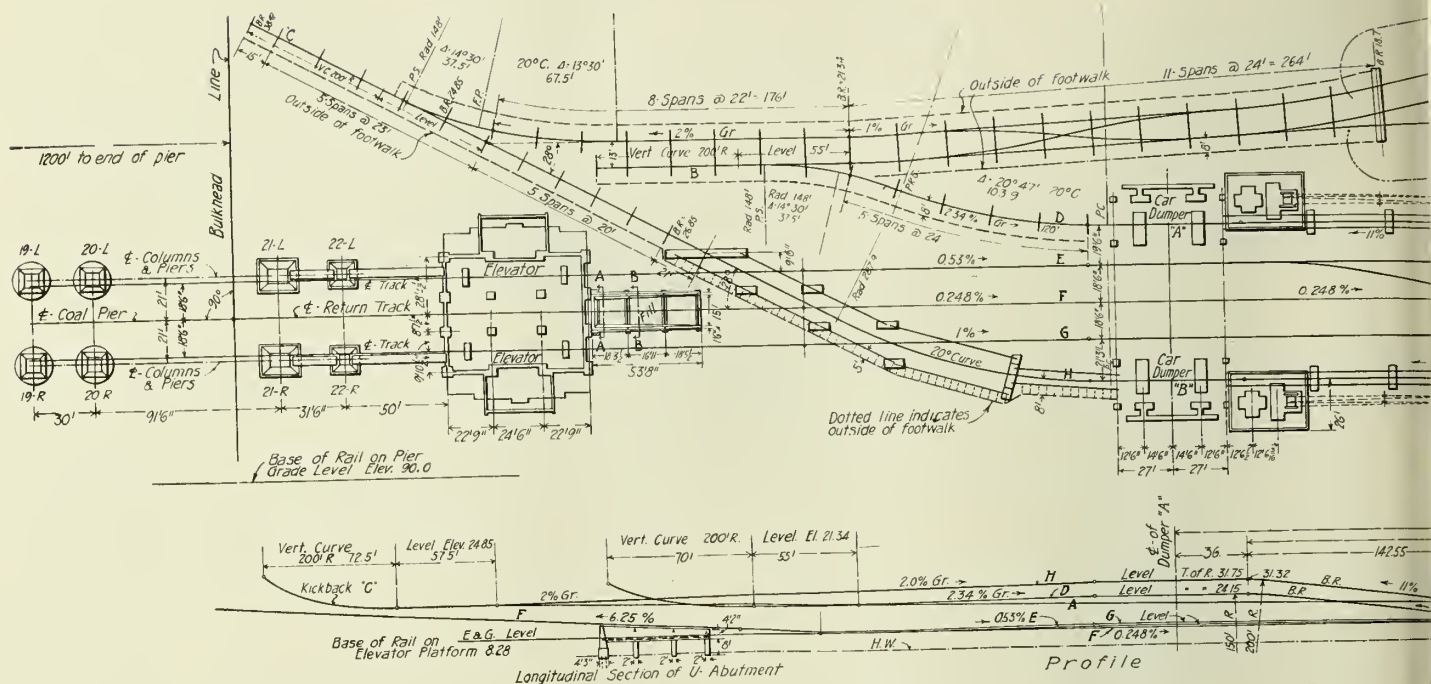


Fig. 2—Arrangement of Tracks Leading to and from Car Dumpers and

house, coaling station, ash pits, turntable, and minor auxiliaries.

The general arrangement for operation of the pier may be described as follows: Loaded cars are pulled back from storage through lead tracks, whence they are pushed forward to the 12-track gravity set that is immediately connected with the pier. These 12 tracks are built on the hump order, the sum-

mit being at the east end, with the lead track or ladder on the other side of the hump. The rate of descent toward the pier is 1 per cent, over a distance of 1735 ft. At the west end these tracks converge into two ladders, which connect with lead tracks running straight to the pier. The cars having been pushed over the summit at the last end, or released from any point in this

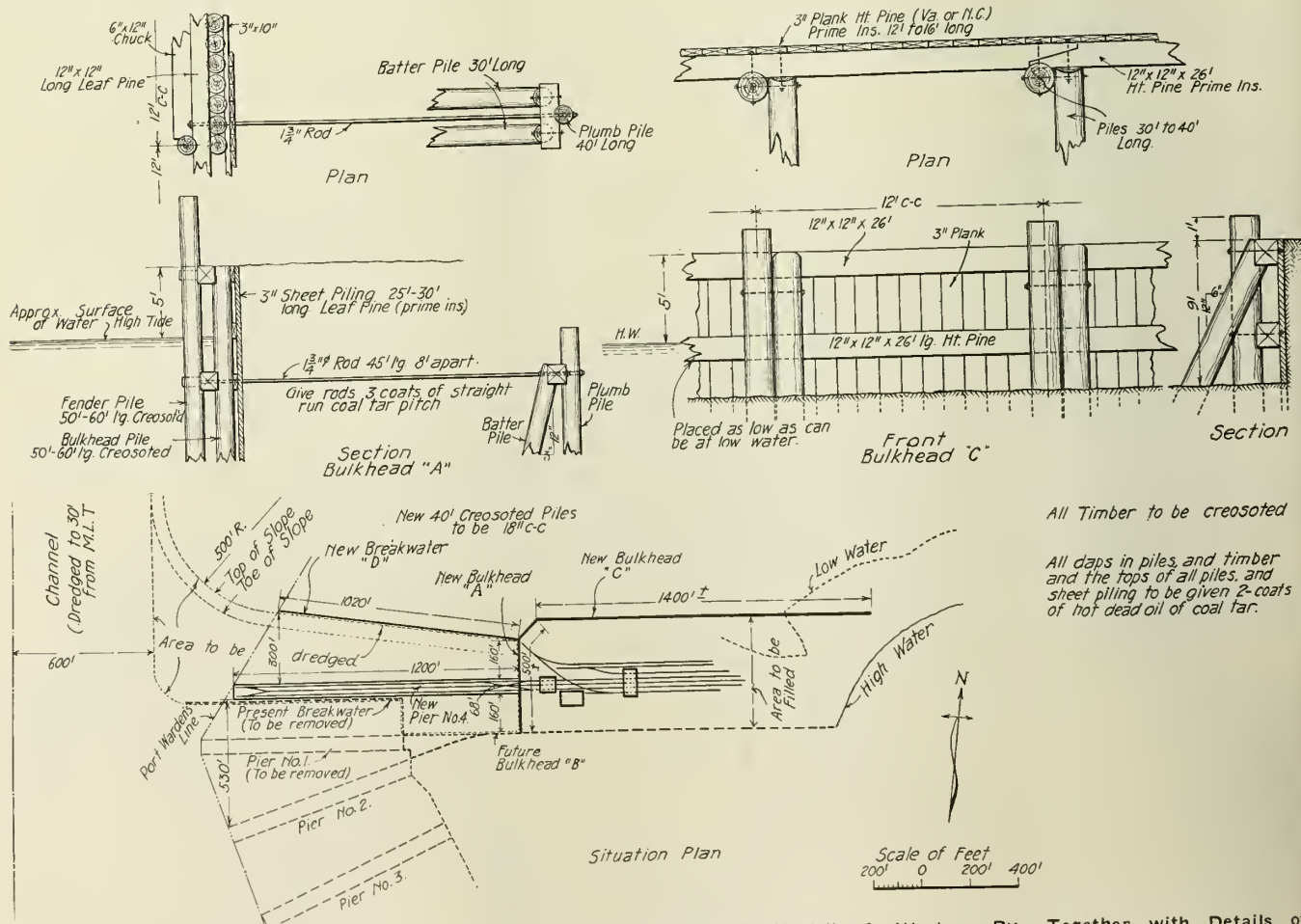
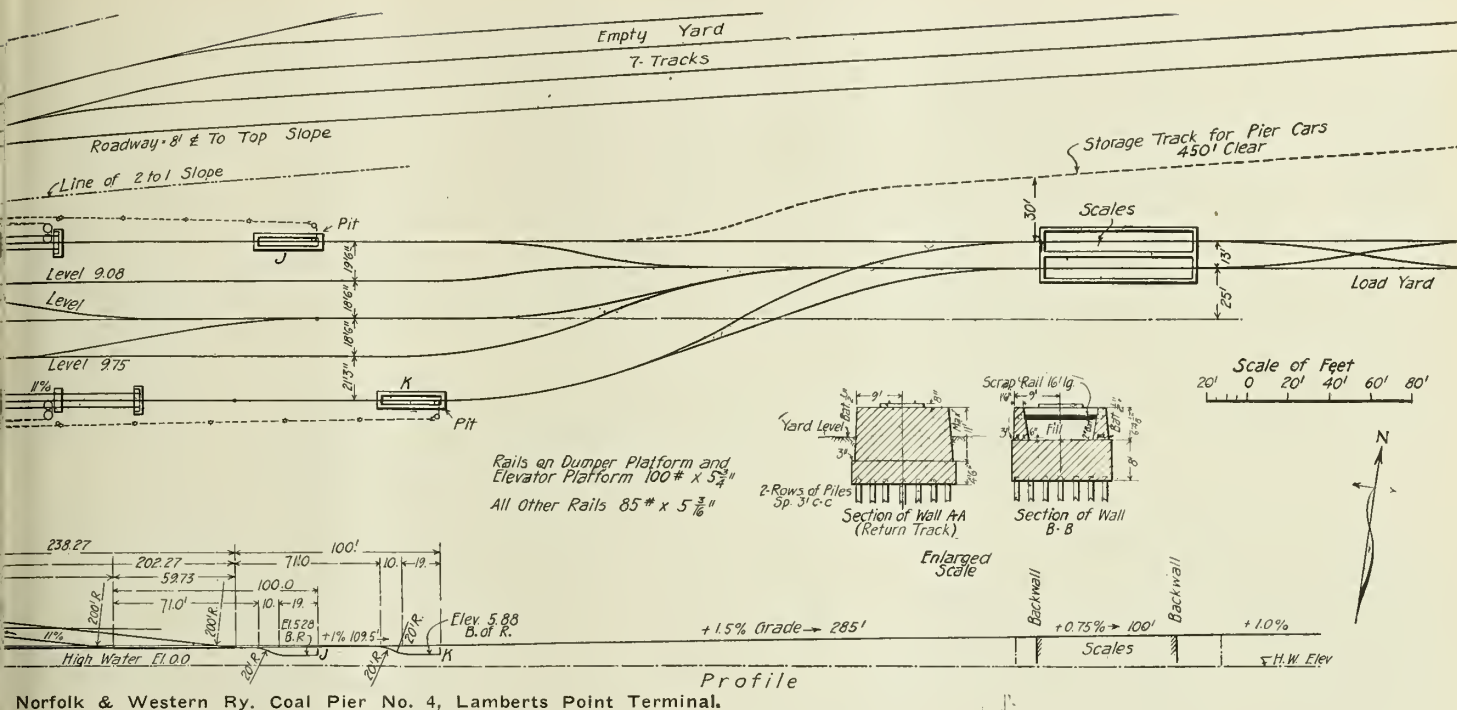


Fig. 3—Situation Plan of New Coal Pier No. 4, Lamberts Point Terminal, Norfolk & Western Ry., Together with Details of Design of Bulkheads and Breakwater.



part of the yard, the operation is entirely by gravity to the car dumper at the pier, and back into the empty storage set.

On the way down to the pier the loaded car passes over scales and is weighed, whence it passes over either barney pit and is hauled up a short incline to the car dumpers (Fig. 2). These dumpers are in duplicate, side by side. They are of the Wellman, Seaver, Morgan type and dump the coal by turning the traffic cars upside down. Here the coal passed direct into so-called transfer cars holding 100 tons each, or with capacity for two of the standard 50-ton road cars. These transfer cars are equipped with electric motors, operating by the trolley system, and, as each becomes loaded at the dumper, it passes to an elevator of ordinary, but heavy, construction, where it is lifted vertically to the top of the pier, 90 ft. above the water. Arriving at the top the transfer car is run to position for dumping into any desired pocket leading to the vessel. The empty transfer car then passes to the west end of the pier, whence it is switched to an incline leading down through the center of the pier to the car dumpers again. By operating both car dumpers and twelve transfer cars the pier can handle and load coal into a vessel at the rate of 100 tons per minute.

As each road car discharges its load at the dumpers it is bumped off the platform by the next loaded car coming on, and passes by gravity to a kick-back, whence it is started down into the empty storage set, which is built on a grade of 1 per cent for a distance of 1334 ft., so that the operation on these tracks also is entirely by gravity.

While the loaded car is descending to the dumpers and returning to the empty storage tracks it is under control of a brakeman. As these brakemen ride the empty cars back into the storage tracks, they walk across to the tracks where the loaded cars stand and grab onto a loaded car as it starts down the grade, and again go around the circuit.

The summit and inclines for these gravity tracks were built up by material dredged from the slips at the pier. This dredging was done by hydraulic means, and the quantity of material filled in behind the shore bulkhead was 675,000 cu. yds.

The situation plan of Pier No. 4 is shown in Fig. 3. In this appear the general layout with details of the bulkhead and breakwater construction, and the area that has been dredged to a depth of 32 ft. at mean low tide. The lumber and piles in this work were creosoted, and wherever dapping was done the



Fig. 7—View Showing Pile Driving Bulkheads, Breakwater and Car Dumper, before Erection of Coal Pier No. 4, at Lamberts Point.

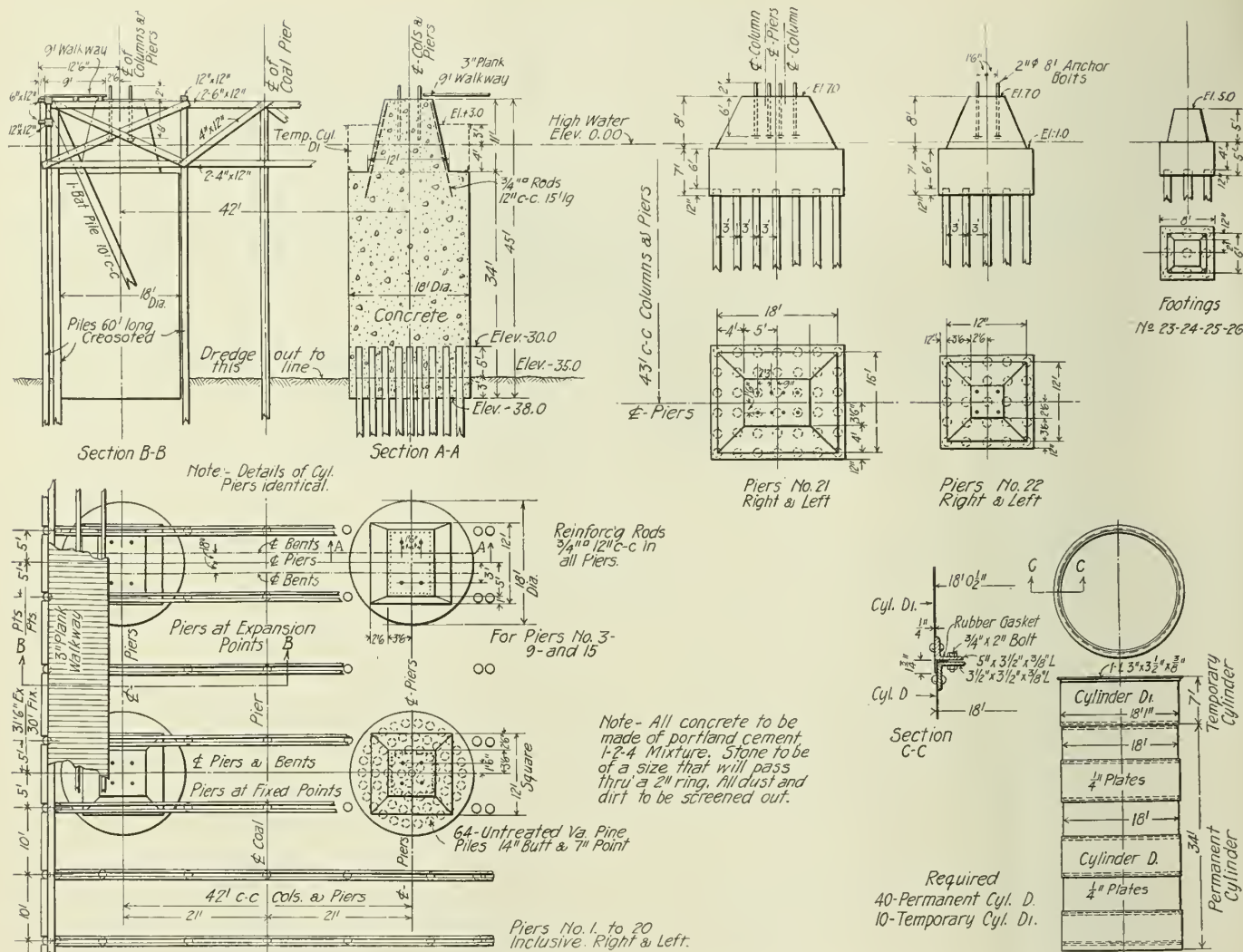


Fig. 8—Setting Steel Cylinders in Place, with Derrick, for Foundation of Coal Pier No. 4, Lamberts Point Terminal.

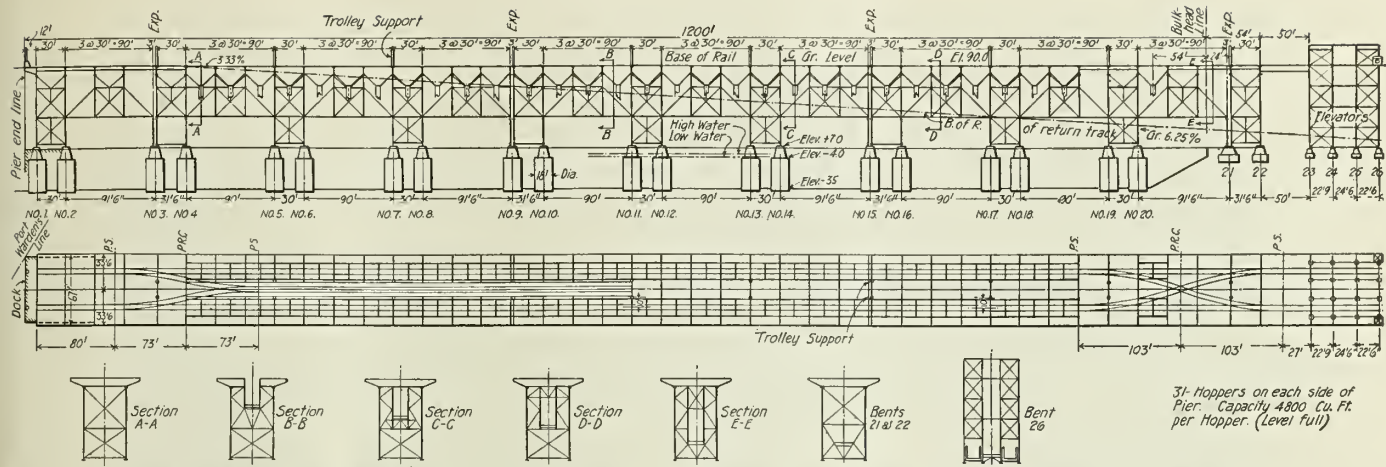


Fig. 5—General Plan and Elevation of New Coal Pier No. 4, Norfolk & Western Ry., Lamberts Point Terminal.

exposed surface was given two coats of hot creosote. Like treatment was applied to the tops of all piles and sheet piling.

The pier was designed as a series of towers, with connecting girders and bracing. That part which supports the coal pockets has ten towers, each 30 ft. long, lengthwise the pier, and 42 ft. wide crosswise the pier. These towers stand 90 ft. apart, in the clear, and are joined at the top by heavy plate girders. In each 90 ft. span there are three pockets or hoppers, each 30 ft. long, and each tower carries a pocket. All told there are 62 pockets or bunkers, each of 4800 cu. ft. capacity, or 20 per cent in excess of the capacity of each of the 100-ton transfer cars.

An end elevation of the pier is shown in Fig. 6. The chutes which carry the coal from the bunkers to the vessel are adjustable vertically to a maximum height of 47 ft. above water, as shown, and for low vessels the chutes can be swung out to a maximum inclination of 60 deg. This adjustment is by means of hand winders at the top of the pier, as seen along either side of it in Fig. 14.

Each tower stands on four concrete piers (one pier for each leg) founded on piles, each pier being 18 ft. in diameter. In each foundation there are 65 piles, of untreated timber, driven right after the area was dredged and before setting the steel cylinder or caisson. The piles were driven so that their tops were down to a depth of 27 ft. below low water.

The material in the bottom was found to be of varying character, being so hard in some places that the piles had to be driven with a jet, while in other places it was so soft that 70-ft. piles had to be used. All of the piles were, of course, driven with a follower.

The steel cylinder for each concrete pier is of ¼-in. plates, made and jointed up as shown in Fig. 4. After the steel cylinder was set over the piles the mud was pumped out at the bottom and concrete, to a depth of 5 or 7 ft., was deposited under water, in drop-bottom buckets. In this manner the concrete was brought to a level about even with the tops of the piles. After the material had set about a week the water was pumped out, the laitance was shoveled off and the empty cylinder was then filled up with concrete. Each cylinder was filled in 6 to 8 hours, with a plant working one Chicago mixer of 1 cu. yd. capacity.

The fender system (Fig. 4), which stands independently of the foundation cylinders, is made of creosoted lumber. This was built and carried along to serve as a backing from which to brace the steel cylinders while they were being filled with concrete.

The accompanying progress views exhibit many features of the method of work, as well as details of the design and construction. Figure 7 shows a pile driver at work, and the car-dumping structure is seen in the distance, at the right of the picture. Figure 8 shows a derrick in the act of setting one of the steel caissons in place. Figure 9 is a view of the concret-

ing plant in operation. The concrete mixture was in the proportion of 1:2:4, the broken stone being of a size to pass a 2-in. ring. The stone and sand were taken off the scows and transferred to the mixer by means of a derrick and clam-shell. Figure 10 shows, at the right, the other side of the mixing plant, with the arrangement for spouting the mixed material from the elevator tower into the caissons.

Figure 11 is a progress view looking from the yard toward the car dumpers. The girders which carry the tracks up to the platforms of the dumpers are supported on concrete piers, as likewise are also the tracks leading from the dumpers. The platform of the left dumper is higher than that of the one at the right, in order that the track over which the empty cars pass to the kick-back may be sufficiently high to provide head-room over the incline track leading down from the top of the pier. The plan of this arrangement, in detail, is shown in Fig. 2.

The erection of the pier was begun with locomotive cranes,

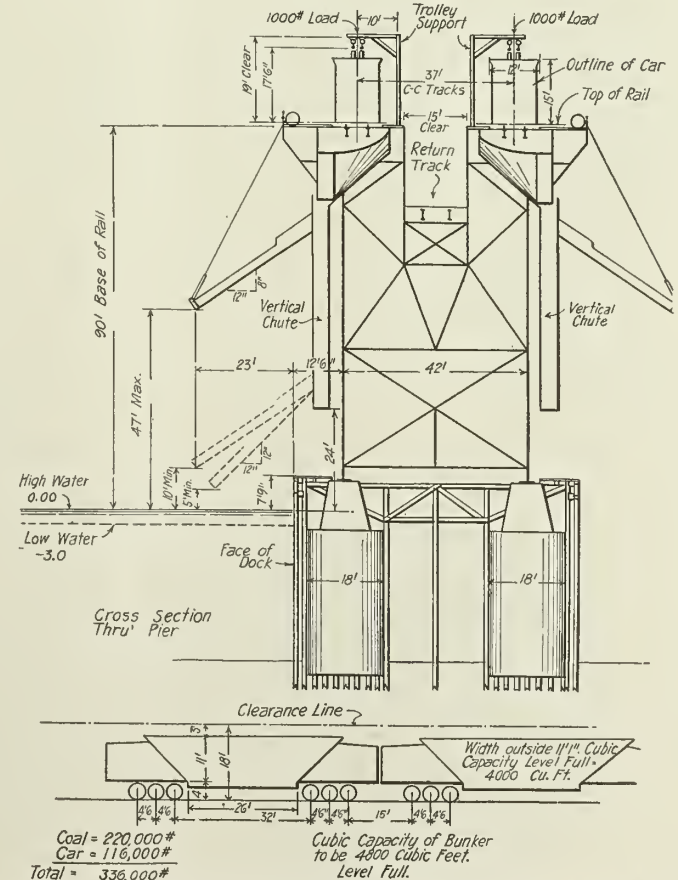


Fig. 6—End Elevation of New Coal Pier No. 4, Norfolk & Western Ry., Lamberts Point Terminal.

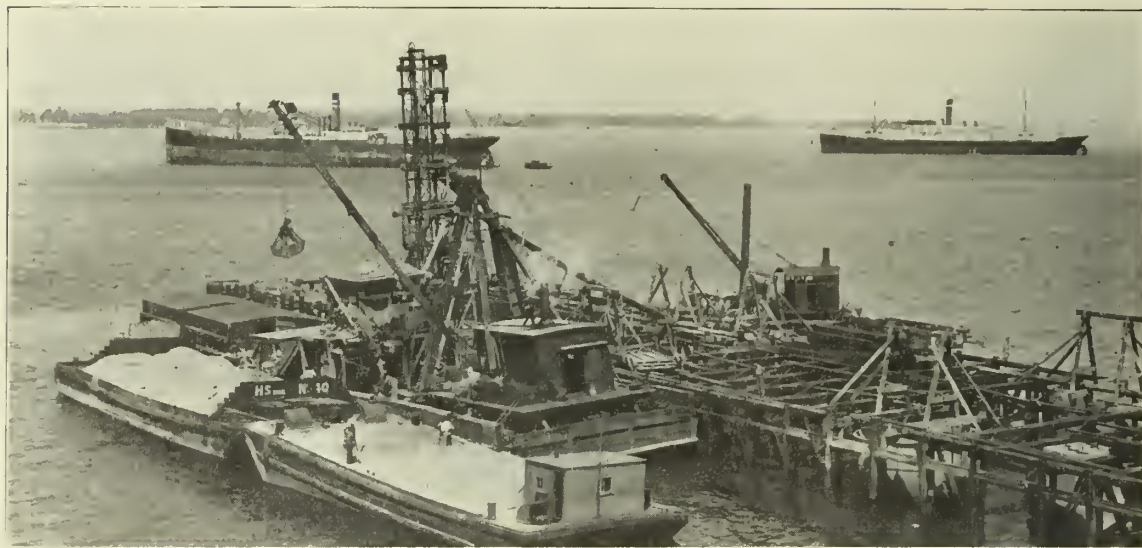


Fig. 9—Material Scows and Concrete Plant at Norfolk & Western Ry. Coal Pier No. 4, Lamberts Point Terminal.

with extra long boom, as shown in Fig. 12. After several panels of the steel work had been put up and braced the erection was then continued by means of a traveler working on the top of the pier, as seen in Fig. 13. Figure 14 is a view on top of the pier, at the outer end, looking landward, and shows the cross-over arrangement by means of which transfer cars may be switched from one side of the pier to the other. Figure 15 is a view of the completed pier, looking seaward.

A general view of the transfer cars is seen in Fig. 16, where there are six of them coupled together. A diagram or outline of the same is shown at the bottom of Fig. 6. The carrying space of the car is provided by a large hopper, with a bottom opening 26 ft. long. On either end of the car there is a cabin for the motorman, with the necessary controlling apparatus, air brake pumps and other equipment.

In this connection it is interesting to mention that the Norfolk & Western Ry. is making a number of 6-wheel-truck gondola or road cars of 96 tons normally-rated capacity, for hauling coal from the mines to this pier. The idea is to have the capacity of each road car equal to that of one of the transfer cars, thereby accelerating the handling capacity of the plant by reducing the time necessary for the transfer car to stand at the car dumper to receive its load. As above stated, it now requires the loads of two road cars to fill the transfer car. The design of these large-capacity road cars was illustrated in the *Railway Review* of Jan. 4, 1913.

From the foregoing descriptive data it is clear, that, primarily, the pier is not intended for storage of coal, the capacity of each pocket being equal only to that of one of the loaded

transfer cars. The storage, such as it is, exists only on the traffic cars held in the yard, and these cars are not switched for dumping until a vessel arrives, or is about to be tied up at the pier.

The pier is electrically operated, by power supplied by a street railway plant. The energy is transmitted to a sub-station, located near the scale house, as seen in Fig. 1, at 11,000 volts. Here, it is transformed down to 600 volts d. c. by a rotary converter, for the trolley circuits. For shop work, which is done with a. c. motors, it is stepped down in stationary transformers.

This work was done under supervision of Mr. J. E. Crawford, chief engineer of the Norfolk & Western Ry., Mr. W. P. Wiltsee, assistant engineer, being in direct charge on the ground. Sandford & Brooks, of Baltimore, was the contractor for the dredging and for the timber and pile work. The Virginia Bridge & Iron Co., of Roanoke, Va., was the contractor for the steel caissons. The Pennsylvania Steel Co. erected the structure above the masonry, in which there is 7,500 tons of steel work. The Link Belt Company furnished the chutes, and the Wellman, Seaver, Morgan Co., of Cleveland, supplied and installed the machinery.

More than 2 billion board feet of timber, with a value of $4\frac{1}{2}$ million dollars on the stump, was sold by the forest service last year, according to the annual report of Henry S. Graves, forester, recently published. This is an increase of 167 per cent over the sales of the preceding year. The timber sold was largely for future cutting under contracts that will run for a number of years. The actual cut was a

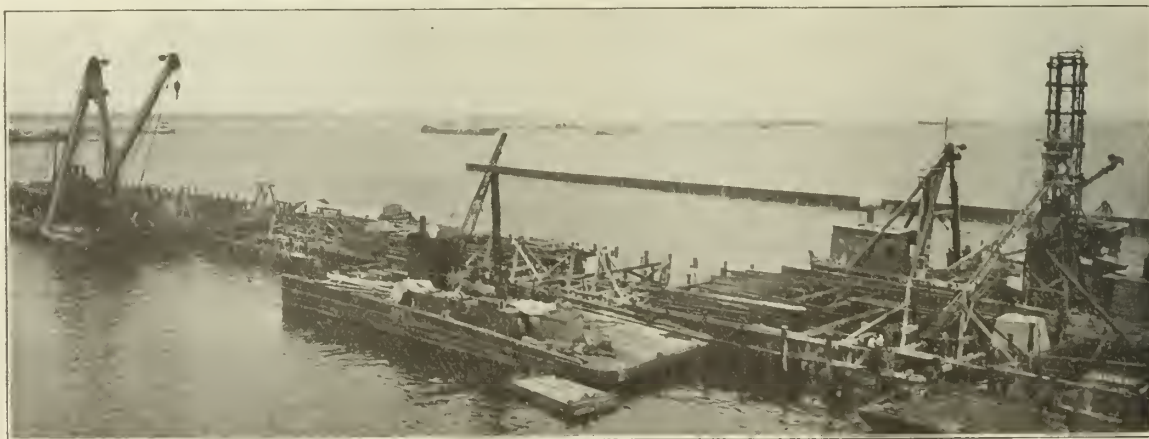


Fig. 10—Progress View on Coal Pier No. 4, Showing Spout Side of Concrete Plant, Derrick Scows, etc.

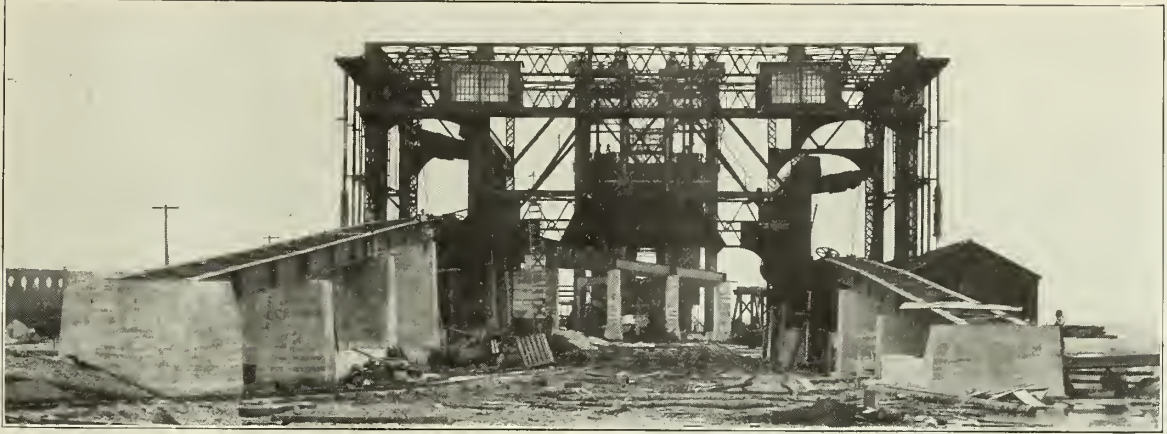


Fig. 11—Progress View of the Car Dumpers at Norfolk & Western Ry. Coal Pier No. 4, Lamberts Point Terminal.

little less than 500 million board feet, an increase of 15 per cent over 1912. Still larger sales are in prospect.

Charges of Extravagance in Construction of National Transcontinental Ry. of Canada.

Abstracts from a report containing sensational charges, returned by a commission appointed two years ago to investigate this important piece of Canadian railway construction. In this connection it will be interesting to refer to our article with profuse illustrations, on "Construction Work on the National Transcontinental Railway of Canada," published in two instalments in our issues of January 3, and January 17, 1914.

The commission appointed two years ago by the Canadian government to investigate the building of the National Transcontinental Ry. made a report covering its conclusions, to parliament, February 12. The document makes sensational charges of extravagant and incompetent methods in connection with the construction. It says, to quote in brief, "We find that the Transcontinental Ry. Commission, the Grand Trunk Pacific Ry. and those having charge of the construction of the railway, did not consider it desirable or necessary to practice or encourage economy in the construction of this road. We find that, without including the money which was unnecessarily expended in building the railway east of the St. Lawrence river, forty million dollars at least was needlessly expended in the building of this road."

The report is a voluminous one and represents the results of one of the most thorough investigations ever made into any government activity in Canada. It is based in the main upon the evidence of the persons who had charge of the building of the railway, but added to this is the personal observation of the commissioners who made an inspection of all work done prior to the first of October, 1911.

After reviewing the agreement under which the railroad had its inception, Investigating Commissioners Gutelius and Lynch-Staunton, K. C., call attention to the fact that until the appointment of Major Leonard in the autumn of 1911, no member of the Transcontinental Railway Commission had any experience or knowledge of railway building or operation. Further, the railway was designed—that is, its standard was decided on—without any knowledge as to whether it was suitable for the country, and on assumptions as to business expected which were unwarranted.

We give below some further abstracts from the report, in the language of the Montreal Gazette:

"The report strongly condemns the methods that prevailed in inviting tenders. The unlimited security required from contractors and the plan of letting the work for the most part in unreasonably large sections resulted in only five contractors tendering for 806 miles of the railway, while eleven contracting firms secured all the work, and sub-let it to upwards of 100 sub-contractors who, had the work been divided into reasonably

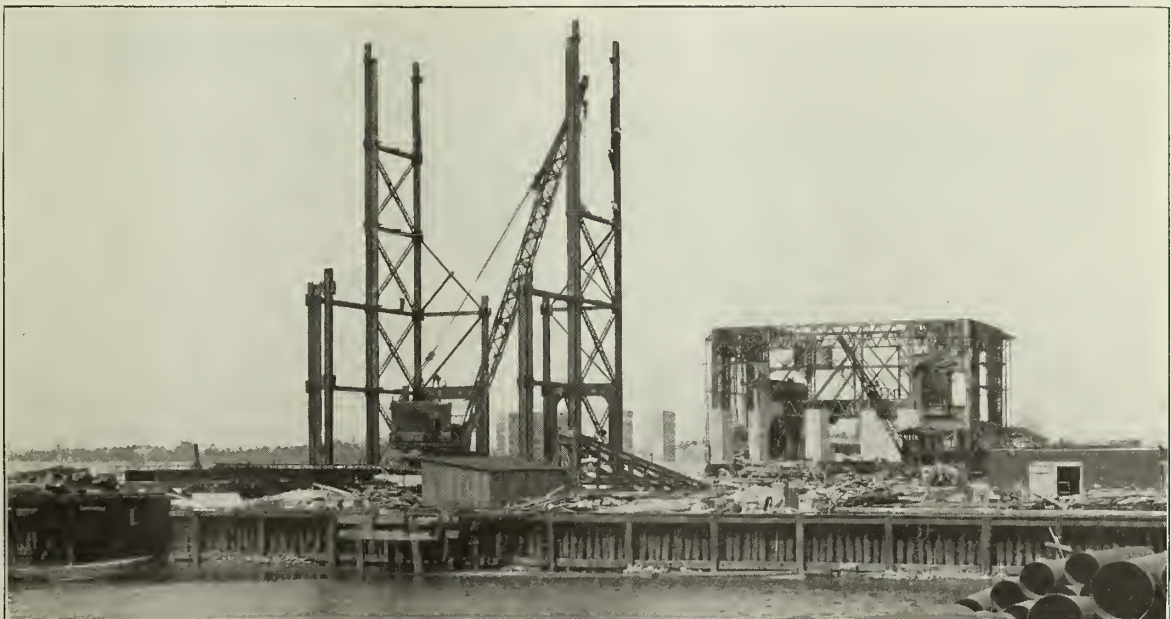


Fig. 12—Beginning of Erection with Locomotive Crane, Coal Pier No. 4, Lamberts Point Terminal.

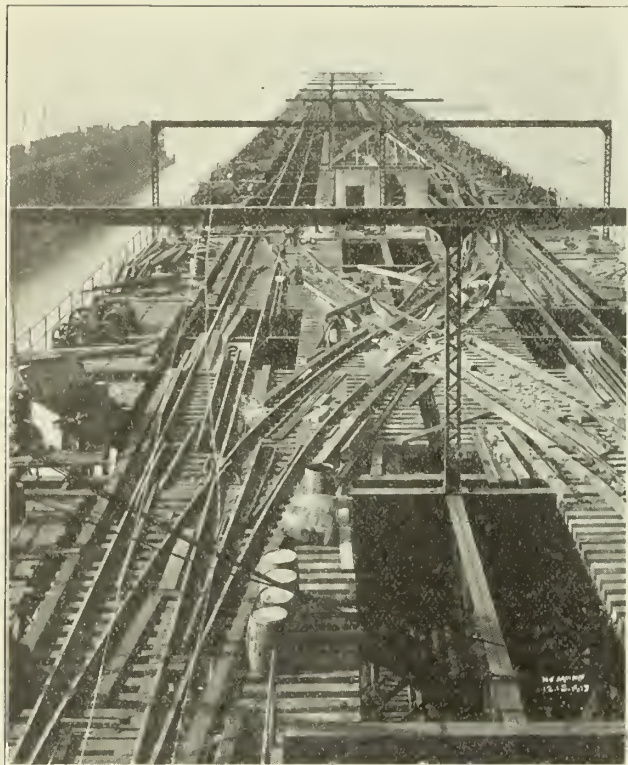


Fig. 14—View on Top of Coal Pier No. 4, Lamberts Point Terminal.

large sections and the security required in other governmental contracts only been exacted, would have, in all probability, competed in the bidding. As an indication of the handsome profits derived by these eleven firms, it appears that they were paid

\$8,800,000 in profits for that part of their work which they let to sub-contractors.

"The commissioners are strong in their condemnation of the construction of the New Brunswick section, and are of the opinion that it was not a commercial necessity, and was built for the purpose of placating the supporters of the government east of Quebec. In addition, its premature construction has resulted in the loss of large sums of money in interest. The report states that it parallels the Intercolonial Railway and is itself earning nothing. Already trees are growing up on the right of way, ties are rotting and the rails are rusting away. This portion of the road cost \$35,000,000, and the interest charges today are \$1,200,000 a year. The commissioners point out that if one-third of this amount had been expended on the Intercolonial it would have provided all the trunk line facilities required for the province of New Brunswick, for many years.

"As to grades, the report says that had momentum grades been adopted, as is the usual practice in high-class modern railway construction, they would have in no way impaired the usefulness of the railway, or increased the cost of operation, or reduced its hauling capacity, and \$6,200,000 might and should have been saved.

"As to curves, the report says, that had sharper curves i. e., curves of a shorter radius than those actually used, been allowed, they would not have impaired the usefulness or increased the cost of operation, or reduced the hauling capacity of the road, and \$2,400,000 might and should have been saved.

"On the question of bridges, the commission finds that had wooden trestles been used instead of train fill and steel structures, as were done by the Grand Trunk Pacific on its portion of the line, and as is allowed in the best modern railway construction, they might have been in course of time replaced by fill and steel structures and \$2,947,227 thereby saved without impairing the usefulness or reducing the hauling capacity of the railway or



Fig. 13—Progress View of Erection on Coal Pier No. 4, Lamberts Point Terminal.



Fig. 16—Transfer Cars for Handling Coal to Pier No. 4, Lamberts Point Terminal, Norfolk & Western Ry.

increasing the cost of operation. The National Transcontinental Railway Commission had an offer from the Grand Trunk Pacific to fill wooden trestles at the rate of 25 cents per cubic yard. Had the commission made such an arrangement to do the train filling after the road was opened \$3,250,000 would have been saved in addition to that included under the last heading.

"As to buildings, the report says that the 16 engine houses to be constructed were considered of such small importance that the contractors were not required, although the attention of the commission was drawn to the omission to name a price either in bulk or in retail for their construction, but were given the contracts on prices afterwards to be arranged. In consequence of this, these buildings cost \$800,000 more than they otherwise would. In the opinion of the investigating commission, this was a direct violation of the statute, which clearly requires that contracts be given on tender which names the price at which the work is to be done.

"The commissioner says with regard to stations that there were 16 station buildings at different points on the line, each with office accommodation for a staff sufficient to operate 500 miles of railway. Four such might have been justifiable,

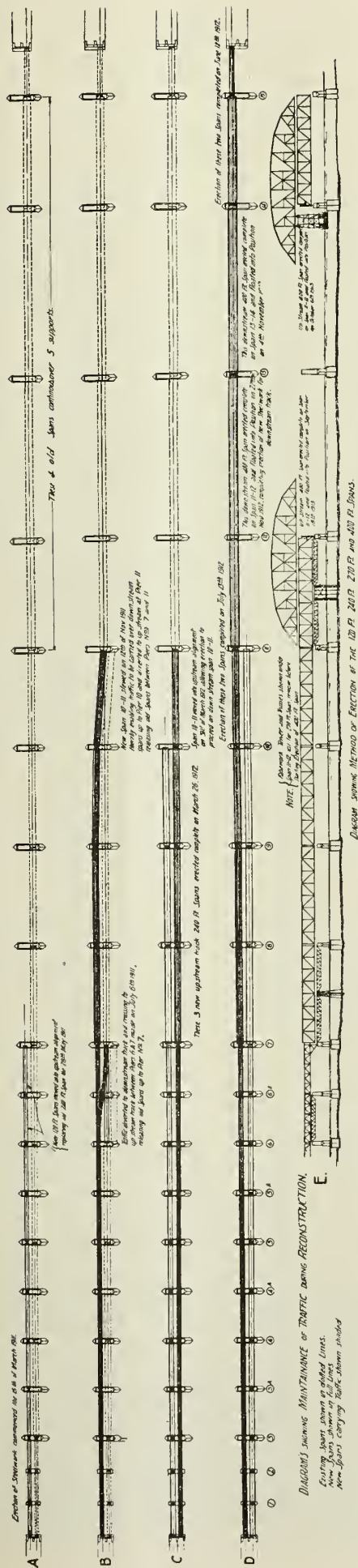
but no more. These station buildings average \$22,000 each, and \$204,000 might have been saved here had care been taken to only provide stations with ample accommodation for the operation of the road. At Redditt, which is in a wilderness, a station ample in every respect for any possible purpose was built, but because it did not comply with the extravagant Grand Trunk Pacific design a second station was built beside it at a cost of \$22,122 to the profit of the contractor alone.

"The commission finds that the design for freight sheds, bunk-houses, store-houses, ice-houses, were on an unnecessarily extravagant scale, and there were far too many of them built. Had the design been within reasonable limits and had they been built only where they were useful \$300,000 would have been saved.

"Dealing with Little Salmon river viaduct, the report finds that this large steel structure, containing 14,000,000 pounds of steel, was erected across the Little Salmon River valley, in New Brunswick, at a cost of over \$800,000. If pusher grades had been used in locating this crossing \$1,750,000 would have been saved in a distance of ten miles and the interest on this sum would in twenty years have paid for a revision of the line if the traffic then warranted it.



Fig. 15—General View of Completed Coal Pier No. 4, Norfolk & Western Ry. at Lamberts Point Terminal, Looking Seaward.



New Canadian Pacific Ry. Bridge over St. Lawrence River at Lachine, Que., Fig. 1.—Erection Diagrams.

The steel was especially designed with a view to quick and simple erection, as it was impossible to place false work in the deeper portions of the river where the 408-ft. spans are located. For these reasons the designers decided upon a peculiar type of construction. This consisted of a set of 4 spans (2 deck and 2 through) continuous over five supports, which enabled the steel work of the side or flanking spans to be erected first on false work, and the main channel spans to be erected by the cantilever method, the flanking spans being used as anchors,—some steel work was also cantilevered both ways from pier No. 13 located in the center of the channel.

When these several spans were connected, they formed, as aforesaid, a continuous span over five supports, fixed at the center on pier No. 13 and expanding both ways therefrom. The channel spans, as noted above, were made of through design, to allow steamers to pass under at full speed, and Shaler Smith solved the problem of combining deck and through spans by a very beautiful and interesting method, that of curving the ends of the spans, as shown in the photographs and plans. This procedure is open to criticism from a mathematical point of view, but, considering that the pier supports were founded on rock and, in addition, had adjusting screws, so that the ideal conditions upon which the calculations had been made, could be at all times maintained (if necessary), the design was considered justifiable.

The locomotives for which the old structure was designed were equal approximately to Cooper's E35 loading, followed by a trainload of 2500 lbs. per lineal foot, and the material in the structure was steel, except stringers, counters and wind bracing, where it was iron. The design lent itself admirably to rapid erection, which was borne out by the fact that the steel took only twelve months to erect ready for traffic. By 1910, the requirements of traffic had necessitated the use of much heavier engines than were considered in the original design and, in addition, the increasing volume of traffic made it advisable to double-track the line from Montreal eastwards. Bids were, accordingly, called for on designs prepared by the railway company's engineers, and a contract was subsequently entered into with the Dominion Bridge Co. for the removal of the old spans and the erection of the new. A contract was also made with the Foundation Co. for the extension of the substructure to accommodate the extra steel work. In the old structure there was no traffic to be taken care of, but in the new it was not allowable to interfere with the regularity of passing trains. This considerably complicated the problem, and, under the circumstances, it was decided that the only possible way of ensuring all the requirements was to build two independent single track bridges, and remove the old bridge in sections, transferring traffic from side to side, as will be described later.

SUBSTRUCTURE.

From observations during the life of the old bridge it was noted that the ice of Lake St. Louis generally grounded on the Lachine side of the river in shallow water, and, after breaking up, floated under the Lachine end of the bridge in small pieces in a manner which did not seem to justify the existence of four 240-ft. spans between piers Nos. 3 and 7. It was, therefore, decided to bisect these spans by the building of new intermediate piers (Nos. 3a, 4a, 5a and 6a), and using eight 120-ft. spans instead of the four 240-ft. ones. This resulted in considerable economy in cost. Between piers Nos. 7 and 11 it was not considered advisable to make a change. With these exceptions, the structure was renewed in span lengths similar to those which originally existed, but, instead of the continuous spans between piers Nos. 11 and 15, it was decided to use simple spans of ordinary deck and through types. The new second track was placed on the down-stream side of the existing bridge. The added masonry was bonded into the old above water line, while below the water line open caissons were sunk generally to the same hard bottom to which the

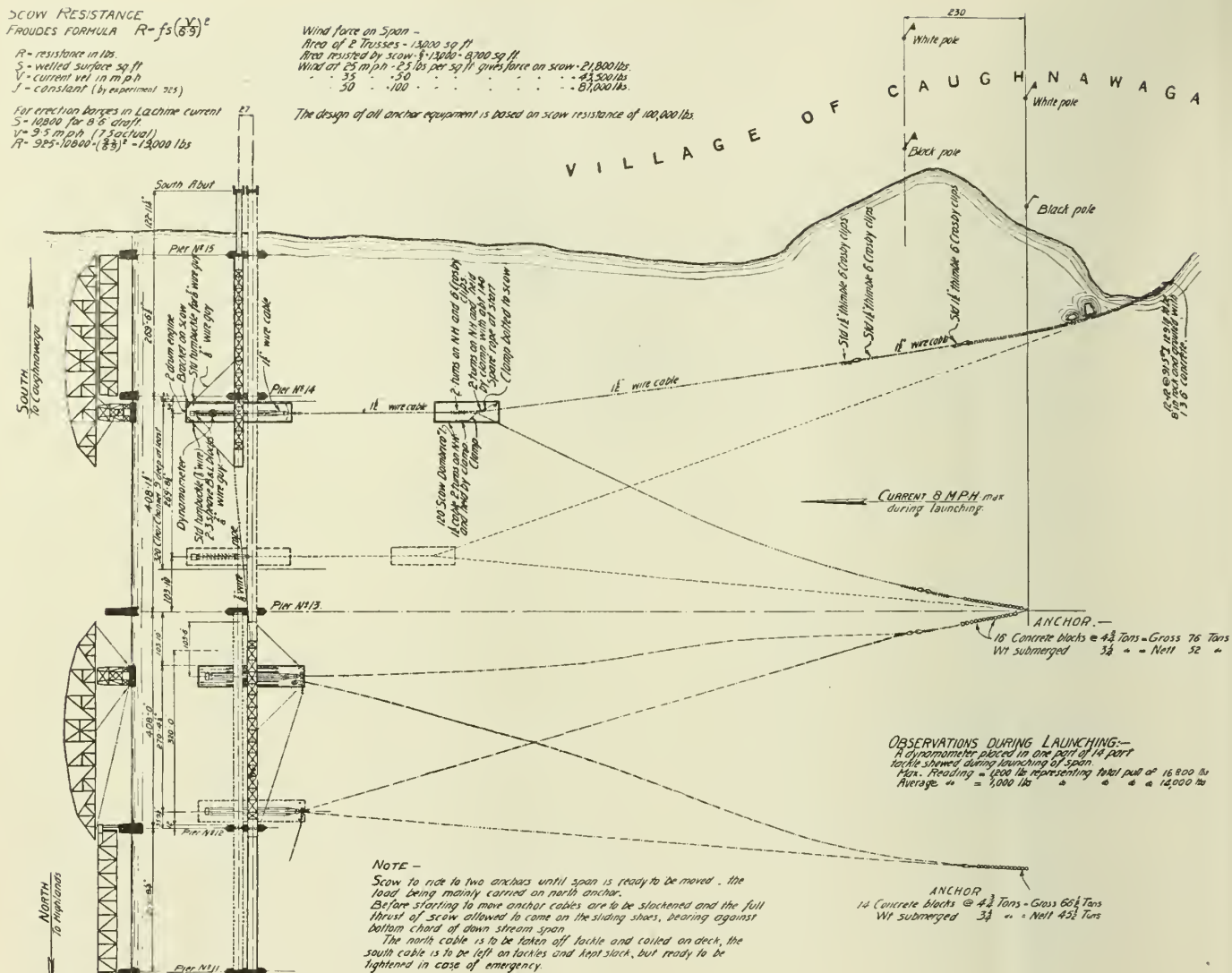
SCOW RESISTANCE
FROUDE'S FORMULA $R = f s \left(\frac{V}{85} \right)^2$

R = resistance in lbs.
 S = wetted surface sq ft
 V = current vel. in m.p.h.
 f = constant (by experiment .925)

For erection barges in Lachine current
 $S = 10,000$ for 8 ft draft
 $V = 3.5$ m.p.h. (7 feet/sec)
 $R = .925 \cdot 10,000 \cdot \left(\frac{3.5}{85} \right)^2 = 12,000$ lbs

Wind force on Span -
 Area of 2 Trusses - 13,200 sq ft
 Area resisted by scow - 8,100 - 8,700 sq ft
 Wind at 25 m.p.h. - 25 lbs per sq ft gives force on scow - 21,000 lbs.
 35 50 81,500 lbs
 50 100 81,000 lbs

The design of all anchor equipment is based on scow resistance of 100,000 lbs.



New Canadian Pacific Ry. Bridge over St. Lawrence River at Lachine, Que., Fig. 3.—Location of Anchors, Scows, etc.

original masonry was carried, except in the case of piers Nos. 9 to 13, where pneumatic caissons were found necessary. Caisson No. 13 was square-ended where it butted against the old masonry, and pointed at the down-stream end. It was carried about 7 ft. lower than the bottom of the old pier, because it was found that the shale immediately under the same was of such a description as to make it advisable to go deeper in order to make sure that there would be absolutely no settlement, which, of course, would result in serious cracks in the bonding above the water line. The work at piers Nos. 8 to 14 was carried out in still water, which was obtained by the use of wing dams composed of rock-filled cribs sunk immediately up-stream at an angle of about 45-deg. so as to deflect the current. Masonry was started in June, 1910, and was finished in November, 1911, except for the up-stream end of pier No. 13, which was left till the removal of the old steel work, after which it was built up by the railway company's forces. The pneumatic plant used on pier No. 13 was of the type designed and operated by the Foundation Co., of New York.

SUPERSTRUCTURE.

The 80-ft. deck plate girders at the Lachine end of the bridge are the Canadian Pacific Ry. standard design, and are single-track spans placed along side each other. The 120-ft. spans are deck Warren truss spans with riveted connections, their ties resting upon the top chords. These spans are also simple single-track spans laid abreast of each other. The 240-ft. spans are also Warren trusses with riveted connections, and

have the usual floor system of stringers and floor beams (two stringers per track) riveted against the vertical posts immediately under the top chord. The upper laterals are also riveted immediately below the top chord, and connected with the top flanges of the stringers, where they intersect with the same. The 270-ft. flanking spans are Warren trusses, and, while longer in the panel lengths than the 240-ft. spans, are the same in general description. All the web members, except the diagonals near the center of the span, have solid web plates down the center of the same, and, where necessary, double lattice on the flanges.

For the deck spans the Warren type of truss was found to be more economical than any other. These spans are of the



Fig. 4.—General View of Part of Bridge, Looking up Stream from Caughnawaga Shore.

sub-paneled Pratt truss type, and the top chords are curved, as far as possible, to an approximate parabola. In the web members solid web plates have been largely used instead of lattice bars. In addition to this, the vertical posts are all of "I" sections, composed in most cases of bulb angles and web plates, and, where necessary, there are stiffeners on the webs, especially of the longer vertical posts. The top and bottom chords are of very stiff cross section, partly to allow them to be cantilevered out during erection.

The 408-ft. spans were also calculated for the stresses caused by the special method of cantilevering and launching, which will be described later. The portal and other subsidiary bracing is generally of a stiff design, consistent with the main trusses, to which it is attached. The 270-ft. spans were also calculated for the concentrated weight of one end of the 408-ft. spans, which was to be carried upon them during the process of launching.

The alignment on the bridge is ruled by the overall width of the 408-ft. spans. At pier No. 11, and the south abutment, the two single-track bridges are 27 ft., center to center, and from pier No. 11 to the north abutment the spans grow closer together till they are 16 ft. 4 ins. at the north abutment. This slight kink in the alignment is quite immaterial from an operating point of view, and allowed a valuable saving in masonry from pier No. 11 northwards.

ERECTION.

One of the most important problems in the work was the maintenance of traffic during the erection of the steel work. There were on an average ten trains between the hours of 8 a. m. and 12 noon, and sometimes an average of eight in the afternoon during the usual working hours. In order to carry out the work without interference with traffic it was decided to erect first all spans on the down-stream side from the north abutment to pier No. 7 (See Diagram "A," Fig. 1). When this was done the two new 120-ft. spans between piers No. 6 and No. 7 were moved bodily into the location of the old 240-ft. span, and the latter moved up-stream upon timber towers prepared for it. The down-stream new spans between piers No. 6 and No. 7 were then erected. Traffic was now diverted over the four new spans between piers No. 6 and No. 7 by means of a crossover laid on suitable wooden ties spanning from span to span, so that all old spans between pier No. 7 and the north abutment were thus released. These were taken down and new spans erected. Next, the new spans on the down-stream side between piers No. 7 and No. 11 were erected.

In order to release some more up-stream spans, it was simply necessary to slew over the 240-ft. span between piers No. 10 and No. 11, as shown on Diagram "B," Fig. 1, all new spans between the north abutment and pier No. 11 now benign under

traffic and all old spans between these points being released. After the new spans on the up-stream side between the north abutment and pier No. 10 had been erected, it was simply necessary to pull span No. 10-11 into alignment, as shown on Diagram "C," Fig. 1, and thereby put the traffic on all new spans between the north abutment and pier No. 11, the old spans between pier No. 11 and the south abutment being still under traffic. Then spans were erected between piers No. 10 and No. 11, No. 11 and No. 12, No. 14 and No. 15, and No. 15 and the south abutment. After these were finished, the 408-ft. down-stream spans were erected on top of the 270-ft. spans, as shown in the photographs and in Diagram "E," at the lower portion of Fig. 1.

The modus operandi in connection with these 408-ft. spans constitutes one of the most interesting portions of the work.



Fig. 5.—Down-Stream Span 14-15 Showing Falsework Trusses and Wooden Tower.

The scheme was to launch the span endwise with its rear end supported upon an ingenious truck or buggy, while the forward end was supported on a large scow of special design.

In order to avoid overstraining the adjacent 270-ft. span by the concentrated loads of the sliding gear, an ingenious framed structure was devised by which it was possible to so distribute the end reaction over the floor system of the carrying span that no part would be strained over allowable units. A diagram of this truck or buggy is shown, Fig. 2, from which it will be noted that the secret of the construction lies in the fact that there is no vertical tie inside the triangulation but, in its place there is an exterior strut, which, by reason of the proportions of the members, carries a reaction which is equal to the reaction at each of the outer ends of the triangulation. Thus, there is a three-point bearing with equal reactions. The skidways consisted of eight 100-lb. greased rails (two sets of 4), on which cast steel skids or slippers were imposed. The scheme, was to move the span forward until it came to the last



Fig. 6.—Commencement of Erection of Down-Stream Span 13-14 on Deck of Span 14-15.



Fig. 7.—Down-Stream Span 13-14 Partly Erected on Deck of Span 14-15, Showing Portion being Cantilevered out over Stream.

panel of the 270-ft. span, where, of course, the front bearing of the three would naturally tend to pass overboard. In order to satisfy all conditions, the two outer bearings were here abandoned, and the span wedged up on the center bearing only. The whole reaction being thus concentrated on one point required the end panel of stringers in the 270-ft. spans to be reinforced. Details of this floating operation will be referred to later. The 120-ft. spans were erected by means of a temporary span, as shown on general Diagram "E," Fig. 1. The 240-ft. spans were erected by the same 120-ft. temporary trusses supported upon a wooden pier in the center, as shown, between piers No. 7 and No. 8 and in the photographic views.

The 270-ft. spans were erected by these same 120-ft. temporary trusses supported on a temporary tower about 30 ft. wide, as shown on diagram between piers No. 11 and No. 12, the only false work at any time in the river being the towers

robored experiments which had previously been made regarding the resistance of floating bodies to the current in the river. They also agreed generally with Froude's formula $R = fs (v \div 6.9)^2$ (See Fig. 3). The current in the river varied between five and eight miles an hour, according to the location where the meter was used.

DETAILS OF LAUNCHING OPERATIONS.

When all was ready an ordinary Lidgerwood unloader, such as is used on railway work, was located and strutted in a position where a direct pull could be made from the drum of the engine. Communication was at all times maintained between the man in charge of the Lidgerwood engine, those in charge on the scows and the man in full charge of the operations, by means of a system of flag signals. The span was started by a number of jacks, after which the Lidgerwood engine con-



Fig. 8.—Down-Stream Span 13-14 being Launched, Showing Lidgerwood Engine and Sliding Buggy.

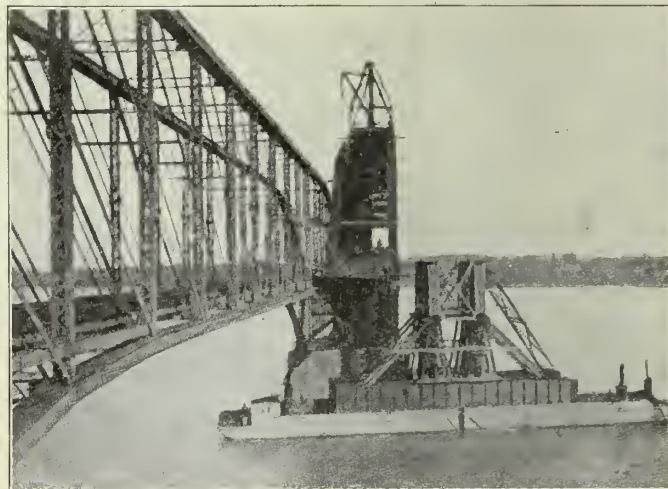


Fig. 9.—Barge being Placed under Down-Stream Span 12-13, and Lowered by Water Ballast before Passing Under.

as shown, and at no time was railway traffic placed upon the temporary false work. This was required by the railway company from the beginning of the work.

The four 408-ft. spans were alike in weight and general characteristics, but two methods, differing somewhat in detail, were used in launching them. The two down-stream spans were launched on the same set of carrying scows, but with a pilot scow up-stream to take up the slack in the cables and to otherwise control the movement of the spans during launching. The experience gained in launching the two down-stream 408-ft. spans led to the abandonment of the pilot scow for the placing of the up-stream spans. Under this arrangement the new spans were allowed, while traveling, to rub along a specially prepared vertical skidway bolted to the lower chords of the down-stream spans already in place. Details of the actual operation of launching are clearly shown in the diagrams and in the photographic views.

The carrying scow was really composed of two independent scows with two 100-ft. deck plate girder spans (four girders) placed on them, to equalize the load over the two scows. On these equalizing girder spans was erected a stiff timber tower on which the span itself was carried.

Anchors, each composed of concrete blocks securely strung together, weighing approximately 76 tons out of water or 52 under water, were placed about 1500 ft. up-stream from the bridge, and generally respectively in line with piers No. 12 and No. 13, but on the land above pier No. 14 a "dead man" was used composed of an "I" beam embedded in the rock. On the main carrying scow a dynamometer was inserted in the reaving of a fourteen-roped tackle which was attached to the main anchor line, in order to record the pull on the anchor ropes. The readings taken from this dynamometer fully cor-

trolled the whole of the movement and at no time was there any unexpected trouble. While the span moved forward the anchor cables allowed the anchor scow to float across the current with a radial motion. This necessitated the cable connecting the anchor scow with the main scows to be constantly shortened in order to maintain the true alignment of the span. As has already been stated, these anchor scows were used only in connection with the floating of the two down-stream 408-ft. spans. They were omitted when floating the up-stream 408-ft. spans, which were allowed to rub against the neighboring spans already in position. The adjustment of the anchor cables was made as required.

The time occupied in the floating operations, over a total distance of 275 ft., is extremely interesting.

Span.	Elapsed time.		Net time in moving.
	Hrs.	Mins.	Hrs. Mins.
Down-stream, 408 ft.	3	—0	1—0
Down-stream, 408 ft.	2	—30	28½
Up-stream, 408 ft.	1	—30	22½
Up-stream, 408 ft.	2	—0	16

The total weight of each 408-ft. span while launching was 1300 tons. During each of these operations all the regular trains of the railway company were allowed to pass on the adjoining spans, which necessitated stopping the floating operations because the work of signaling and superintendence were interfered with. The difference between the net time and the gross was occupied in overhauling cables, taking up slack, and in dismantling some of the steel work connected with the special truck or buggy when it reached the last panel of the



Fig. 10.—View of Skidways on Down-Stream Span 13-14.

270-ft. span. At this point it was necessary to remove certain steel work which became no longer necessary on account of the load being shifted, from a 3-point to a 1-point bearing.

A diagram of this buggy is shown in Fig. 2. The perfection of the control under which the span was handled at all times is exemplified by an incident which occurred during one of the floating operations. The span had reached a point 3 ins. short of its correct location, and after the necessary signaling over the intervening distance of nearly 800 ft. the Lidgerwood enginedriver made exactly the 3-in. movement called for,

provided with special end bracing to enable them to be jacked up on the piers, if necessary, during erection.

The time occupied in erecting the steel is as follows:

March, 1911—Erection started at north end.

May 28, 1911—New 120-ft. spans moved into up-stream alignment, replacing old 240-ft. span between pier No. 6 and No. 7.

July 6, 1911—Traffic diverted to down-stream track between piers No. 6 and No. 7.

Nov. 12, 1911—New down-stream span between piers No. 10 and No. 11 slewed over, thereby releasing old spans between piers No. 7 and No. 11.

March 31, 1912—Spans Nos. 10-11 moved into up-stream alignment allowing erection to proceed on down-stream spans Nos. 10-11.

June 18, 1912—Spans Nos. 14-15, and 15-south abutment erected.

July 13, 1912—Down-stream spans Nos. 10-11 and Nos. 11-12 erected.

Nov. 4, 1912—Down-stream 408-ft. span Nos. 13-14 floated.

Nov. 22, 1912—Down-stream 408-ft. span Nos. 12-13 floated.

April, 1913—Started taking down old spans between pier No. 11 and south abutment.

June 10, 1913—All old steel dismantled.

Sept. 18, 1913—Up-stream 408-ft. span Nos. 12-13 floated.

Oct. 6, 1913—Up-stream 408-ft. span Nos. 13-14 floated.

Nov. 4, 1913—All new steel erected and double track put into service.

The total weight of metal work in the old bridge was about 4100 tons, in the new it was 14,231 tons.

The total quantity of masonry and concrete in the original piers and abutments was approximately 12,400 cubic yards.

In the additions to old piers and in new piers there were 13,300 cubic yards.

The total length of the bridge and height above watermarks were not changed.

The number of rivets in the new bridge is approximately 3,500,000.



Fig. 11.—View of Completed C. P. R. Bridge over St. Lawrence, from Caughnawaga Side. Looking Down-Stream.

no more and no less. This is remarkable, considering the tonnage being handled.

As has already been stated, the 408-ft. spans were skidded upon the deck of the adjacent 270-ft. deck spans, and after each pair of the large spans (on one track) were floated into correct location they were at an elevation approximately 12 ft. higher than their permanent levels. This required that they be jacked down to their correct bridge seat levels, which was done by means of 150-ton jacks and blocking, the end floor beams having been designed for this purpose, as were also the end cross beams of the 270-ft. spans. The 240-ft. spans were also

As far as can be ascertained from the records, about 3500 cars were used in transporting stone and steel to the bridge. These cars would, if placed in a single train, extend over a distance of 21 miles.

One of the noteworthy performances during erection was the speed with which the five old spans between pier No. 11 and the south abutment were dismantled and the new spans erected. This was done between April 22 and October 31, 1913. That is to say 4000 tons of steel were handled in six months, or 666 tons per month, and this without interrupting the railway company's traffic.

During the work one man was drowned from one of the scows engaged on the substructure and one man was killed in Highland Station yard; but, during the erection of the steel work over the river proper, there were no fatalities, and only a few minor injuries to men.

* The cost of the work was slightly under \$2,000,000.

In charge for the Foundation company were John W. Doty as chief engineer, with W. B. Taylor as superintendent on the work.

For the Dominion Bridge Co., G. H. Duggan was chief engineer, and F. P. Shearwood, James Finley and David Bell were in charge of the design, superintendence and erection respectively.

For the railway company, J. M. R. Fairbairn was assistant chief engineer. C. C. Schneider was connected with the work as consulting engineer, and for the design and approval of all detail plans the writer was responsible, as engineer of bridges for the railway company.

Report on the Chelsea Wreck, St. L. & S. F. R. R., by the Interstate Commerce Commission.

A report has been returned by H. W. Belnap, chief inspector of safety appliances, Interstate Commerce Commission, covering the investigation of the derailment of a passenger train on the St. Louis & San Francisco R. R., which occurred near Chelsea, Okla., Oct. 29, 1913, resulting in the death of the engineman and the injury of the fireman. This accident was investigated jointly with the Corporation Commission of Oklahoma, and testimony was taken at a hearing held in Oklahoma City, Okla., on November 4, 1913.

A good share of the report is given up to a description of faulty track conditions at the place where the wreck occurred, and vicinity, which may be summarized by the following extracts:

"Examination was made of the track from a point one-half mile east of the point of derailment to a point nearly $\frac{1}{2}$ mile west of Chelsea, a total distance of about $1\frac{1}{2}$ miles. The track conditions disclosed by this examination were extremely bad; in fact they were such as to constitute a dangerous menace to the operation of trains in safety. At a point 1800 feet east of the point of derailment was found a rail joint at the approach of a bridge where three spikes were so loose as to enable them to be removed by hand. At a point 1600 feet east of the point of derailment were found two rail joints bolted on only one end, presumably on account of the necessary bolt holes not being drilled in the rail. At bridge No. 378.1, located approximately 1100 feet east of the point of derailment, the approaches were found to be in extremely bad condition. Three of the ties at this place had no ballast for a distance of from 2 to 3 feet on the right-hand side." "During the course of this examination," the report continues, "a train passed over this bridge, and it was found that the track at this approach was depressed 3 inches under the weight of the train. Notwithstanding the conditions existing at this point, however, there was no slow order governing the operation of trains over this bridge; in fact, the only speed limit of any kind affecting any of the track in this vicinity was the special time-card which provided that no passenger train should exceed a speed of 50 miles per hour over this part of the road. At a point 900 feet east of the point of derailment a rail section was found under which 10 out of the 20 ties were decayed. A total of 30 spikes were removed by hand from the ties under this rail section."

"Bridge No. 379.6 was located nearly 2700 feet west of the station at Chelsea. Examination of the track for a distance of seven rail lengths east of this bridge showed that out of a total of 134 ties 78 were defective, one rail length having

16 defective ties out of 19 ties in use. Of the 16 defective ties under this rail 15 were successive ties. In this same distance of seven rail lengths there were 142 loose or missing spikes and 126 spikes which could be removed by hand, a total of 268 spikes out of 536 in use which had practically no holding power. Under the fifth, sixth, and seventh rail lengths east of the bridge there were 96 spikes which could be removed by hand. There were also 54 loose or missing spikes in this same three-rail section. In other words, out of 228 spikes in this three-rail section only 78 were serving any practical purpose. Out of 14 rail joints in this seven-rail section only three had all the spikes in good condition."

After some further account of the circumstances surrounding the wreck and the condition of the roadbed and equipment concerned, Inspector Belnap states his conclusions, as follows:

"While the cause of this accident was not definitely determined, it is believed that the track conditions were not safe for the operation of trains at the speed permitted, and that these conditions caused the tender of the locomotive hauling this train to rock back and forth until finally the forward wheels were derailed. As will be seen from their statements, the officials and employees of this railroad considered the track conditions approaching the point of derailment to be very good. Between bridge No. 378.1 and the point of derailment none of them found anything to be wrong with the track. In view of the conditions, however, which, as a matter of fact, were found to exist, it is impossible to believe that the examinations made by the officials and employees could have been anything but superficial in the extreme. It is true, of course, that the examinations made by them were confined to that part of the track immediately east of the point of derailment, and for this reason would not include the seven rail lengths east of bridge No. 379.6, but it is difficult to understand how they could have failed to discover the conditions existing upon that part of the track examined by them, particularly the one-rail section where 10 out of 20 ties were decayed and where 30 spikes were removed by hand. It is equally hard to understand how the most ordinary system of inspection or maintenance could have permitted to exist such a dangerous condition as was found immediately east of bridge No. 379.6.

"The existence of track conditions such as was disclosed by this investigation constitutes a dangerous menace to the traveling public, and vigorous measures toward remedying these conditions should be taken at once. In its 26th annual report the commission called attention to the fact that with the track and roadway conditions existing upon many railroads in this country the danger of serious derailments was ever present, while, in the report covering the investigation of the accident which occurred on the Mobile & Ohio Railroad near Buckatunna, Miss., on October 19, 1913, attention was called to derailments investigated since July 1, 1911, where the speed of the trains involved was a more or less direct cause of derailment, particular mention being made of the fact that out of the 16 derailments listed, in only 3 cases were the trains involved being operated in excess of the speed limit allowed. There was every reason to believe that, in view of the existing track conditions, had the speed been properly restricted, and had these restrictions been observed, all of the derailments would probably have been averted. The same general principle applies in the case of this accident. Had the operating officials of this railroad made themselves familiar with the existing track conditions, and had they restricted the speed of trains in accordance with such knowledge, it is believed that this accident would not have occurred."

The Italian government will begin the construction of an electric railway from Milan to Genoa as soon as the

chamber of deputies has granted the \$30,000,000 necessary for the work. At present the great difficulty is to decide upon the exact route the line is to take, as several plans have been proposed whereby the original line of about 94 miles is to be shortened by from 12 to 16 miles.

Engineering Articles During The Past Month.

PUBLISHED IN THE RESPECTIVE ISSUES OF THE RAILWAY REVIEW.

January 24.

- Construction Work on the National Transcontinental Railway, of Canada—III.
- Convention of the Wood Preservers' Association.
- Air Pumps for Injecting Timber Preservatives.
- New Railroad Construction for 1914.
- Block Signal and Interlocking Extensions in 1913.
- The C., B. & Q. R. R. Experiments with Treated Ties.

January 31.

- Doubling the Load Capacity of an Old Railroad Viaduct.
- Convention of Wood Preservers' Association.

February 7.

- New Locomotive Repair Plant, Chicago & Northwestern Ry., Clinton, Iowa.
- Protecting Ties from Mechanical Wear.
- Protection of Ties from Mechanical Destruction.

February 14.

- Association of Creosoting Companies of the Pacific Coast.
- Extension of the Boston Subway.
- Water Tanks with Swivel Outlet.
- Mr. Prouty on Valuation of Railroads.
- Screw Spikes.
- Steaming Process for Ties and Timber.

Results With Titanium-Treated Rails.

Bulletin No. 4 of "Rail Reports" of the Titanium Alloy Mfg. Co., of Niagara Falls, N. Y., gives data of further tests of rails rolled of steel that had been treated with ferro-titanium. On the Boston & Maine R. R. comparative tests that had been conducted 27 months on all rails under observation, and where the traffic conditions were equal, showed the following results on the rail wear. The amount of ferro-titanium used with Sample 3 was 0.15 of 1 per cent; and with Sample 4, 0.20 of 1 per cent.

SUMMARY OF CHEMICAL AND PHYSICAL RESULTSAS REPORTED IN BULLETINS Nos. 1, 2, 3, AND 4

STANDARD OPEN-HEARTH A RAILS

CHEMICAL ANALYSES															PHYSICAL TESTS															Sample No.		
Sample No.	Complete Report in	Carbon		Manganese		Phosphorus		Sulphur		Silicon		Elastic Limit		Ultimate Strength		Per Cent. Elongation		Per Cent. Reduction		Hardness			Impact Resistance			White-Souther			Lendgr-Turn Endurance			
		Low	High	Low	High	Low	High	Low	High	Low	High	Head	Flange	Head	Flange	Head	Flange	Head	Flange	Head	Web	Flange	Head	Endurance	Head	Web	Flange					
1	Bulletin No. 1	.64	.89*	.003	.741*	.021	.038*	.019	.038*	.170	.180*	60,200	38,600	122,700	121,700	9.5	9.8	8.9	9.5	217	277	223	3.02	0.85	1.12	2,689,000	1,044	354	990	1		
2	Bulletin No. 2	.64	.88	.784	.901	.019	.044	.032	.069	.137	.150	56,100	37,100	122,100	120,500	8.5	11.5	8.5	12.7	217	283	214	1.16	0.88	0.92	12,132,700	1,350	740	1,355	2		
3	Bulletin No. 2	.71	.93	.712	.810	.019	.030	.033	.049	.114	.120	62,600	40,200	115,700	127,500	4.0	10.0	3.1	10.2	241	277	230	1.94	0.88	1.16	*No Test	1,110	685	1,305	3		
4	Bulletin No. 2	.65	.95	.581	.607	.013	.032	.025	.052	.109	.113	58,100	33,200	116,200	116,500	14.0	16.8	15.3	19.0	223	267	108	2.38	1.16	1.22	9,799,750	1,320	909	1,565	4		
5	Bulletin No. 3	.70	.95	.705	.770	.027	.029	.032	.041	.140	.160	57,200	40,500	120,900	131,900	4.3	11.5	4.1	12.8	230	274	259	1.28	1.14	1.40	9,947,300	1,175	870	1,250	5		
6	Bulletin No. 3	.67	1.03	.698	.711	.023	.045	.026	.068	.130	.140	56,100	38,200	123,800	120,500	13.7	14.5	14.6	18.7	219	253	215	1.00	0.82	1.03	30,000,000	1,065	540	1,250	6		
7	Bulletin No. 3	.54	.70	.692	.731	.014	.024	.019	.033	.109	.140	57,700	33,200	118,600	115,600	10.7	16.5	10.9	19.6	217	237	212	1.08	1.32	1.40	17,478,150	1,305	980	1,355	7		
8	Bulletin No. 4	.63	.84	.805	.857	.020	.033	.044	.082	.130	.140	61,000	39,000	125,600	126,400	15.8	16.3	20.0	20.2	237	253	225	1.00	1.46	0.90	37,880,150	1,600	1,265	1,460	8		
9	Bulletin No. 4	.58	.90	.839	.938	.012	.027	.031	.069	.140	.180	60,082	42,100	124,960	126,700	15.8	16.3	19.2	21.1	221	253	221	0.94	1.36	0.96	29,843,450	1,715	1,095	1,390	9		
Average		.64	.90	.720	.788	.0186	.0335	.029	.060	.130	.147	58,288	38,011	121,166	123,700	10.7	13.7	11.6	15.9	224	263	219	1.53	1.09	1.12	17,470,062	1,298	825	1,327	Average		

* Web analyses not reported in Bulletin No. 1

* One end was badly machined, causing very early fracture. The other was bent when machine stopped at night, so that test could not be completed.

* Web analyses were not reported in Bulletin No. 1

* One end was badly machined, causing very early fracture. The other was bent when machine stopped at night, so that test could not be completed.

TITANIUM-TREATED OPEN-HEARTH A RAILS

CHEMICAL ANALYSES													PHYSICAL TESTS																				Sample No.
Sample No.	Complete Report in	Carbon		Manganese		Phosphorus		Sulphur		Silicon		Elastic Limit		Ultimate Strength		Per Cent. Elongation		Per Cent. Reduction		Hardness			Impact Resistance			White-Souther		Landgraf-Turner	Enlurance				
		Low	High	Low	High	Low	High	Low	High	Low	High	Head	Flange	Head	Flange	Head	Flange	Head	Flange	Head	Web	Flange	Head	Web	Flange	Endurance	Head			Web	Flange		
1	Bulletin No. 1	.64	.70*	.735	.753*	.024	.027	.024	.037*	.110	.130*	58,400	37,200	121,000	132,100	14.3	13.8	15.7	17.6	223	228	228	4.26	2.47	1.02	25,281,800	1,065	1,035	1,035	1			
2	Bulletin No. 2	.76	.80	.744	.810	.018	.025	.033	.035	.089	.092	58,700	39,600	125,000	128,900	9.5	10.8	10.1	12.3	237	250	236	1.32	1.04	1.28	30,000,000	1,215	960	870	2			
3	Bulletin No. 2	.77	.86	.757	.784	.018	.027	.031	.034	.123	.130	58,300	40,500	127,100	137,400	13.0	15.0	16.9	19.9	226	239	230	1.88	1.28	2.18	*No Test	1,260	915	1,360	3			
4	Bulletin No. 2	.62	.67	.646	.690	.016	.022	.029	.038	.075	.080	53,300	36,500	115,800	118,100	13.3	14.3	15.9	18.7	217	221	223	2.36	1.72	2.70	*No Test	1,325	1,170	1,200	4			
5	Bulletin No. 3	.72	.87	.764	.833	.028	.031	.037	.045	.090	.120	56,300	39,700	124,500	126,800	13.0	13.5	16.2	17.5	225	243	236	1.90	1.44	1.84	30,000,000	1,185	1,170	1,205	5			
6	Bulletin No. 3	.58	.65	.679	.705	.022	.025	.026	.030	.109	.100	52,900	34,600	113,900	114,800	13.5	17.2	13.8	23.0	210	221	212	2.10	1.55	2.63	22,473,750	1,070	960	905	6			
7	Bulletin No. 3	.64	.71	.842	.875	.028	.029	.025	.032	.100	.110	63,200	41,800	130,300	130,000	12.7	15.5	14.5	19.2	219	223	226	1.98	1.30	1.90	30,000,000	1,370	930	1,160	7			
8	Bulletin No. 4	.71	.93	1,020	1,090	.019	.033	.027	.030	.080	.090	59,300	36,200	128,200	128,600	16.8	18.0	22.2	22.6	223	263	237	1.04	1.22	0.88	28,931,100	1,510	885	1,610	8			
9	Bulletin No. 4	.61	.67	.764	.798	.023	.025	.024	.033	.080	.094	57,000	37,000	120,700	124,600	18.8	18.5	25.9	26.0	210	200	210	1.80	1.70	1.90	22,137,800	1,300	1,140	1,515	9			
Average,		.67	.76	.772	.815	.0217	.0271	.0284	.0371	.094	.104	57,588	38,555	122,944	124,588	13.8	15.1	16.8	19.6	221	234	225	2.07	1.52	1.81	26,977,778	1,266	1,051	1,223	Average			

* Web analyses were not reported in Bulletin No. 1

* Both ends vibrated excessively, due to worn bearing and burled liners, as found after test, which created unusual conditions causing early fracture

† Both ends were machined a trifle too small, and on starting test there was excessive vibration, causing premature failure.

RAILWAY REVIEW

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WILLARD A. SMITH	- - - - -	President and Manager
HAROLD A. SMITH	- - - - -	Assistant Manager
W. M. CAMP	- - - - -	Editor
CLYDE F. BURNS	- - - - -	} Assistant Editors
JOHN M. LAMMEDEE	- - - - -	
H. H. WALL	- - - - -	

Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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CORRESPONDENCE.—Information concerning any matter of railway or engineering news is invited. We desire to receive particulars of changes in the personnel or organization of railways; of work projected or of the improvement of existing roads; bids asked or contracts let; new structures or new equipment; experiments with new devices or methods; adoption of new rules or practice; methods of maintenance; changes in the supply and equipment trade and advice of important sales or orders. Railway or engineering literature, including trade catalogues and circulars describing new devices and appliances, will receive attention if sent to this office. Our columns are available for criticism or comment on articles published, and for expression of opinion on any subject of railway business or management, if of an impersonal nature and of general application. All matters for editorial purposes should be addressed to the Chicago office.

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SATURDAY, FEBRUARY 21, 1914.

The expected February dullness in iron and steel is absent; and instead a strong, steady non-railroad demand has been maintained in all lines from crude to finished material, with exceptional activity in basic and stronger tone in sheets, bars and plates. The postponement of the Interstate Commerce Commission decision has cast a gloom over that portion of the industry living in anticipation of a heavy railroad business. However, equipment requirements are good, especially pending locomotive inquiries.

The Great Eastern Ry., of England, has announced that Henry W. Thornton, general superintendent of the Long Island R. R., Jamaica, N. Y., will become general manager of the former company, at London. The appointment has been the subject of much comment both in this country and across the water. The British press and public are particularly exercised over the fact that Lord Claud Hamilton, chairman of the board of the Great Eastern Ry., in announcing the appointment said that the company had been obliged to go to the United States for a new general manager as at the present time there was a great dearth in the British Isles of proficient men for the more prominent positions on British

railways. He said too that Mr. Thornton had been selected because his "career had been one succession of intellectual railway triumphs," and also because he came to the system at the age of forty-one, whereas in England the railways were so hampered by government legislation that men were too old by the time they had reached the point whereby they were eligible for the post. Such remarks, and the circumstance of the appointment itself, are naturally received as a more or less direct compliment to American railroading, and are regarded with gratification by the profession here. For Mr. Thornton, however, the turn thus given to the affair is not the happiest. But his personal characteristics include to an unusual degree, ability to win and hold the confidence of his associates and subordinates, qualifications which no doubt were given an important place at the time of his selection; and we may safely expect him to rise to whatever situation may confront him.

Rate Decision Postponed.

Announcement was made in Washington, February 16, that the Interstate Commerce Commission has postponed the time at which it will make its decision in the proposed five-per-cent increase in freight rates by fifty-two eastern carriers from March 15 to September 12, next. Recent events had caused the public to lose hope that the decision would be forthcoming by the date originally set; but the stipulation of a new date more than six months in the future was indeed dismal news. The hope immediately arose, however, that the intention of the commission might have been to specify the ultimate date, with the probabilities still left open for an earlier decision. That such was in fact the case became apparent on February 19, with the announcement by Commissioner Harlan, that the order suspending the tariffs until September 12 seemed to have been misunderstood. It had no significance, he said, beyond the fact that the case is not yet ready for disposition.

"Recognizing the public importance of an early disposition of the problem before us here, the carriers, shippers and the commission are using every effort to bring the inquiry to an early conclusion," said Commissioner Harlan, "and there is reason to think the record on the main issues in the case may be closed and the arguments had in time to enable the commission to dispose of those questions before the summer recess."

In commenting on the case, Commissioner Harlan said that the commission had before it two broad inquiries in respect to the proposed advance: "Are the present revenues of the carriers adequate?" and, "If not, how may they be supplemented?" "With respect to the first of these issues, the carriers have already offered much testimony, but their witnesses have not been cross-examined; nor have the investigations by the commission on that question been completed. We are also advised that certain shipping interests will submit important testimony touching the adequacy of the present revenues of carriers. In aid of an understanding of the

first question and of a proper solution of the second question, the commission, as I explained at a recent hearing, has also addressed certain inquiries to carriers which they have not yet been able fully to answer. Pending the preparation by the railroads of their replies, we have been hearing the protests of shippers against the proposed increases in the rates on certain particular commodities in which they deal or are otherwise interested."

A hearing will be had in Washington on February 27 and 28 to consider further the question of making a charge for spotting cars for loading and unloading on private spur and side tracks, for the trap or ferry car service, and for the tunnel and lighterage services in Chicago. It is expected that the final arguments upon these subjects will be had before the full commission at Washington on March 16 and 17. "While the general conditions in this regard at Chicago were outlined at the recent hearing," Mr. Harlan said, "further testimony is desired, and the commercial interests of Chicago that have already participated in these proceedings and others that desire to do so are requested to come together promptly in conference among themselves in order that at the approaching hearing the commission may have further details respecting private spur and switch tracks by means of illustrative cases."

Safety in Tunnel Work.

As railroads construct a good many tunnels, the managements, in keeping with the "safety-first" idea that is now receiving so much attention, should find interest in a pamphlet issued by the Bureau of Mines, at Washington, entitled "Safety in Tunneling." While the matter was intended primarily for guidance in mining work, yet there is much that applies to the building of tunnels for any purpose. In the study of the subject accidents have been classified as to the principal causes, or the manner in which negligence or carelessness contribute most frequently to accidents, and advice is given as to how repetition of various undesirable conditions, methods or behavior may be avoided.

In relation to danger from falls of rock, it is shown that the common practice of overcharging shot holes is one of the chief causes of material dropping from the roof. The character of the rock, of course, is an important factor here, and only good judgment, trial and constant watchfulness can reduce trouble of this kind to a minimum. As a precaution, in any case, the foremen should not permit men to return to the face after shooting a round without carefully testing the part of the roof that was exposed to the blast. Methods of testing or sounding the overhead rock are stated and commented upon. Support for the roof or the pulling down of the loose rock should be attended to at once, and this requires that supplies of timber be kept ready at hand at all times, lest consideration of

the delay consequent upon lack of such material might tempt those in charge to take undue chances.

The care and handling of explosives are always to be rigorously safeguarded wherever such dangerous materials are used, either under ground or above, and no persons should be permitted to handle them or work in the vicinity where they are stored who do not well understand all the precautions and regulations pertaining to the same. The list of "don'ts" suggested for observance in this direction is a long one. The precautions to be taken in preparing charges, firing, etc., are even, in a sense, more important, as some degree of skill is involved.

Accidents that occur in the transportation of the men are numerous, and result in various ways, among which are poor condition of the track, which is liable to be the case wherever track is laid down for a temporary purpose; riding upon loaded cars without extra precaution; not keeping within the cars when riding empties, and too rapid movements through switches. The careless use of fire in nearness to combustible materials; carelessness in permitting rubbish to lie around; smoking; and, not by any means the least, intoxication; or what is fully as bad, stupor from recent intoxication, must not be permitted about the works.

A principle to be insisted upon in tunneling, and to be taught everywhere that workmen are congregated together, for that matter, but never to be lost sight of in tunneling, quarrying, train operation and such hazardous occupations, is to foster such an esprit de corps that all workmen will constitute themselves inspectors, to inform upon and seek to eradicate the careless ones from their midst. The habit of safety is the main desideratum. Regulations do not attain the highest degree of effectiveness unless those who are supposed to observe them come to do so habitually.

Federal Headlight Legislation.

To the English railway official the present turmoil in this country over the locomotive headlight proposition, is about as far beyond comprehension as any phase of railway operation possibly could be. In his country, which by the way is even more thoroughly supplied with railroad governing commissions than our own, from one to four lamps are displayed on the front of each locomotive, each of which gives something like two candle-power at the wick and possibly ten candle-power when intensified by means of a reflector. These lights are utilized in no sense for purposes of illumination but merely as a means of identification. Public sentiment has not been known to criticize the roads for this practice, even when given opportunity to do so by the recent disastrous Aisgill collision. The testimony in that case showed dilatoriness in observing and obeying signals—a not

infrequent cause of disaster on our own roads and a condition that no amount of illumination projected forward from the locomotive can ever serve to correct.

The simple fact of the matter in the case of the English road is that anything in the form of a headlight is superfluous, due mainly to the profound respect that the public in that country has for railway property, trespassing being practically an unknown quantity, and to the facts that grade crossings do not exist, block signals are almost universally employed, and the permanent way generally is practically immune from physical obstructions such as are likely to develop on our own hastily and often precariously constructed lines. We have in this country however, great systems of roads on which the permanent way has been developed to an extent as to be brought into very approximate comparison with that on the lines of the English roads, and to the extent that the above named conditions are parallel, the need of illumination ahead of the engine is obliterated. All progress leads to the ideal in permanent way. The ideal in permanent way makes the headlight superfluous as English practice has demonstrated.

Owing to physical conditions on many American roads, especially those single track lines serving rugged and sparsely settled sections of the country, the headlight is without question, indispensable. On many others having from two to four track lines free from grade crossings, handling heavy traffic and fully protected by automatic signals, the "indispensableness" of the headlight can be accounted for only on the basis of long established practice—habit—tradition if you please, and yet a habit or tradition that can undoubtedly be respected to advantage for many years to come. In doing so however, it is unfortunate there are those influences at work that seek to make universal application of extreme measures, whose only defense lies in the power behind them, and which though they may be commendable when applied to broad sections of the country where traffic is sparsely distributed, are nothing short of a menace to the greater volumes of traffic in more congested territory.

The wave of diversified headlight legislation that has emanated from various state legislatures has finally reached the national congress where three measures are now under advisement seeking to give headlight regulations a nation-wide application. These measures have their origin with the two leading and rival organizations of engine-men and fortunately are such as to leave room for a choice between them. Two of the bills, introduced in the house and in the senate respectively are similar and have for their object, the setting aside of an appropriation to be used under the direction of the Interstate Commerce Commission, for the purpose of making an investigation of the headlight subject, the results of this investigation to be made the

basis of a recommendation by the commission to be incorporated into a federal law. The rival measure is fathered by Representative Raker of California and seeks to foist upon the roads of the country without further ado, the most drastic form of headlight law that even the irresponsible state legislatures have yet dared to promulgate; that being that a headlight of 1500 candle-power without the aid of the reflector be universally required.

Accepting headlight legislation as a fact, this recent move is to be commended in so far as it will have the effect of introducing uniform conditions in adjoining states where a headlight as such, is a thing to be desired. To enforce the same requirements in those sections where the function of such a light is no more than to serve as a marker, particularly if the high-power light as called for in the Raker bill, is forced upon the roads, will constitute an error that the legislators will probably refuse to recognize until the fact has been demonstrated by several costly years of experience. The report of the hearings before the house committee to which these bills were referred, seems to indicate a determined move to see the Raker bill favorably reported out of the house committee, this despite the fact of the greater reasonableness of the alternate bill which the committee also has under consideration, and the fact that the committee of the Master Mechanics association on the minimum requirements of headlights presented before the house committee the results of its recent most thorough investigation showing clearly the injustice and viciousness of the more radical of these two measures. Judge Raker in advocating this bill clearly shows his bias, he deprecates the work of the Master Mechanics committee, impugns the honesty of its members, and, admittedly ignorant of the subject he is handling, identifies himself as an advocate of class legislation and a caterer to political influence. It is to be hoped that saner judgment than his will prevail and that his efforts will come to naught.

Finally, we conceive that the high-power headlight has its field of usefulness and is entitled to all the recognition in that field that it can properly command. This field however, is *not* universal and to enact legislation establishing it as such will we believe speedily bring about a reaction that will vindicate the judgment of those better intellects whose "scientific" deductions, to quote one of the Judge's objections, "can just drive a man crazy."

The Administration's Program of Anti-Trust Legislation.

President Wilson's program of anti-trust legislation, otherwise called the vivisection of big business, is now well under way. His special message to congress, read in person before that body on January 20, and noted

in our issue of January 24, recited the various subjects under which may be grouped the legislative reforms which the President now considers to be imperative. Following the message by a few days, tentative drafts of bills covering four of the five topics enumerated by the President, were introduced into congress, and the drafting of a fifth bill has so far progressed that its terms have been under earnest consideration. The five legislative measures thus proposed by the administration are as follows: 1. The creation of an interstate trade commission, of five members, with inquisitorial powers into corporations, save common carriers, and to act as an advisory board to the attorney-general and the courts, with the additional function of assisting the government in preventing violations of the Sherman act and in aiding the attorney-general to terminate alleged unlawful conditions by agreements. 2. Prohibition of interlocking directorates in interstate corporations, railroads and banks and trust companies, members of a reserve bank. 3. A Sherman law definitions bill, defining the terms and expressions used in the Sherman anti-trust law. 4. A trade relations measure designed to prohibit "cut throat" competition through price discrimination, discounts, rebates, territorial restrictions, etc., and giving to individuals injured by reason or anything forbidden in the Sherman act, the right to bring suits in equity against corporations against which decrees have been obtained by the government. 5. Empowering the Interstate Commerce Commission to regulate the issuance of railroad stocks and bonds.

Only one of the five measures relates distinctively to railway business: that giving the Interstate Commerce Commission control over issues of securities. But another, that prohibiting interlocking directorates, is aimed directly at the railroads along with other big business; and the other three bills comprise legislation of such comprehensive import to industry and trade in general, that the railroads are most intimately concerned with the form in which it is finally to crystallize. The first and fifth of the measures enumerated above have been given into the hands of the house committee on interstate and foreign commerce, of which Representative W. C. Adamson, of Georgia, is chairman; while the other three bills are in the care of the house judiciary committee, of which Representative Henry D. Clayton, of Alabama, is chairman. Hearings on the bills have been in progress and will continue. The form of the bills will be modified in many particulars before they are finally whipped into shape. Assurance has been given that the fullest publicity will attend every stage of the deliberations. This means that the successive revisions of the bills are to be made public, and all interested individuals will be given the privilege of explaining their views and presenting their arguments in the course of the hearings; and correspondence has been specifically invited by the chairmen of the committees.

The legislation contemplated by these bills comprises as a whole an entirely unprecedented program of regulation and control. And the series of measures may soon

be augmented by the addition of another, prohibiting without qualification, all holding companies. It is somewhat remarkable that up to this time business men have made but slight appearance at the hearings. Lawyers, college professors, politicians, and a few retailers have testified; but representatives of large interests have in the main, been conspicuous by their absence. However, the country at large is not without an appreciation of the tremendous moment of the steps which the government is about to take. The apparent purpose of the bills, viewed as a whole, is well expressed by the phrase which we quoted in beginning: the vivisection of big business. The general drift of the measures undoubtedly is that big business as such is iniquitous; and the fact that the President in his message used the most reassuring language and implied the utmost moderation, does not alter that aspect of the legislation now proposed.

But regarding most of the ideas specifically embodied in the measures, the fear will be as to the means rather than the end. Federal control of the issues of railway securities is only an enlargement of powers now quite successfully wielded in some cities, and it is admitted that certain evils which ought to be corrected can be corrected in this way. The most serious of the objections raised, that federal authorization will give the appearance of federal guarantee of the securities, can perhaps be avoided by judicious framing of the bill. If the trade relations bill confines its scope to the elimination of those things which everyone recognizes as unfair competition, there can be little objection to it. And there has been in the past, great need for better definition of the Sherman law, although the more recent decisions of the courts have clarified the statutes upon these points considerably. Mr. Victor Morawetz, of New York, denies that any further service in this direction can be rendered by the definitions bill. He said before the National Chamber of Commerce, at Washington: "The anti-trust act prohibits in the broadest language restraints of trade and monopolizing, and it is now settled that the purpose and policy of the act cannot be avoided by any disguise or subterfuge. I doubt that any statute can be drawn that would really make the act more definite and certain, except either by limiting the scope of the act and defeating its purpose, or by subjecting commerce to a set of cast-iron rules that will cripple it. Certainly, neither the so-called 'bill to define the Sherman law,' or the trade relations bill, or any of the other bills, make the law more definite."

But the matters of prohibition of interlocking directorates and the creation of an interstate trade body call for even greater caution on the part of those who are drafting the bills. The provision that no person who is in any wise interested in a railroad can at the same time hold interest in any bank, and the same restrictions as to interests between banks, are extraordinarily broad. Mr. Samuel Untermyer, of New York, said before the house judiciary committee: "I do not see why it is necessary to prohibit interlocking directorates among banks

and railroad corporations. It is proper to prohibit such interlocking directorates between a railroad and a concern handling supplies of material used by the road, but what harm is there in a railroad director also becoming a director of a bank." The men who have shown by their success their ability to handle large interests, are in demand in the conduct of other businesses. Mr. Lawrence Chamberlain, representing the Investment Bankers' Association of America at one of the hearings on this bill argued that the bill should be framed with an eye to the effect on average business in an average town. "The ordinary legitimate business relations of the man of affairs in a medium-sized town," said Mr. Chamberlain, "cause him to promote his local street railway or power company, and to sit on the board of his bank. It is better that local interests should thus be represented than that the general level of quality and efficiency on the board should be lowered by introduction of men of smaller affairs and experience or by men from outside the local community unless the outsider represents outside capital. The bill in its present form would prevent an owner of a South American coal mine from being a director in the Eastern Consolidated Electric Co., of Easton, Pa., because it crosses the Delaware river."

The interstate trade commission bill is the one that is causing the most trouble to the framers themselves, seemingly because it is very difficult to adjust the prerogatives and authority of the proposed commission in such manner as to avoid infringement upon the province of the federal Department of Justice, or any other bureau. Indeed, there is a probability that two distinct bills may be before the house representing divergent viewpoints upon this question. As it is framed at present the measure is astonishingly broad. It gives the proposed commission power to investigate practically any phase of interstate business, and to demand almost any corporate records and files; all information thus obtained is to be a matter of public record, and is to be made public in such form as the commission deems necessary. The potential evils in such a system are apparent with a statement of its scope. Unless the efforts being made to introduce such modifications are successful, there will be nothing in the measure to protect legitimate privacy in business, and nothing but the hypothetical good judgment of the commission to differentiate in the application of the publicity features between legitimate commercial enterprise and predatory business.

Railway Construction in 1913

Following our established custom we supplement our tabulation of new railway construction for the year 1913, published at the beginning of the new year, by final and complete returns from official sources. The report given with the first issue of the calendar year is only preliminary and necessarily incomplete, owing to the fact that the reports of the engineering departments are not made up at that early date, the year's additional mileage in many cases, can only be guessed at, or estimated.

The total mileage of new railroad built in the United States during the calendar year 1913, was 3419.87 miles, as detailed in the tabulation below. In 1912 the total new mileage was 3703.81. The present year therefore records a falling off of 283.94 miles, in new construction. Our total for the year 1911 was 3695.46.

The new mileage laid in Canada during the calendar year 1913, was 3216.80. This compares with a total of 2315.46 miles in 1912 and 1905.62 miles in the year 1911.

In Mexico railroad construction has been almost at a standstill, owing to disturbed conditions there. We have a record of but 9 miles during the year 1913, which compares with 217.18 miles in 1912, and 363 miles in 1911.

New Track Record By States, 1913.

Alabama	108.41	Louisiana	61.35
Arkansas	203.99	Maine	8.38
Arizona	19.71	Maryland	8.73
California	168.91	Massachusetts	9.82
Colorado	53.10	Michigan	105.51
Florida	84.61	Minnesota	17.37
Georgia	138.40	Mississippi	45.50
Idaho	72.04	Missouri	31.75
Illinois	71.76	Montana	393.86
Indiana	8.96	Nebraska	26.46
Iowa	42.00	Nevada	19.62
Kansas	46.83	New Jersey	1.57
Kentucky	68.50	New Hampshire	7.47

New Mexico.....	12.93	Utah	17.26
New York	2.37	Vermont	3.68
North Carolina.....	149.47	Virginia	41.54
North Dakota	150.68	Washington	208.81
Ohio	28.65	West Virginia.....	45.61
Oklahoma	40.00	Wisconsin	20.35
Oregon	105.04	Wyoming	55.54
Pennsylvania	49.79		
South Carolina	78.70	Total in U. S.....	3419.87
Tennessee	120.99	Total in Canada.....	3216.80
Texas	463.85	Total in Mexico.....	9.00

Alabama.

Alabama & Northwestern—Vaugale to Sweetwater....	8.00
Alabama, Tennessee & Northern.....	4.00
Atlantic Coast Line.....	1.00
Birmingham & Southwestern—Tallahassee to Eclectic.	14.00
Baskett Lumber & Mfg. Co.....	5.00
Birmingham Selma & Pensacola.....	4.00
Gulf Florida & Alabama—Local to Broughton.....	20.00
Kentucky Lumber Co., Sulligent.....	2.00
Louisville & Nashville—Athens to Tenn. Line.....	15.50
Mobile & Baldwin County.....	2.00
Mobile & Ohio—Lewis to Dawes.....	4.16
Montgomery & Chattanooga.....	7.00
Pierce Development Co., Bridgeport.....	5.00
St. Louis & San Francisco—Empire to Sipsey.....	4.75
Vredenburg Sawmill Co.....	12.00

Arkansas.

Ashley Drew & Northern.....	40.68
Black Mountain & Eastern.....	10.00
Butler County	10.50
Chicago Rock Island & Pacific—(Malvern & Camden).	54.81
Kentark Land & Timber Co., Hunnaker.....	3.00
Kansas City & Memphis	6.00
G. B. Lambert Co.—Elaine.....	7.50

Memphis Dallas & Gulf—Murfreesboro to Hot Springs	22.00		
Missouri Pacific—Marianna to Bridge Junction.....	46.50		
Pine Bluff, Sheridan & Southern.....	1.00		
Warren Johnsville & Saline River.....	2.00		
Arizona.			
Atchison, Topeka & Santa Fe.....	2.47		
Arizona Eastern	2.94		
El Paso & Southwestern—Lewis Springs to Ft. Huachuca	14.30		
California.			
Atchison, Topeka & Santa Fe—Minkler Southern Cutler to Minkler (17 m. Cutler to Exeter 18m.).....	35.00		
California & Oregon Coast.....	12.00		
Mt. Tamalpais & Muir Woods.....	.75		
Nevada County Narrow Gage.....	1.50		
Northwestern Pacific	21.16		
San Diego & Arizona.....	5.00		
San Francisco—Oakland Terminal.....	1.07		
Southern Pacific—Central Pacific, Fernley-Lassen Branch 48.962 m. Colusa & Hamilton 28.853 m....	82.43		
Trona	10.00		
Colorado.			
Denver & Salt Lake—Steamboat Springs to Craig....	40.60		
San Luis Central	12.50		
Florida.			
Atlantic Coast Line—Archer to Morristown.....	20.00		
Bagdad Land & Lumber Co.....	4.00		
Charlotte Harbor & Northern.....	4.00		
Deep Lake Co., Everglade to Allen's River.....	2.50		
Gulf Florida and Alabama—West Pensacola to Goulding	2.50		
Florida East Coast—Kissimee Valley Div.....	15.00		
Madison Southern	1.75		
Seaboard Air Line—Mulberry to Barton 8.42 m.; Junction to Royster Mine 3.44 m.....	11.86		
South Georgia—Perry to Hampton Springs.....	5.00		
Tampa & Gulf Coast—Lake Fern to Tampa Northern Junc.	18.00		
Georgia.			
Atlantic Coast Line.....	2.00		
Brinson	13.00		
Elberton & Eastern—Elberton to Tignall.....	21.80		
Gainesville & Northwestern.....	1.00		
Georgia Coast & Piedmont.....	18.60		
Green County	1.00		
Hawkinsville & Western—Grovania to Perry.....	9.00		
Ocilla Southern—Fitzgerald to Rochelle	24.00		
Pelham & Havana.....	19.00		
Rome & Northern.....	2.00		
Waycross & Western.....	21.00		
Zickgraf Lumber Co.—Arcola to Black Creek.....	6.00		
Idaho.			
Chicago, Milwaukee & St. Paul.....	15.00		
Nezperce & Idaho.....	1.50		
Oregon Short Line—State Line to Homedale, 7.48 m.; Big Eddy to Lake Fork of Payette River, 41.21 m.; at Victor, 0.22 m.; Alexander to Grace, 6.60 m.	55.54		
Illinois.			
Alton & Southern.....	12.00		
Chicago & Northwestern—St. L. P. & N. W. 46.74 m. Macoupin Co. 4.66.....	51.40		
Chicago & Alton—Eldred Extension.....	6.36		
Rock Island Southern.....	2.00		
Indiana.			
Chicago, Terre Haute & Southeastern.....	2.23		
Illinois Central—Extension S. of Bloomington.....	6.73		
Iowa.			
Cedar Rapids & Iowa City.....	15.00		
Waterloo, Cedar Falls & Northern—La Porte City to Urbana	24.00		
Chicago & Northwestern—Iowa Southern.....	3.00		
Kansas.			
Anthony & Northern.....	6.00		
Atchison, Topeka & Santa Fe—Dodge City & Cimarron Valley Moscow to Elkhart.....	40.83		
Kentucky.			
Big Sandy & Kentucky River.....	9.50		
Chesapeake & Ohio (Elkhorn & Beaver Valley Ry.)..	21.00		
Elk Fork & Licking River.....	6.00		
Kentucky Rock Castle & Cumberland—Heidelberg to McKee	9.00		
Owingsville & Olympia.....	9.00		
Rockcastle Lumber Co.—Martin Co.....	14.00		
Louisiana.			
Alexandria & Western.....	14.00		
Franklin & Abbeville.....	3.00		
Grant Timber & Mfg. Co.....	4.00		
Louisiana & Arkansas.....	10.00		
Newell Lumber Co., Eunice.....	8.50		
Oberline Hampton & Eastern.....	5.00		
Ouachita & Northwestern.....	2.60		
St. Elmo, Belle Helene & Louisiana Eastern.....	4.25		
Southern Ry. & Nav. Co.....	3.00		
Terry, Janesville & Southern.....	1.00		
Zwolle & Eastern—Blue Lake Junct. to Sanderson....	6.00		
Maine.			
Aroostook Valley—Carson to Caribou.....	7.13		
Bangor & Aroostook.....	1.25		
Maryland.			
Canton Co.	8.50		
Western Maryland .....	.23		
Massachusetts.			
Hampden	9.82		
Michigan.			
Boyne City, Gaylord & Alpena.....	44.50		
Chicago, Milwaukee & St. Paul.....	21.00		
Copper Range	4.00		
Detroit, Bay City & Western.....	11.30		
Detroit Terminal	4.21		
East Jordan & Southern (in logging woods).....	6.00		
Grand Trunk—Cass City—Bad Axe Line 13.25 m.; Bay City 1.25 m.....	14.50		
Minnesota.			
Minneapolis St. Paul & Sault Ste. Marie—Iron Hub to Iron Mt. Mine 8.21 m.; Ironton to Riverton 3.36 m.	11.57		
Minnesota & International.....	5.80		
Mississippi.			
Batesville & Southwestern.....	2.00		
Finkbine Lumber Co.....	8.50		
Hand-Jordan Co. Purvis.....	6.00		
Meridian & Memphis	29.00		
Missouri.			
Butler County—Linstead to Broseley.....	9.25		
Missouri Pacific	1.00		
Shelby Northwestern	21.50		
Montana.			
Billings & Central Montana.....	12.80		
Chicago, Milwaukee & St. Paul.....	209.00		
Great Northern—Plentywood to Scobey 44.65 m.; Montana Eastern Snowden to Sidney 18.70 m.; Power to Bynum 43.09 Great Falls & Teton Co. Ry.....	106.44		

Minneapolis, St. Paul & Sault Ste. Marie—N. Dak.		New York Cent. & H. R.—Boardman Branch, 2.09 m.;	
State line to Whitetail	57.19	Emigh Run, .32 m.....	2.41
Union Pacific	8.43	Pennsylvania Rd.—Mt. Eagle Cut-off and Extension	
Nebraska.		Hillman Branch, 5.99 m.; Bostoria Branch, 1.44	
Union Pacific—Hastings to Gibbon.....	26.46	m.; Penna., Monon & Southern Rd., 2.39 m.;	
Nevada.		Apollo, Jeanette & Turtle Creek Branches, .91 m..	10.73
Southern Pacific—Central Pacific, Fernley-Lassen		Pittsburgh, Shawmut & Northern.....	10.84
Branch	9.15	Susquehanna & New York.....	12.00
Western Pacific—Silver Zone to Proctor.....	10.47	South Carolina.	
New Jersey.		Bamberg, Ehrhardt & Walterboro.....	14.00
Central Rd. of N. J.	1.10	Marion & Southern.....	6.00
Pennsylvania Rd.—Change at Rahway.....	.16	Northwestern Rd. of So. Carolina.....	4.00
Raritan River .....	.37	Orangeburg—Raymond to Orangeburg.....	7.70
New Hampshire.		South Carolina, Western—Lydia to Timmons ville, 15	
Boston & Maine Connecticut River R. R.	7.47	m.; Florence to Poston, 32 m.....	47.00
New Mexico.		Tennessee.	
El Paso & Southwestern—Whitewater to Tyrone..	12.93	Carolina, Clinchfield & Ohio.....	3.20
New York.		Louisville & Nashville.....	89.34
New York, Auburn & Lansing.....	.39	Southern—(Knoxville)	5.35
New York Central & Hudson River.....	1.98	Tennessee	6.50
North Carolina.		Tennessee Western (L. & N.).....	16.60
Black Mountain	18.00	Texas.	
Carolina & Yadkin River.....	16.00	Artesian Belt.....	4.00
Durham & South Carolina—(Bonsal to Duncan).....	10.00	Burrs, Ferry, Browndell & Chester.....	3.25
Elkin & Allegheny	3.00	Fidelity Lumber Co.....	10.00
Southern Aluminum Co.—Whitney.....	3.00	Gulf, Texas & Western.....	17.35
Norfolk Southern (Raleigh, Charlotte & So. Ry.)....	80.47	Houston & Brazos Valley.....	3.50
Watauga & Yadkin River.....	15.00	Houston & Texas Central—Eureka to Stella 9.5 m.;	
Waynesville Lumber & Timber Co.....	4.00	Stone City to Giddings, 39.27 m.....	46.77
North Dakota.		Kansas City, Mexico & Orient of Texas.....	46.64
Fairmont & Veblen.....	12.00	Lufkin, Hemphill & Gulf.....	10.00
Great Northern—Mobile to Int. Boundary 18.69; Mon-		Nacogdoches & Southeastern.....	2.20
tana Eastern Ry. to Arnegard 30.40 m.....	49.09	Orange & Northeastern—Vinton to Orange.....	11.00
Midland Continental—Homer to Wimbledon.....	26.00	Paris & Mt. Pleasant—Bogata to Mt. Pleasant.....	27.00
Minneapolis, St. Paul & Sault Ste. Marie—Ambrose		Pecos & Northern Texas—(A. T. & S. F.) Lubbock	
to Montana state line.....	28.59	to Texico.....	87.30
Northern Pacific—Stanton to Orlando.....	35.00	Quanah, Acme & Pacific.....	42.00
Ohio.		San Antonio, Fredericksburg & Northern.....	25.00
Fairport, Painesville & Eastern.....	.65	San Antonio, Uvalde & Gulf—Pleasanton to Odem....	100.00
Lorain Ashland & Southern.....	28.00	San Benito & Rio Grande Valley—Lomita to Monte	
Oklahoma.		Christo	21.34
Cheyenne Short Line—Cheyenne to Strong City.....	7.50	Scholten Bros. Cedar Co.....	6.50
Clinton & Oklahoma Western.....	4.00	Utah.	
Oklahoma New Mexico & Pacific.....	25.00	Denver & Rio Grande—Increase acc't of new con-	
Pawhuska & North Eastern.....	3.50	struction Soldier Summit to Detour.....	4.50
Oregon.		Salt Lake & Alta.....	8.00
Booth-Kelly Lumber Co.....	2.00	Utah Ry	4.76
California & Oregon Coast.....	10.00	Vermont.	
Clackamas Southern	6.75	Burre & Chelsea.....	2.46
Great Southern—Dufur to Tariend.....	11.00	Boston & Main (Connecticut River R. R.).....	.72
Oregon Short Line—Nyssa to state line.....	17.74	Vermont Valley .....	.50
Oregon-Washington Rd. & Nav. Co.....	24.10	Virginia.	
Salem, Falls City & Western.....	1.24	Lyndhurst Lumber Corporation—Lipscomb.....	6.00
Southern Pacific—Willamette Pacific from Eugene		Mill Creek-Hotchkiss to Wilderness.....	12.00
West, 18.155 m.; Oregon Eastern, Oakridge West,		Norfolk & Western	12.82
0.55 m.....	18.21	Southern	2.72
C. A. Smith Timber Co.....	14.00	Virginia Carolina	8.00
Pennsylvania.		Washington.	
Buffalo, Rochester & Pittsburgh—Lucerne Jct. to Lu-		Chicago, Milwaukee & St. Paul.....	48.00
ciusboro	5.40	Great Northern—Wenatchee to Orville.....	111.65
Johnstown & Stony Creek.....	1.75	Meskill & Columbia River.....	2.50
Lehigh & New England—Catasauqua Br.....	2.66	Montana Eastern	18.70
Montour	4.00	Northern Pacific—Tacoma to Tenino.....	11.21
		North Yakima & Valley.....	1.95
		Oregon-Washington Rs. & Nav. Co.....	14.80
		West Virginia.	
		Chesapeake & Ohio (8.6 m. up Spruce Fork; 3 m.	

Gauley & Meadow River Ry.; 7.8 m. Logan & South)	19.40
Clarksburg & Northern.....	13.00
George Craig & Son, Winterburn.....	2.00
Norfolk & Western	3.96
Twin Mountain & Potomac—Barkville to Twin Mt..	7.00
Western Maryland .....	.25

Wisconsin.

Chicago, St. Paul, Minn. & Omaha—Kaiser to Park Falls	6.00
Fairchild & Northeastern (Strader to Allen).....	11.00
Wisconsin & Northern.....	.35
Wisconsin-Northwestern (logging branches).....	3.00

Wyoming.

Chicago, Burlington & Quincy (Power River to Casper)	53.00
Union Pacific—Lion Junction to Lion.....	2.54

Canada.

Algoma Central & Hudson Bay.....	48.49
Algoma Eastern	6.57
Canadian Northern	500.63
Canadian Northern Ontario—Bet. Montreal and Hawkesbury, Que., 10 m. Ottawa to Capreol, Ont., 120 m. Ruel to Port Arthur, Ont., 406 m. Sydenham to Ottawa, Ont., 54 m.....	590.00
Canadian Northern Pacific.....	211.00
Canadian Pacific—Eastern Lines: Interprovincial & James Bay Ry., Lumsderis Mills to Opemican; 10 M.; Campbellford Lake Ontario & Western Ry., Glen Fay to Agincourt 182.65.....	192.65
Canadian Pacific—Western Lines: Snowflake West 10 m. Virden-McAuley 23 m. Estevan N. W. 47 m. Boissevain-Lauder 35 m. Kerrobert N. E. 22 m. Swift Current-Bassano 60.8 m. Weyburn Stirling 162 m. Suffield S. W. 32.3 m. Gleichen-Shepard 25 m. Alberta Central 40 m. Lacombe East 8 m. Kootenay Central 19.7 m. Whitewater-Kaslo 16 m.	504.60
Dominion Atlantic	1.00
Dominion Government	130.00
Edmonton Dunvegan & B. C.	88.00
Esquimaux & Nanaimo.....	19.00
Frederickton & Grand Lake Coal & Ry. Co.....	15.84
Great Northern, V. V. & E. Ry. & Nav. Co.—Kilgard to Lewis Landing	5.05
Grand Trunk Pacific	
Saskatchewan—	
Regina to Int'l Boundary.....	48. m.
Moose Jaw N. W. Br.....	52. "
Young to Prince Albert Br.....	20. "
Battleford to Wainwright Br.....	33.3 "
Biggar to Calgary Br.....	66.7 "
Alberta—	
Tofield to Calgary.....	35.5 "
British Columbia—	
Yellowhead to Prince Rupert.....	339. " 594.50
Intercolonial, Georges River to Sydney Mines.....	8.80
Kettle Valley Lines.....	50.00
Northern Pacific, Midland Ry. of Manitoba, Winnipeg Terminals	6.40
Pacific Great Eastern.....	18.00
Quebec Central	5.00
St. John & Quebec.....	92.00
Sydney & Louisburg.....	3.00
Temiskaming & Northern—Elk Lake Branch 28.54 m.; Iroquois Falls Branch 7.25 m.....	35.79

Transcontinental-Quebec 88.26 m.; Manitoba 2.22 m....	90.48
Total for Canada.....	3216.80

Mexico.

San Diego & Arizona.....	5.00
Zitacuaro & Zoconusco	4.00
Total for Mexico	9.00

Auxiliary Track Built in 1913

SECOND, THIRD AND FOURTH TRACK SIDINGS, SPURS, YARDS, ETC.

In addition to the mileage of auxiliary track built in 1913, reported in the Railway Review of January 3, 1914, we have received official information of the following:

Arcata & Mad River.....	1.00
Atchison, Topeka & Santa Fe—Coast Lines.	
Second track—Cactus to Flagstaff 43.30 mi.; Ash Ford to Yampi 49.61 mi.; Colorado River to Needles 11.49 mi.; Summit to Cajon 12.64 mi.; yards, siding, etc. 45.87	162.91
Atlantic Coast Line.....	4.00
Boston & Maine—Greenfield, Kan.....	1.51
Brinson .....	.13
Buffalo & Susquehanna.....	.47
California Central .....	.27
Central New England.	
Second track—Lloyd to Reynolds Bridge 2.67 mi.; St. Elmo and Berea .04 mi.; yards and sidings 28.12 mi.	30.83
Central Rd. of New Jersey.	
Second track—1.10 mi.; yards, sidings, etc. 53 mi....	54.10
Central Vermont	1.73
Chicago Transfer & Cleaning Co.....	.57
Cincinnati, New Orleans & Texas Pacific.	
Second track—Erlanger to Crittenden 17.7 mi.; Boyce to Citico 2.16 mi.; Greenwood to Cumberland Falls 4.54 mi.....	24.40
Cincinnati Northern	2.43
Columbia & Puget Sound.	
Second track 256 ft.; sidings 1800 ft.....	.44
Delaware, Lackawanna & Western.	
Second track—Bloomfield to Montclair, N. J. 1.45 mi.; Third track—Anamolik to Henryville 3.16 mi.; sidings, yards, etc. 11.47 mi.....	16.10
Duluth, Winnipeg & Pacific.....	3.67
Erie—second track	156.05
Ft. Worth & Rio Grande.....	.28
Georgia.	
Second track—2.5 mi.; sidings, etc. 1.5.....	4.00
Georgia Coast & Piedmont.....	.19
Grand Rapids & Indiana.....	5.65
Grand Trunk Pacific.....	56.40
Lehigh Valley—third track 18.83 mi.; fourth 7.26 mi....	26.09
Lehigh & New England.....	.84
Louisville & Nashville—second track.....	117.96
Long Island.	
Second track—2 mi.; third track 2.17 mi.; fourth track 2.29 mi.; yard track, 3.82 mi.....	8.48
Memphis, Dallas & Gulf.....	6.00
Minneapolis & St. Louis.....	4.61
Missouri & North Arkansas.....	8.13
Missouri, Kansas & Texas.	
Second track 7.5 mi.; sidings, etc. 19.55 mi.....	27.05
Missouri Pacific.	
Second track—7.69 mi.; sidings, yards, etc. 46.00 mi..	53.69
Mobile & Ohio.	
Yards and sidings.....	12.53
Nevada Northern .....	.32

New Orleans & Great Northern.....	4.23
New York, Auburn & Lansing.....	.35
New York, New Haven & Hartford.....	11.64
New York, Philadelphia & Norfolk.	
Second track—Keller to Exmore, Va. 4.15 mi.; yards and sidings 8.22 mi.....	12.37
Northwestern Pacific.	
Second track 2.55 mi.; sidings 1.81 mi.....	4.36
Oregon Short Line.	
Second track—Idaho 9.40 mi.; Wyoming 11.82 mi...	21.22
Oregon-Washington.	
Second track—at The Dalles 1.14 mi.; sidings, etc..	41.50
Pacific Coast .....	.10
Pennsylvania Lines West.....	16.43
Pere Marquette.	
Sidings, yard, etc.....	26.71
Pittsburgh, Cincinnati & Chicago.	
Second track—Piqua, O., 1.66 mi.; third track, Piqua, O., 2.16 mi.; sidings, etc. 2.91.....	6.73
Poteau Valley .....	.09
Quebec Central	4.83
St. Louis & San Francisco.....	34.45
St. Louis, San Francisco & Texas.....	.57
San Antonio, Uvalde & Gulf.....	10.00
Sand Springs	3.68
San Francisco-Oakland Terminal.....	1.33
San Joaquin & Eastern.....	.50
Southern—second track	11.37
Sunset Ry. (A., T. & S. F.).....	4.99
Toledo, St. Louis & Western.....	1.62
Toledo Terminal	1.58
Trinity & Brazos Valley.....	1.50
Union Ry. (Memphis, Tenn.).....	1.31
Utah Ry.	3.33
Western Maryland	1.54
Wilmington, Brunswick & Southern.....	.51

More Railroads Petition To Hold Water Lines.

The Interstate Commerce Commission began hearings in Washington, February 17, with Commissioner McChord presiding, on the application of the Pennsylvania R. R. and the Northern Central Ry. for relief from the operation of that provision of the Panama Canal act, which requires interstate railroads to divest themselves of ownership or control of steamship and other water lines before July 1, 1914. The law provides that if the Commission should find that the operation of water lines by railroad companies does not "exclude, prevent, or reduce competition" between the rail and water carriers, it may permit the railroads to continue to operate the water carriers. An order issued last autumn by the commission gave all railroads until March 1 to file applications for the retention of their water lines after July 1.

In addition to the application of the two roads named above, the Lehigh Valley asked for the same privilege, as noted in these columns last week. Since then a number of other companies have petitioned to the same effect, as follows:

The Southern Railway, which owns large blocks of stock in the Old Dominion Steamship Co., the Chesapeake Steamship Co., and the Virginia Navigation Company, the New York, New Haven & Hartford, which owns or controls the Fall River Line, the New Bedford Line, and several other smaller water routes operating between points in New England and New York city, and the Merchants' and Miners' Transportation, which operates between New England and South Atlantic ports; the New York Central & Hudson River R. R., which indirectly controls the Mutual Transit Co., operating twelve steamers on the Great Lakes; the Duluth, South Shore & Atlantic, the Grand Rapids & Indiana, and the Michigan Central, which jointly own the Mackinac Transportation Co., a system of car ferries operating in

the straits of Mackinac; the New York Central & Hudson River R. R., which operates a large number of ferryboats, tugboats, car floats, lighters, grain boats, and barges in New York harbor; the New York Central & Hudson River R. R., which owns the Western Transit Co., operating ten steamers on the Great Lakes and two barges on the canal between Buffalo and New York city. The Atlantic Coast Line, owning 1200 of the 15,000 shares of the Old Dominion Steamship Co., and 2000 of the 6000 shares of the Chesapeake Steamship Co. The Delaware & Hudson, owning the Champlain Transportation Co., and the Lake George Steamboat Co., operating steamers on Lake Champlain and Lake George; the Norfolk & Western, owning 2100 shares of the Old Dominion Steamship Co. The Seaboard Air Line, owning 2100 shares of the Old Dominion Steamship Co., and the whole of the Baltimore Steam Packet Co., the stock of the latter being pledged as security for obligations. The Chesapeake & Ohio, owning 1200 shares of the Old Dominion Steamship Co., the railway's principal freight connection with the Northeast. The Southern Pacific and the Central Pacific, which control a line of six vessels operating chiefly between San Francisco and Sacramento, Cal., in competition with other boat lines on the Sacramento river.

A Plain Statement To The People Of Texas.

The following statement was published this week as an advertisement in daily papers of general circulation throughout the state of Texas, over the signatures, "General Managers, Texas Railroads." It is a straightforward appeal for fair treatment.

TO THE PEOPLE OF TEXAS

President Woodrow Wilson, in his message to the congress of the United States, on January 20, 1914, said: "The country is ready to accept and accepts with relief, as well as approval, a law which will confer upon the Interstate Commerce Commission, the power to superintend and regulate the financial operations by which railroads are henceforth to be supplied with the money they need for their proper development to meet the rapidly growing requirements of the country for increased and improved facilities of transportation. We can not postpone action in this matter without leaving the railroads exposed to many serious handicaps and hazards; and the prosperity of the railroads and the prosperity of the country are inseparably connected."

President Wilson, with his wonderful fund of information and keen foresight so characteristic of the man, sees the necessity for the railroads of the country to be supplied with more money, which they need and must have for their proper development, and in order to meet the growing requirements of the country for increased and improved facilities of transportation, and he further recognizes the fact that the country cannot prosper unless the railroads are permitted to enjoy a reasonable degree of prosperity, for he says: "The prosperity of the railroads and the prosperity of the country are inseparably connected."

While the President evidently favors a law which will empower the Interstate Commerce Commission to enable the railroads to obtain necessary funds for their proper and efficient operation, the Texas railroads are not in a position to await action by congress. Besides, such action by the national government is not necessary in this state. You have provided a railroad commission, and conferred upon it the powers, so far as Texas is concerned, that President Wilson thinks ought to be conferred upon the Interstate Commerce Commission, regarding the United States as a whole. Besides, there are a great many people who believe that the regulation of our internal affairs should be confined to the state and not conferred upon the national government. This presupposes, of course, that the servants whom the people have elected to office will

act promptly as occasions arise; otherwise, action by the federal government will become imperative.

It costs a great sum of money to operate the railroads of Texas, and inasmuch as you annually pay all of the expenses of operating the railroads, you are entitled to know whether the railroads are collecting more than is just and reasonable under the circumstances.

Under the law, the railroads are entitled to collect enough to pay all operating expenses, taxes, etc., and in addition thereto, a fair return on the value of the property devoted to public use. Your tax commission, created by you, and acting under their oaths of office, has found that the true value of the railroads of Texas is \$30,000 per mile. We believe they are of greater value. According to Table No. 10, page 400 of the Twenty-first Annual Report of the Railroad Commission for the year 1912, the total cost of the construction and equipment of the Texas railroads up to June 30, 1912, was \$582,388,949.99, which shows that the roads have cost their owners a little over \$38,000 per mile. But, taking \$30,000 per mile, which the tax board says is the true value of the roads, as a basis, the railroads of this state, for the year ending June 30, 1910, earned 4.30 per cent on that value. For the year ending June 30, 1911, they earned 4.16 per cent; for the year ending June 30, 1912, they earned 3.97 per cent. Out of these earnings the companies must pay the interest on their bonds and other indebtedness and if it is not sufficient, they are forced to borrow the money, or default in interest payments. For the year ending June 30, 1912, the shortage amounted to a little over three and a quarter million dollars, and for the year ending June 30, 1913, the shortage amounted to something over one million six hundred thousand dollars. And for the first five months of the year beginning July 1, 1913, the railroads are over four million dollars behind what they were at the end of the corresponding five months of the year beginning July 1, 1912, so that if they break even for the balance of the year, their deficit for the year ending June 30, 1914, will be nearly six million dollars. However, they cannot hope to break even, because the month of December with its disastrous floods and loss of business has not yet been taken into account.

We are anxious to continue to give the people at least as good service as heretofore; in fact, we want to improve that service, but it is apparent that we cannot do so unless we can obtain more money from the operation of the roads. We have reduced operating expenses all we can. Further reductions of expenses must come, if at all, by the help of the people, the legislature, the courts and the juries. The crisis has been reached where we must have more money, or else be unable to give the people adequate, safe and reasonable service. Poor service naturally gives rise to bitter complaints, and as your servants, we believe you are entitled to know the truth of the situation with which we are confronted.

Former Interstate Commerce Commissioner Prouty, now at the head of the railroad valuation department of that body, recently said:

"The railroad is a public servant. That phrase comes to us from the Supreme Court and has been for a quarter of a century in the mouth of everybody who has to do with this subject. It comes, as time goes on, to take on a different meaning. Originally, the people said 'The railroad is our servant, therefore we can kick the railroad and cuff the railroad ad libitum.' It is coming to be understood, gentlemen, that just as your servant can only properly discharge his duties when he is suitably fed, suitably clothed, and suitably housed, so the railroad can only properly discharge its duties when it receives proper treatment from the public. It is coming to be apprehended that in the final analysis, the public pays the bill and that it pays for us, as railroad commissioners, to accord to the railroad just and fair treatment. That, I say, is not only demanded by justice—it is demanded by public interest."

Former Interstate Commerce Commissioner Franklin K. Lane, now a member of President Wilson's cabinet, said:

"The railroad is our common high-road; it is not a luxury; it is not a concern in which the farmer and the manufacturer alone are interested; it is an essential to the commercial life of our people, almost as necessary as the land itself, for we have grown up as a people to be physically dependent upon our railroads. No other people are so bound up as we are in economic interdependence. No one community in all this land lives to itself. We have grown as railroads are built. We have made a community of a continent."

Ex-President Theodore Roosevelt recently said: "The great need of the hour, from the standpoint of the general public—of the producer, consumer and shipper alike—is the need for better transportation facilities, for additional tracks, additional terminals and improvements in the actual handling of the railroads, and all this with the least possible delay. Ample, safe and rapid transportation facilities are even more necessary than cheap transportation. The prime need is for the investment of money which will provide better terminal facilities, additional tracks and a greater number of cars and locomotives, while at the same time securing, if possible, better wages and shorter hours for the employees. There must be just and reasonable regulation of rates, but any arbitrary and unthinking movement to cut them down may be equivalent to putting a complete stop to the effort to provide better transportation."

The state having taken over the regulation of the railroads and the fixing of rates is under both legal and moral obligations to discharge that duty so as to enable the railroads to earn a fair return on the value of their property, and give to the public the best and safest transportation service possible. That is all we ask, and we submit that the railroads and the public are justly entitled thereto.

American Society for Fire Prevention.

Organization of the American Society for Fire Prevention was consummated at a meeting in New York city, February 11. The association is formed for the purpose of carrying on an aggressive and militant campaign for fire prevention along every practical line. Officers were elected for the current year and a vigorous campaign all over the country was authorized. Plans for this campaign on a large scale have been in preparation for some months and are in the hands of experts retained for that purpose. The society's resources are ample for the big work under way, many of America's leading sponsors of welfare and research work having pledged themselves generously to the cause. The society is incorporated under the laws of the state of New York, and will maintain offices at 51 Chamber street. Abram W. Herbst, of New York, who until January first was chairman of the committee on buildings of the board of aldermen and who in this official capacity was the author of the Herbst building code now before the board of aldermen, was chosen director of safety of the Society. Mr. Herbst will have charge of all the technical work of the society. In this he will be guided by a strong advisory board. Organization was completed by the election of Charles W. Abrams as treasurer and Bernard Glaser as secretary. Edward Staats Luther was appointed director of publicity. The following statement concerning the work of the society was given out: "Fire Prevention is the most vital subject now before the American public. The annual fire loss in the United States has reached the appalling figure of more than \$200,000,000 in actual cash, irrespective of the additional loss of business and wages which conservative authorities place at a combined total of \$500,000,000 a year. This is only the money loss. The loss of life runs into the thousands each year. Fully 75 per cent. of the losses through

fires in this county are due to non-compliance with, or non-enforcement of, the most ordinary principles of fire prevention. This is because there still prevails the entirely erroneous idea that fireproof construction costs more than non-fireproof construction. The other 25 per cent. of the fires are directly traceable to arson, carelessness, ignorance and to the lack of proper supervision. Ninety per cent of all the fires are unnecessary."

Railway and Engineering Literature.

The Hays Track Appliance Co., Richmond, Ind., has published a new edition of its book No. 68 on "How to Install Hayes Derails." In addition to the book itself, a circular also is being sent out announcing and describing the book and inviting requests from maintenance-of-way department men for copies of same. Applications should be made to the firm at the address above given.

The Clyde Iron Works, Duluth, Minn., has issued bulletin K, which is a catalog of "Clyde-Grade" electric hoists. These machines are made in a great variety of types, as adapted to the wide field in which electric hoisting machinery is now demanded.

The General Electric Co., Schenectady, N. Y., has issued bulletin No. A4199, which illustrates and describes the company's railway motor gears and pinions. The bulletin contains curves and data which will be of interest to purchasers of this material. The company has also issued bulletin No. A4189, devoted to small plant direct-current, three-wire switchboards of 125 and 250 volts, and 10 to 100

kilowatts. Another new bulletin, No. A4143, is devoted to belt-driven alternators, known as form B.

An instruction book on the installation, operation and maintenance of pyrometers for superheater locomotives is being distributed by the Locomotive Superheater Co., 30 Church street, New York. A description, with illustrations, of the form of electric thermo-couple pyrometer approved by this company is given, together with an explanation of the conditions affecting its performance and full directions for its proper use. A circular, also giving a description of the pyrometer and a statement as to its field of usefulness, is likewise being sent out.

The Terry Steam Turbine Co., Hartford, Conn., is circulating bulletin 17 which treats of that company's design of return-flow turbines. This principle involves a combination of a multi-velocity stage element for the high pressure end with a series of multi-pressure stage elements (such as Rateau, Zoelley or Parsons) in the low pressure end. For condensing units, 500 k. w. capacity or less, this form offers many advantages on the basis of economy. Leading European turbine builders are stated to have adopted the same principle which is considered strong evidence of its merit. Descriptive literature will be forwarded by the manufacturers on application.

Recent bulletins by the Richmond Stay-Bolt Drilling Machine Mfg. Co., Richmond, Va., show that company's twelve-spindle semi-automatic horizontal stay-bolt drilling machine and also a vertical six-spindle drilling machine which is especially adapted to the multiple drilling of parts in light manufacturing operations. The manufacturers will be pleased to send copies of these bulletins on request.

The Railway Supply Man's Point of View

Is it the Firm, the Product or the Representative?

Rather an interesting question was brought up the other day in conversation with a number of railway supply men. An analysis of the subject under discussion would seemingly be worth while in the "Railway Supply Men's Point of View." Here's what it was:

Which has the most influence on sales: the company, its organization, standing and general record; the product which the company sells; or the man who does the actual selling? Unquestionably all three have their bearing so far as sales are concerned, but the query was which of the three is of the most importance.

We hear the remark very often that certain men can sell anything—born salesmen—have the ability to go out and dispose of any article to prospective or possible buyers. We hear it said that a certain salesman can always make a good living as he knows "so and so," and "so and so," and whatever he has to sell, he has an acquaintance that will get him into offices so that he can get a hearing, and the buyers are friends of his and have confidence in him, and he can therefore get a favorable hearing.

All this is true, and the manufacturing company itself occupies a position somewhat similar as regards selling. They have made an enviable reputation for turning out a product that is good and serviceable, and they have a further record for making right to their customers anything which has been wrong. They have been fair in their dealings at all times, and naturally a buyer has respect for such a concern.

Then, as regards the product. If a thing has merit, it is bound to be recognized sooner or later. If it is bought by one man, and he benefits by buying it, the word is going to be passed along at least to two or three others as to the intrinsic value of the particular product in question, and gradually it is going to come into extended use.

But we are inquiring as to which of the three is the most important—the salesman, the company, or the product. What gives the salesman his friends—what enables him to get a hearing, and a favorable hearing? His past record of course. Also the character of the man, and his character is the sum-total of his environment and experiences. What has been the record of the successful salesman? Has he sold blue sky to one man, a gold brick to another? Has he sold anything which is of value? Look carefully into the career of any successful salesman. Why has his career been successful? True he has all the natural ability of a born salesman. That is why he has naturally drifted into work of that kind; but to be a successful salesman, and to continue to be such year after year, it has been necessary for him to sell a product of merit, and when he ceases to do that, his usefulness as a salesman is bound to cease sooner or later.

Now analyze, if you will, why a firm, company or corporation has made a success. Well organized? True. Carefully financed? Yes. Careful in their dealings and prompt in their shipments? All true. But more than all this, they have sold a product that has merit, and because of selling this product which has merit, they have made an enviable record for themselves, and have the confidence of the buyers who purchase what they have to sell. A concern may arrive after a number of years at a position where they could put out an inferior article and attach their name to it, and sell it without much difficulty for a time. They could do this, of course, because during many years they have done other things which have inspired confidence, and the very fact that they are back of anything causes it to be unquestioned—for a time. However, even a concern which has been successful for many years cannot take up the manufacture and sale of a new article which has no real value. They can do it longer of course than a concern that has no established reputation.

What we have premised in regard to the company and

the salesman is an answer to the question as to what is the most important—the company, the salesman, or the product. Unquestionably, the product. But added to this, what a splendid combination it is to have for sale the best—the intrinsic merit of which cannot be questioned, a salesman who has made an acquaintance, and more, has made friends because of the record for never selling anything but the best, and a company who have an established reputation for manufacturing and selling the best. We are coming more and more to recognize the value of buying a product of merit from a concern of established record and reputation, and in doing this, to deal with a salesman whose characteristics fit in both with his company and his product. All these things should be taken into consideration in the buying of railway equipment.

Railway Service as a Training School for Railway Supply Business—VII.

J. LEONARD REPGLE.

Climbing to the top of the ladder after beginning at the bottom is not an unheard of record in this land of promise and possibilities which is ours. It is quite unusual, however, for a man to reach the top and occupy a position of responsibility and authority in a concern where he began as office boy. To make such a record speaks not only well of the individual, but well of the company and its management.



J. Leonard Repogle, Vice President and General Manager of Sales, Cambria Steel Co.

More records like this would lend more substantiability to many of our American institutions than they now have, and such things as make for business permanency and commercial success are always to be desired. It is very natural to think along these lines when we are considering the record made by J. Leonard Repogle, whose photograph we are reproducing in this issue.

Mr. Repogle was elected to the position of vice-president and general manager of sales of the Cambria Steel Company on September 26th, 1912. For a time, in addition to these duties, he was temporarily in charge of the entire operations of the Cambria Steel Company during the illness of the president of the company.

Mr. Repogle has grown up in the Cambria Steel Company, entering its employ at the age of thirteen as an office boy. There can be no question but what he knows intimately the company in which he holds an important position. His record of twenty-five years' continuous service with this one company is of interest. Beginning as an office boy, he advanced successively to the positions of clerk, shipper, assistant superintendent axle department, superintendent forge, axle and bolt departments assistant to the assistant general manager, superintendent order department, and later to the position of assistant to the president, and finally to that of vice-president and general manager of sales of the Cambria steel company.

SUPPLY TRADE NOTES.

—M. J. Comerford, who has been employed as a representative of the Railroad Supply Co. since 1900, died February 17. Mr. Comerford was an experienced track engineer, having been roadmaster with the Brooklyn Elevated Ry., and Lake Street Elevated Ry., in Chicago, before taking up the railway supply field. He was one of the early members of the Roadmasters' and Maintenance of Way Association and took an active part in its meetings.

—Edward W. Hodgkins, formerly associated with Guilford S. Wood, Chicago, is no longer with Mr. Wood, having gone into business for himself.

—The Union Draft Gear Co. announces the following changes in organization, effective February 14: W. G. Krauser, formerly mechanical engineer, is advanced to assistant to vice-president and will have charge of the first district. James E. Tarelton, formerly assistant mechanical engineer, is advanced to assistant to vice-president. Mr. Tarelton will have charge of the second district. J. W. Hathaway, assistant to vice president, will have charge of the third district. H. Barnard, formerly chief draftsman, is advanced to mechanical engineer and C. J. Gorman is appointed inspector. The mechanical engineer will have charge of all research work, including the laboratory and inspection along with his regular duties. The position of assistant mechanical engineer is abolished.

—Chas. J. Webb has been elected vice-president of the International Seal & Lock Co., manufacturers of the Tyden car seal. He continues in the capacity of sales manager, with office at Chicago.

—Scott R. Hayes, vice-president of the Railway Steel Spring Co., has resigned to become assistant to the president of the New York Air Brake Co., effective March 1.

—The report of the Pressed Steel Car Co. for the year ended December 31, 1913, showed gross earnings of \$2,768,459, an increase of \$1,482,849, and net earnings of \$2,374,816, a gain of \$1,404,473. The balance available for dividends was \$2,194,816, equal to 10.56 per cent on the outstanding stock, compared with \$1,224,473 the year before, or .76 per cent on the outstanding stock. In his remarks to stockholders President Hoffstot put gross sales for the year at \$30,967,360, and with reference to business conditions, stated: "During the last nine months of the year the plants were not operated to capacity, and while your company carries into next year quite a little less business than was on the books at the beginning of 1913, we feel confident if our customers, the railroads, secure such an increase in freight rates as will partially make up for the increased costs forced upon them, your company's business will be given quite an impetus, particularly as there has been less than 100,000 freight cars purchased during 1913, and it has been many years since the full estimated annual requirement of over 250,000 cars have been purchased."

—The Union Switch & Signal Co. reports for the year ended Dec. 31, 1913, compared with the previous year:

	1913	1912
Net income from sales.....	\$1,704,792	\$1,076,501
Other income	59,303	69,861
Total income	1,763,995	1,146,362
Depreciation, etc.	145,987	141,631
Balance	1,618,008	1,004,731
Cash dividends	593,933	541,681
Balance	1,019,075	463,050
Patent adjustments, etc.....	147,570	257,421
Surplus	971,505	205,629

RAILWAY NEWS.

Alabama, Tennessee & Northern.—A mortgage for \$3,663,000 to the Guaranty Trust Co., of New York, has been filed in the probate court at Mobile, Ala., by the Alabama, Tennessee & Northern Ry. The money borrowed, it is said, will be used in completing consolidation of the small roads known as the Cochrane lines, and extensive terminal improvements at Mobile are contemplated.

Denver & Salt Lake.—The election held in Denver, Colo., February 17, resulted in a large vote in favor of the proposed bond issue for the Moffet tunnel to be built under James peak. The Denver & Salt Lake R. R., as previously noted in these columns, will use the tunnel as soon as it is completed and work on it is to be begun at an early date.

Great Northern.—Announcement is made that the directors of the Great Northern Ry have adopted a resolution subject to the ratification of the stockholders for the issuance of 190,000 additional shares of capital stock of the company of the par value of \$100 each. The proceeds are to be used for the acquisition of lines, extensions, telegraph and telephone lines, terminal properties, etc.

New Orleans, Texas & Mexico.—Willard V. King, president of the Columbia-Knickerbocker Trust Co. of New York, who is chairman of the bondholders' protective committee of the New Orleans, Texas & Mexico R. R., has been quoted as saying that, considering the extensive damage done by floods, he thought the property was in good condition; also that it would require from \$6,000,000 to \$8,000,000, including the proceeds of the sale of \$2,000,000 of receivers' certificates out of which \$850,000 has already been expended, mostly for rentals of leased lines and for equipment obligations. Before July 1 it is hoped to dispose of \$1,500,000 more certificates, the proceeds to be used for improving the tracks. Bids have also been received to furnish some new rolling stock which will cost about \$1,200,000.

New York Central & Hudson River.—The New York Central & Hudson River R. R. has applied to the New York public service commission for permission to issue \$70,000,000 in 4½ per cent refunding and improvement mortgage bonds to net not less than 92½ per cent. The money is to be used to meet notes which fall due this year.

New York, New Haven & Hartford.—Directors of the New York, New Haven & Hartford R. R. at their monthly meeting, February 19, took no formal action on the tentative plan for the separation of the Boston & Maine R. R., reported to have been drawn up in Washington. The road's special counsel and Chairman Howard Elliott are to continue their negotiations with Attorney General McReynolds along the lines already planned. The personnel of the Boston & Maine trusteeship has not been determined, but something definite in this connection is expected next week, when further conferences will be held in Washington, D. C. It is stated that the New Haven desires a period of five years to ten years in which to dissolve the whole system.

Pennsylvania Lines.—A report says that preliminary surveys have been made for double tracking the southern end of the Cleveland and Pittsburgh division of the Pennsylvania Lines West of Pittsburgh.

PERSONALS.

E. D. Levy, assistant general manager of the St. Louis & San Francisco R. R., effective March 1, is appointed general manager, succeeding W. T. Tyler, resigned.

W. T. Tyler, general manager of the St. Louis & San Francisco R. R., with office at St. Louis, Mo., has resigned.

Charles N. Whitehead, assistant to president of the Missouri, Kansas & Texas Ry., with office at St. Louis, Mo., has been appointed a vice-president of the company.

T. B. Coppage, superintendent of the Northern division of the St. Louis & San Francisco R. R., with headquarters at Fort Scott, Kan., is appointed superintendent transportation, with headquarters at Springfield, Mo., effective March 1.

O. H. McCarty, superintendent of the River and Cape division of the St. Louis & San Francisco R. R., at Chaffee, Mo., is appointed superintendent of the Northern division, with headquarters at Fort Scott, Kan., succeeding T. B. Coppage, promoted.

C. H. Claiborne, assistant superintendent, River and Cape division of the St. Louis & San Francisco R. R., is appointed superintendent of that division with headquarters at Chaffee, Mo., succeeding O. H. McCarty, transferred.

J. H. Doggrell, superintendent of freight loss and damage claims of the St. Louis & San Francisco R. R., is appointed assistant superintendent transportation, with office at Springfield, Mo.

J. F. Frazer is appointed assistant superintendent of the River and Cape division of the St. Louis & San Francisco R. R., at Chaffee, Mo., succeeding C. H. Claiborne, promoted.

M. Crown, assistant district superintendent of the Atlantic Coast Line R. R., at Sanford, Fla., has been appointed superintendent of terminals at Jacksonville, Fla.

J. Fitzgerald has been appointed assistant trainmaster of the Baltimore & Ohio R. R. at Cleveland, Ohio, succeeding J. C. Hahn.

G. E. Reel, trainmaster of the Cincinnati, Hamilton & Dayton Ry., has been transferred from Dayton to Lima, Ohio.

W. C. Herbert has been appointed trainmaster of Southern Railway, at Richmond, Va., to succeed F. H. Boisseau, assigned to other duties.

Richard W. Barrett has been appointed assistant general solicitor of the Lehigh Valley R. R., with office at New York.

C. W. Keeling has been appointed auditor of the Danville & Western Ry., with office at Danville, Va., to succeed T. B. Cowper, resigned to accept service elsewhere.

O. H. Bower has been appointed auditor of the Missouri, Kansas & Texas Ry. of Texas, with office at Dallas, Tex., succeeding T. E. Anderson, resigned.

J. O. Talbott has been appointed auditor of receipts of the Missouri, Kansas & Texas Ry., of Texas, with office at Dallas, Tex., succeeding F. W. Pope, resigned to accept service with another company.

B. J. Bromley, trainmaster of the Erie Railroad, at Buffalo, N. Y., has been relieved and assigned to other duties.

Edward J. Edmunds has been appointed trainmaster of the Erie Railroad at Buffalo, N. Y., effective February 10.

John T. Taffany has been appointed trainmaster of the Erie Railroad at Buffalo, N. Y., effective February 10.

Thomas B. Hamilton, whose appointment as general manager of the Vandalia Railroad has been noted in these columns, was born August 7, 1865, in Columbus, Ohio. He graduated from Princeton university in 1888, and began railway work in November of the same year as rodman on the Jefferson, Madison & Indianapolis Ry., now part of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. January 27, 1890, he became connected with the engineering corps of the Pittsburgh division of the latter road, and six years later was made assistant engineer of that division. He was engineer of maintenance of way from May, 1897, to June, 1901, having been consecutively on the Toledo division of the Pennsylvania Lines West, on the Cincinnati district of the Panhandle, and on the Cleveland & Pittsburgh division of the Pennsylvania Lines West. He was then appointed superintendent of the Erie & Ashtabula division and on December 21, 1903, was made superintendent of the Cleveland & Pittsburgh division. On January 1, 1912, he was appointed general superintendent of the Central system of the Pennsylvania Lines West of Pittsburgh, and occupied that position until his recent promotion.

S. E. Burkhead, whose appointment as assistant general manager of the International & Great Northern Ry. was announced in a previous issue, began his railroad career with the International & Great Northern when he was 17 years old. His first official position was inspector of transportation with office at Palestine, Tex. He was next assistant superintendent of the Gulf division with office at Pales-

tine, and then became assistant superintendent of the first division of the Colorado lines of the Denver & Rio Grande R. R., with office at Pueblo, Colo. From here he was transferred to the Utah division as superintendent with office at Salt Lake City, Utah. He became trainmaster of the Eastern division of the Texas & Pacific Ry., with headquarters at Marshall, Tex., and later became superintendent of terminals of the Texas & Pacific at Fort Worth, Tex., and then inspector of transportation of that road and the International & Great Northern, after which he was made superintendent of the Fort Worth division of the International & Great Northern. Mr. Burkhead's appointment as assistant general manager was effective February 1.

S. B. Zartman, whose appointment as superintendent of the New Jersey Southern division of the Central Railroad of New Jersey has been noted in these columns, began his railroad career about thirty years ago in construction and engineering departments during vacation periods while attending college. He was later employed in various capacities in the traffic and transportation departments, and has since served as trainmaster of the Philadelphia & Reading Ry., superintendent of construction and superintendent of various lines, and previous to taking service with the Central of New Jersey, superintendent terminals of the Seaboard Air Line Ry.

Samuel F. Clark has been appointed purchasing agent and general storekeeper of the Spokane, Portland & Seattle Ry., with headquarters at Portland, Ore., succeeding J. E. Mahaney, resigned.

Henry W. Thornton, general superintendent of the Long Island R. R., with headquarters at Jamaica, N. Y., has accepted appointment as general manager of the Great Eastern Ry. of England.

Charles L. Churchill, former chief engineer of the Norfolk & Western Ry., effective March 1, is appointed assistant to the president, in immediate charge of federal valuation, and will perform such other duties as may be assigned him. W. S. Battle, Jr., and J. B. Baskerville have been serving with Mr. Churchill as a valuation committee. Mr. Battle now resumes his duties as general claim agent and Mr. Baskerville is appointed assistant general claim agent.

E. L. King has been appointed superintendent of telegraph of the Southern Pacific Co., with headquarters at San Francisco, Cal., vice F. S. Rawlins, deceased.

Charles L. Krick, superintendent of the Manhattan division of the Pennsylvania Railroad, at New York city, has been appointed superintendent of the Philadelphia terminal division, with headquarters at West Philadelphia, Pa., succeeding J. B. Baker, deceased.

R. V. Massey, superintendent of the New York, Philadelphia & Norfolk R. R., at Cape Charles, Va., has been appointed superintendent of the Manhattan division of the Pennsylvania Railroad, with headquarters at New York, succeeding Charles L. Krick, transferred.

C. S. Leiper, principal assistant engineer of the Philadelphia, Baltimore & Washington R. R., at Wilmington, Del., has been appointed superintendent of the New York, Philadelphia & Norfolk R. R., with headquarters at Cape Charles, Va.

Ross M. Blackburn, supervisor of material of the Chicago & North Western Ry., at Chicago, has been appointed acting general storekeeper, with office at Chicago, vice W. M. Carroll, deceased.

P. L. McManus, superintendent of the Chicago, Indianapolis & Louisville Ry., at Lafayette, Ind., has been appointed general superintendent, effective February 15, with office at Lafayette.

J. M. Baths, trainmaster of the Chicago, Indianapolis & Louisville Ry., at Lafayette, Ind., has been appointed division superintendent, with headquarters at Lafayette.

W. H. Fogg, trainmaster of the Chicago, Indianapolis & Louisville Ry., at Lafayette Ind., has been appointed division superintendent, with headquarters at Lafayette.

Arthur L. Mills, former general superintendent of the Toledo, St. Louis & Western R. R., has been appointed general manager of the Fort Smith & Western R. R., with headquarters at Ft. Smith, Ark., succeeding W. M. Bushnell, resigned.

TRAFFIC.

John J. Koch, general freight agent of the Pennsylvania Company, at Pittsburgh, Pa., has been appointed assistant freight traffic manager of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, succeeding J. P. Orr, who has recently retired. G. S. McCabe becomes general

freight agent, Pennsylvania Company, succeeding Mr. Koch; James E. Welter, general western freight agent, Pennsylvania Company, at Chicago, succeeding Mr. McCabe; John B. Couffer, general western freight agent, Pittsburgh, Cincinnati, Chicago & St. Louis Ry., at Chicago, succeeding Mr. Weller; F. E. Sawyer, agent Green line, Pittsburgh, Cincinnati, Chicago & St. Louis Ry., at Chicago, succeeding Mr. Couffer. S. C. Matthews is appointed assistant general freight agent, Pennsylvania Company, at Pittsburgh, succeeding Mr. Sawyer; E. R. Coleman, division freight agent, Pittsburgh, Cincinnati, Chicago & St. Louis Ry. at Cincinnati, succeeding Mr. Matthews; P. C. Sprague, division freight agent, Pittsburgh, Cincinnati, Chicago & St. Louis Ry. at Richmond, Ind., succeeding Mr. Coleman, and C. L. Ferrall, division freight agent at Cambridge, Ohio, succeeding Mr. Sprague.

G. E. Whitelam is appointed superintendent freight loss and damage claims of the St. Louis & San Francisco R. R., with office at Springfield, Mo.

Frank D. Austin has been appointed manager of the Mt. Jewett Route of the Baltimore & Ohio and Erie railroads, with office at 399 Broadway, New York, vice Russell S. Underwood, promoted in Erie service.

L. B. Johnson has been appointed commercial agent of the Norfolk Southern R. R. at Charlotte, N. C.

W. P. Hinton, general passenger agent of the Grand Trunk Pacific Ry., at Winnipeg, has been appointed passenger traffic manager, with office at Winnipeg. C. W. Jonnston becomes assistant to the passenger traffic manager, with headquarters at Montreal, Que.

C. H. Gattis, assistant traffic manager of the Georgia & Florida Ry., at Augusta, Ga., has resigned to take service with another company.

F. W. Brown has been appointed traffic manager of the San Francisco-Oakland Terminal Rys., with office at Oakland, Cal.

S. E. Dewey has been appointed commercial agent of the Grand Trunk Ry. system, all rail lines, with office at 290 Broadway, New York.

D. M. Crawford has been appointed commercial agent of the Grand Trunk Ry. system at Pittsburgh, Pa., vice S. E. Dewey, promoted.

ENGINEERING.

Frank S. Wheeler has been appointed division engineer of the Erie Railroad, with headquarters at Buffalo, N. Y., effective February 10.

H. B. Titcomb, district engineer of the Southern Pacific Co., at Los Angeles, Cal., has been appointed maintenance of way assistant, headquarters at San Francisco, Cal., reporting to the assistant chief engineer, the office of district engineer having been abolished.

R. M. Drake, district engineer of the Southern Pacific Co., at San Francisco, Cal., has been appointed maintenance of way assistant, with headquarters at San Francisco. The office of district engineer was abolished, effective February 10.

J. E. Crawford, acting chief engineer of the Norfolk & Western Ry., effective March 1, is appointed chief engineer of the Norfolk & Western Ry. and the Williamson & Pond Creek R. R., with office at Roanoke, Va.

R. W. Willis, whose appointment as district engineer of the Chicago, Burlington & Quincy R. R. was previously noted in the Railway Review, entered the service of the Chicago, Burlington & Quincy as rodman April 8, 1898, remained with that company until August 1, 1902. August 1, 1902, to April 1, 1903, he was assistant to chief engineer of the Cincinnati Northern R. R. Mr. Willis re-entered service of the Chicago, Burlington & Quincy in April, 1903, as assistant engineer, in which position he was mostly engaged on construction work. January 1, 1905, he was appointed division engineer at Galesburg, Ill., and March 11, 1907, was appointed engineer Missouri district, with office at St. Louis, Mo. Mr. Willis is a graduate from the Virginia Military Academy, Lexington, Va., class of 1895.

D. Rounseville, whose appointment as engineer of maintenance of the Chicago & North Western Ry. was noted in our issue of February 7, began his railroad career April 1, 1879, as chainman with a locating party for the Milwaukee, Lake Shore & Western Ry. In 1880 he was instrument man on the St. Paul & Eastern Grand Trunk Ry. Mr. Rounseville was assistant engineer of the Milwaukee, Lake Shore & Western from September, 1880, to March, 1884; locating and construction engineer with the same road from 1884 to 1893, and division engineer from 1893 to 1895.

From 1895 to September 20, 1897, he was assistant engineer of the Chicago & North Western Ry., September 20, 1897, to March 22, 1906, division engineer, Ashland division, Chicago & North Western, and from March 22, 1906, to April 1, 1907, resident engineer of the Milwaukee, Green Bay & Western Ry. On the later date he again became division engineer of the Ashland division of the North Western, and two years afterward resident engineer of the Milwaukee, Sparta & North Western Ry. Prior to Mr. Rounseville's recent promotion, from March, 1912, to February 1, 1914, he was resident engineer of the St. Louis, Peoria & North Western Ry., a proprietary company of the Chicago & North Western.

G. R. Barry, division engineer of the Pennsylvania Lines West of Pittsburgh, with office at Logansport, Ind., has been appointed division engineer at Columbus, Ohio, succeeding F. H. Watts, promoted.

A. C. Watson, division engineer of the Central system of the Pennsylvania Lines, with office at Zanesville, has been appointed division engineer, with office at Logansport, Ind., succeeding G. R. Barry.

William G. Atwood has resigned as chief engineer of the Lake Erie & Western R. R., at Indianapolis, Ind., to become assistant district engineer of the Division of Valuation, Interstate Commerce Commission, with office at Chattanooga, Tenn.

MECHANICAL.

D. C. Wilson has been appointed electrical engineer of the Union Pacific R. R., at Omaha, Neb., succeeding A. J. Collett, resigned to accept a position in Santa Domingo.

John Dickson has been appointed master mechanic of the Spokane, Portland & Seattle Ry., Oregon Trunk Ry., Oregon Electric Ry. and United Railways, with headquarters at Portland, Ore. The office of superintendent of motive power, which A. C. Adams recently resigned to engage in other business, has been abolished.

Lewis D. Freeman, chief draftsman of the Kansas City Southern Ry., has been appointed mechanical inspector of the Seaboard Air Line Ry., with headquarters at Portsmouth, Va.

OBITUARY.

Walter M. Carroll, general storekeeper of the Chicago & North Western Ry., died at Chicago February 11, after an illness extending over several months. He was born at Hemlock Lake, N. Y., December 7, 1870. Mr. Carroll had been in the service of the Northwestern for 25 years. For a number of years he occupied the position as chief clerk to the vice-president and president, and later succeeded to the position of assistant storekeeper and general storekeeper.

Edwin R. Holden, former coal sales agent and until 1899 a vice-president of the Delaware, Lackawanna & Western R. R., died February 13 at his home in New York, in his 78th year.

Samuel Woodward, former president and afterward receiver of the Cincinnati & Eastern railway, now a part of the Norfolk & Western Ry., and superintendent of the Ohio & Mississippi railroad, now a part of the Baltimore & Ohio Southwestern R. R., died February 12, at Morrow, Ohio, aged 74 years.

William H. Taylor, vice-president of the St. Louis Southwestern Ry., with office at New York, died February 7, at his home in that city, aged 56 years.

William Henry Boardman, for many years president of the Railroad Gazette (now the Railway Age Gazette), and for eight years its editor, died at his home in Ridgefield, Conn., February 16. He was born in Dixon, Ill., on August 3, 1846. His father owned and published the Dixon Telegraph. It was in this office that Mr. Boardman first learned the many details of printing and publishing which stood him in good stead later. He was graduated from the University of Michigan in 1869. During the years that he was at the University he was employed during vacation times in the survey of the Great Lakes then being made by the War Department. After working for a time on his father's newspaper, Mr. Boardman was employed by the Railroad Gazette, then published in Chicago. From that time and until early in 1911, when he became ill, Mr. Boardman gave his entire time to the affairs of what is now the Simmons-Boardman Publishing Co. At the time of the great Chicago fire, in 1871, he put the remaining assets of the Railroad Gazette in his bag and started for New York, where the work of publishing the paper was resumed. In 1878 he established a home in Franklin, now Nutley, N. J., and lived there for

22 years. He was active in politics, an officer in the town government, president of the school board, and an officer of several of the local social and sporting clubs. Later he moved to New York city and made his country home at Ridgefield, Conn. He was fond of outdoor sports. He was a member of the Century club, the St. Andrew's Golf club and the Camp Fire club. On November 5, 1874, Mr. Boardman was married to Miss Henrietta Frances Hall, of Rutland, Vt., who survives him, as do also three sons, Francis, Dixon and Bradford, and two daughters, Mrs. Richard S. Chisholm and Miss Clara T. Boardman.

NEW ROADS AND PROJECTS.

Alaska.—Vice-president Robert Baxter of the Copper River & Northwestern Ry. has been quoted as saying that the Morgan-Guggenheim syndicate will spend \$1,000,000 in building railroad extensions in Alaska and adding to the Alaska Steamship company's connecting steamship fleet upon passage of the Alaska railroad bill by Congress. Spurs will be built to bodies of lower grade copper ores than it has been unprofitable to work hitherto. Mr. Baxter figures that the building of the government railroad will begin an era of Alaskan development comparable to that of western states following the building of the transcontinental railroads.

California.—The Death Valley R. R. proposes the construction of a 17-mile railway from the Ryan branch of the Tonopah & Tidewater R. R. to the Biddy McCarthy borax mine in Inyo county, Cal. W. D. Cole, Oakland, Cal., is interested.

See also New Roads and Projects under Nevada.

Permission for the issuance of \$10,000,000 of bonds and \$3,000,000 of stocks by the San Diego & Arizona Ry. for the completion of its line from San Diego, Cal., into the Imperial valley, has been granted by the California railroad commission. The line will be approximately 14 miles in length. The stock of the railroad stands in the names of J. D. and A. B. Spreckels, but there is said to be a controversy regarding ownership of this stock, the Spreckles interests saying that the Southern Pacific Co. agreed to take over the road, while the Southern Pacific asserts that the Spreckles agreed to reimburse the company for such advances as it made when construction work was begun. About \$5,000,000 already has been expended in construction. The railway extends south from San Diego to Tia Juana on the Mexican line, and then passes for a distance of approximately 40 miles through the northern part of Lower California, re-entering California at Tecate. From this point it traverses the mountain ranges eastward into the Imperial Valley to Seeley, where it connects with the Imperial Valley branch of the Southern Pacific.

Florida.—Edward Walker, vice-president and general manager of the Tampa, Atlantic & Gulf Ry., Box 1061, Tampa, Fla., says the line to be built is 230 miles in length from Tampa to Fort Lauderdale, Fla., via Punta Gorda, Charlotte Harbor and Lake Okeechobee, and it will include six drawbridges and five miles of trestling. The West Coast Construction Co., same address, will build the road.

Georgia.—The Atlanta & North Georgia R. R. has applied for incorporation, to build a line of railway 50 miles in length from Atlanta, Ga., via Bolton, Roswell, Crabapple, Alpharetta and Cumming to Creighton Ga. The capital stock is reported as \$1,200,000 and the headquarters of the company in Atlanta. Incorporators: A. B. Kellog, Jas. N. Ellis, J. H. Drewry, R. W. Underwood, J. N. Johnson, Jr., S. O. Vickers, E. C. Rupley and J. W. Tindall, all of Atlanta; J. M. Estes and H. P. Hoyt of Kirkwood, Ga.

Nevada.—Construction work on the projected Surprise Valley Ry., running from Reynard, Nev., 55 miles northeast into Surprise valley, Modoc county, Cal., will be begun early in the spring. This is an independent project but will connect with the Western Pacific Ry. at Reynard, Nev., and will give railway communication to Cedarville, Eagleton, Lake City, Modoc and Fort Bidwell, Cal. With the building of the line, a reclamation project involving 64,000 acres of land is proposed. The Surprise Valley Ry. was incorporated in Salt Lake City, Utah, August 7, 1913, with a capital stock of \$800,000, \$250,000 of which is preferred stock, and \$550,000 common. The officers of the company are E. L. Perkes, president; Charles L. Rood, vice-president; H. B. Laub, secretary and treasurer. It is understood that J. E. Saxton, general manager of the Eureka Nevada Ry. at Palisade, Nev., is also identified with the new line.

New York.—The Degnon Terminal R. R. which is constructing a freight terminal for the Dutch Kills Canal near the Sunnyside yards of the Long Island R. R. north of Hunter's Point, Borough of Queens, has obtained a certificate of convenience and necessity for a railroad from a half mile to a mile long from a point near Devis street to a point near School street. According to the application there are 18 city blocks in the area to be served by the proposed freight line, which will cost about \$250,000. Alfred A. Stuart is president and John T. Doherty is secretary.

Pennsylvania.—Rice's Landing branch of the Monongahela division of the Pennsylvania Railroad has been extended from Rice's Landing, Pa., to Crucible, 1.8 miles.

Virginia.—H. G. Guyan, Humbert, Pa., according to report, will construct a railroad in Wythe county Va., in connection with the development of a large tract of timberland in that county.

West Virginia.—According to a report, announcement was made at the annual meeting of the Buckhannon & Northern R. R. that the Baltimore & Ohio R. R. had sold its interest in the property to the Pennsylvania Railroad thus giving the Pennsylvania and the New York Central Lines an equal share in the road. It was also announced that construction operations will begin early in the spring, without waiting for completion of the work in Fairmont, W. Va. Headquarters will be at Brownville, Pa. The company has under construction at present the Pricketts Creek branch of five miles, which will carry its line into Fairmont. The Monongahela River R. R. is to operate the entire line when it is finished. J. M. Schoonmaker of Pittsburgh is president; J. J. Turner, vice-president; J. T. Blair, secretary and treasurer, and S. D. Brady, Morgantown, W. Va., chief engineer.

Electric Railways.

The Cleveland Alliance & Mahoning Valley railroad will begin work this spring on a line to extend from Ravenna, Ohio, through and two miles northwest of Hudson, Ohio, where it will make connections with the Akron, Bedford & Cleveland R. R.

Clarence Keedy and Henry A. Bester, Jr., of Hagerstown, Md., according to report, are promoting plans and have been granted franchise for an electric railway, which will probably be known as the Washington County Traction Co., and will extend from Hagerstown to Smithsburg, Md., 10 to 15 miles, via Security, Chewsville and Cavetown.

The Interborough Rapid Transit Co. has awarded contracts for third-tracking of the elevated lines of the Manhattan Railways Co. in Second, Third and Ninth avenues, New York, and the work will begin as soon as the courts have handed down a decision in the proceedings brought by property owners along the affected routes. The contracts involve the expenditure of between \$16,000,000 and \$18,000,000.

A survey for an extension of the Evansville & Eastern Electric Ry. from Kincaid, Ind., to a point opposite Owensboro, Ky., has begun, and it is expected the spur will be built this year. Transfer at Owensboro across the Ohio river will be made by a steel-hull ferry boat. The estimated cost of the extension is placed at \$250,000.

The Utah Light & Ry. plans to build during the year from four to five miles of new track from Holliday, Utah, to Cottonwood canyon and from Centerville to Farmington, four miles.

The Minneapolis, Mille Lacs & Northern R. R. has been organized to build a line from Anoka, Minn., to Ogilvie in Kanabec county, and will thereafter go forward to Mille Lacs lake, the Cuyuna range and Aitkin, Minn. F. H. Hunter is president of the new company; L. H. Boldue is vice president and treasurer, and A. F. Pratt is secretary. A. A. Kranhold and F. E. Vrooman of St. Francis are directors.

The Beloit & Delavan Interurban railway will soon begin construction of 17.5 miles of electric line between Beloit and Delavan, Wis. Joel B. Dow, Beloit, Wis., is manager.

The Badger Railway & Light Co. has awarded a contract to the Raulf Co., Milwaukee, Wis., to build its 22-mile line from Lake Geneva to Whitewater, Wis.

Reports say that plans are being considered by Texas-Louisiana Traction Co. to build a line from Mansfield northward to Vivian via Shreveport, Blanchard, Oil City and Mooringsport. Ultimately this line will be extended to Longview. A. B. Blevins, of Jefferson, is president.

Construction has been begun on the Knoxville-Maryville Interurban railway. It is estimated by the general contractor, R. B. Oliver, that cars will be running between Knoxville and Blount counties by the first of next January. The first section has been sub-let by Mr. Oliver to Hickey

& Son, of Knoxville, Tenn. The president of the company is John F. Shea, of Knoxville. Knox Burger is secretary and treasurer and J. Park Vestal, of Knoxville, is a director.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Atlantic Coast Line R. R. has ordered 25 locomotives from the Baldwin Locomotive Works.

—The Tennessee Central R. R. has ordered 2 80-ton consolidation (2-8-0) locomotives from the American Locomotive Co.

—The Dill-Cramer-Truitt Corp., Suffolk, Va., has ordered 1 prairie type (2-6-2) locomotive from the Baldwin Locomotive Works.

—The Conway Lumber Co., Conway, S. C., has ordered 1 prairie type (2-6-2) type locomotive from the Baldwin Locomotive Works.

—The John L. Roper Co., Norfolk, Va., has ordered 1 prairie type (2-6-2) locomotive from the Baldwin Locomotive Works.

—The Chicago, Milwaukee & St. Paul Ry., according to report, is in the market for 12 locomotives.

—The Delaware, Lackawanna & Western R. R., is reported to have ordered 14 Pacific type (4-6-2) locomotives from the Lima Locomotive Corporation.

—The Lake Shore & Michigan Southern Ry. is reported in the market for 50 Pacific and Mikado locomotives.

—The New York Central & Hudson River R. R., it is said, is inquiring for 25 switching locomotives.

—The Chesapeake & Ohio Ry. reported in a previous issue as having ordered locomotives, has ordered 6 Pacific type and 14 Mallet type locomotives from the American Locomotive Co. There were also ordered for the Hocking Valley Ry., 6 Mikado locomotives.

—The Southern Railway is in the market for 21 locomotives.

Freight Cars.

—The New York Central Lines, according to report, is inquiring for 1000 steel underframe box cars, 500 all-steel box cars, 1000 steel hopper cars and 300 work cars.

—The Florida East Coast Ry. has ordered 500 box cars from the Mt. Vernon Car Manufacturing Co.

—The Cambria & Indiana R. R. is reported as ordering 500 hopper cars from the Cambria Steel Co.

—The Morgantown & Kingwood R. R. has ordered 200 hopper cars from the Pressed Steel Car Co.

—The Philadelphia & Reading Ry. is reported in the market for 1000 hopper cars.

—A report says the Lake Erie, Franklin & Clarion R. R. is in the market for 100 freight cars.

—The Pennsylvania Lines West of Pittsburgh are reported as in the market for 200 cabooses.

—The Bangor & Aroostook R. R. is reported in the market for 85 flat cars.

—The Central of Georgia Ry. is inquiring for 500 40-ton box cars.

—The Virginian Railway has ordered 1000 gondolas from the Standard Steel Car Co. Our issue of February 7, reported in error the placing of this order with another builder.

—The Denver & Rio Grande R. R., it is understood, will not place orders at this time for additional freight cars. Inquiries had been sent out for 500 box and 500 gondola cars.

Passenger Cars.

—The Atlantic Coast line R. R. is said to have issued inquiries for 15 passenger cars.

—The Erie Railroad is reported in the market for 5 passenger cars.

—The Norfolk & Western Ry. has ordered 5 dining cars from the American Car & Foundry Co.

Machinery and Tools.

—The Seaboard Air Line Ry. is in the market for about 40 machine tools for delivery at Portsmouth, Va., and about 20 for delivery at Savannah, Ga.

—The Grand Trunk Railway system has put out a list of machine tool requirements, 14 machines and 3 motors, from

the office of its purchasing agent at Montreal, Que. The tools are for delivery at Port Huron, Mich.

—The Cleveland, Cincinnati, Chicago & St. Louis Ry. has ordered nine electric turntable tractors from Geo. P. Nichols & Brother, for installation at different points on the company's line.

Signals and Interlocking.

—The new automatic signal service of the Pennsylvania Railroad between Lewistown Junction and Denholm, Pa., has just been placed in service, adding 10 additional miles of automatic protection to the middle division and leaving only a 38-mile section under the old system.

Iron and Steel.

—The Illinois Central R. R. has ordered 7500 tons of rails from the Tennessee Coal, Iron & Railroad Co.

—The Central of Georgia Ry. has ordered 10,000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

—The Baltimore & Ohio R. R. has ordered 25,000 kegs of spikes from the Jones & Laughlin Steel Co.

—The Great Northern Ry., it is said, will order 10,000 kegs of spikes.

Bridges.

—The Erie Railroad is having plans drawn for a new structure to replace an old covered bridge on the Niles and Lisbon branch, near Niles, Ohio.

—Bids are being taken this week on about 20,000 tons of steel for the proposed bridge of the Arkansas & Memphis Railway Bridge & Terminal Co. (Rock Island Lines), to be erected over the Mississippi river at Memphis, Tenn.

—The Pennsylvania Railroad has made application to the Pennsylvania water supply commission for permission to construct a bridge over the Susquehanna river at Mehaffey, Pa.

—The Pennsylvania Railroad has contracted for about 500 tons of bridge work, which includes 250 tons for a structure at Norristown, Pa., to the Phoenix Bridge Co.

—The Atlantic Coast Line R. R. has awarded contract to the McClintic-Marshall Co. for 1400 tons of bridge steel.

—The Atlantic Coast Line R. R. will erect a 200-ton bridge over the Suwanee river.

—The Cumberland Valley R. R. has awarded contract for 800 tons of bridge steel for a new structure over the Potomac river to the Pennsylvania Steel Co.

—The Philadelphia & Reading Ry., it is said, has awarded contract for the erection of a reinforced concrete bridge near Glen Moore, N. J., to the Phoenix Bridge Co.

Buildings, Terminals, Etc.

—The Louisville & Nashville R. R. will erect a large coaling plant at Paris, Ky.

—The Delaware, Lackawanna & Western R. R. it is said has awarded contract to the Lackawanna Bridge Co. for 500 tons of structural steel for the railroad's new terminal at Buffalo, N. Y., and 1500 tons are pending. Contract for a reinforced concrete dock on the Buffalo river from Main to Michigan streets for the Lackawanna terminal, requiring 250 tons of bars, has been awarded to the Great Lakes Dredge & Dock Co.

—The Delaware & Hudson Co. has awarded general contract to J. H. Miller, Baltimore, Md., for its new office building at Albany, N. Y.

—The Delaware & Hudson Co. plans to start work early in April on the improvement of its yards at Scranton, Pa. Estimated cost, \$350,000.

—The Union Station Co., Chicago, in the interests of the Pennsylvania Lines West of Pittsburgh, the Chicago, Burlington & Quincy R. R. and the Chicago, Milwaukee & St. Paul Ry., has presented new plans for the new union terminal, granting many concessions to the city. A new site has been chosen for a freight terminal for the Pennsylvania company east of Canal street, between Polk and Sixteenth streets. Viaducts, street grading, widening of streets and other improvements which the railroads will make at their own expense will cost about \$7,000,000. These improvements are to be given the city in return for street vacations.

—A new union station is now being proposed for Texarkana, Tex.-Ark., by the railroads entering that place.

—The Seaboard Air Line Ry. plans an expenditure of about \$100,000 for further terminal improvements on Hutchinson island, Savannah, Ga.

—The Louisville & Nashville R. R., according to a report from Birmingham, Ala., will improve its north yards in that

city at a cost of about \$200,000, including the building of additional tracks.

Patents On Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, FEB. 10, 1914.

Car roof, 1,084,604—Lewis T. Canfield, Chicago, Ill.

Electric Locomotive, 1,086,396—Glover F. Perin, Birmingham, Ala., assignor to The Jeffrey Manufacturing Co., Springfield, Ohio.

Metallic Tie, 1,086,404—Burton S. Rupp, Salt Lake City. Rail-Fastener, 1,086,411—Frank E. Spencer, Thornburg, Pa. Track-Sanding Apparatus, 1,086,454—Oscar Johnson, Chicago, Ill.

Valve-Gear, 1,086,476—Willis H. Smith, Knoxville, Tenn. Apparatus for Controlling the Operation of Railway Switches and Signals, 1,086,499—Charles O. Anderson, Omaha, Nebr.

Railway-Switch, 1,086,500—Charles O. Anderson, Omaha, Nebr.

Rail-Tie, 1,086,505—John Bons, Chicago, Ill.

Tandem-Spring Draft-Rigging, 1,086,553—John F. O'Connor, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.

Saddle-Block for Car-Roofs, 1,086,556—Herman Pries, Michigan City, Ind.

Buffing Mechanism for Car-Platforms, 1,086,573—Charles T. Westlake and Charles F. Frede, St. Louis, Mo., assignors to Double Body Bolster Company, St. Louis, Mo.

Railway-Switch Stand, 1,086,576—George Ashton, Cincinnati, Ohio, assignor to The Cincinnati Frog and Switch Co., Cincinnati, Ohio.

Car Door, 1,086,602 and 1,086,603—Philip C. Merker, Cedar Rapids, Iowa.

Fastening for Car-Doors, 1,086,604—Philip C. Merker, Cedar Rapids, Iowa.

Stay-Chain-Attaching Device for Car-Doors, 1,086,605—Philip C. Merker, Cedar Rapids, Iowa.

Wheel-Flange Lubricator, 1,086,624—William T. Small and Charles Bess, Dunsmuir, Cal.

Metallic Track-Fastener, 1,086,668—Frank Jager, Chicago, Ill. Renewable Flange for Car-Wheels, 1,086,669—Frederick W. Johansen, San Francisco, Cal.

Car-Truck, 1,086,672—Roscoe B. Kendig, Port Chester, N. Y. Underframe for Cars, 1,086,677—Basil Magor, New York, N. Y.

Normal-Danger-Signal System, 1,086,706—Laurence A. Hawkins and Elmer F. Bliss, Schenectady, N. Y., assignors to The Union Switch and Signal Co., Swissvale, Pa.

Car-Door-Operating Mechanism, 1,086,723—Charles A. Lindstrom, Pittsburgh, Pa.

Reinforced Rail-Joint, 1,086,734—Edgar M. Smith, Chicago, Ill.

Flexible Stay-Bolt, 1,086,737—Ralph G. Taylor, Davenport, Iowa.

Block-Signal System, 1,086,752—James Burke, Erie, Pa., assignor to General Railway Signal Co., New York.

Rail-Fastening, 1,086,771—Arthur E. Hogrebe, Philadelphia, Pa.

Electric-Railway-Crossing Gate, 1,086,775—Anton S. Kobling, Wallingford, Conn.

Grain-Door, 1,086,780—Orin J. Miller, Hurdsfield, N. D.

Coupling for Superheaters, 1,086,807—Frederick Conrath, St. Paul, Minn.

Rail-Joint, 1,086,895—Parker T. Corbin, Bradford, Ohio.

Substructure for Railway-Crossings, 1,086,901—William P. Day, Cleveland, Ohio.

Car-Roof, 1,086,915—John J. Hoffman, Pittsburgh, Pa., assignor to P. H. Murphy Co., Parnassus, Pa.

Railway-Traffic-Controlled Apparatus, 1,086,957—Ralph P. Tuttle, Arrochar, N. Y., assignor to The Union Switch & Signal Co., Swissvale, Pa.

Concrete Railway-Tie, 1,086,981—Robert Trommell Bagby, Whitney, N. C.

Rail-Fastening, 1,087,004—Leon Faque St.Germain-en-Laye, France, assignor to Societe Universelle des Appareils Controleurs, Paris, France.

Rail Joint, 1,087,016—Gottlieb H. Hoelscher, Hawarden, Iowa.

Car-Seal, 1,087,020—Raymond H. Jones, Marysville, Cal.

Headlight, 1,087,028—Charles Owen Maphis, Linville, Pa.

Railway-Switch, 1,087,034—Frank Mientus, Oliver, Pa.

Bolt-Lock for Rail Joints, 1,087,041—Waldow F. Myers, Fostoria, Ohio.

Railway-Vehicle, 1,087,053—Norman W. Storer, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

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Committee on Stresses in Track.

A special committee had been appointed by the American Society of Civil Engineers to co-operate with a similar committee of the American Railway Engineering Association, to conduct a series of tests on stresses in track. President James J. Farrell, of the United States Steel Corporation, has offered to subscribe \$10,000 toward the expense of making these tests, and the Erie R. R., through Vice-President J. C. Stuart, has indicated its willingness to offer the use of its tracks and facilities. The American Society of Civil Engineers has made an appropriation of \$2000 to the fund, to be expended under the direction of the committee. The following members have been appointed to represent the American Railway Engineering Association in conducting the experiments: A. N. Talbot (chairman), W. M. Dawley (vice-chairman), A. S. Baldwin, J. B. Berry, G. H. Bremner, H. E. Hale, John Brunner, W. J. Burton, J. B. Jenkins, George W. Kittredge, P. M. LaBach, William McNab, G. J. Ray, F. E. Turneure, Chas. S. Churchill, W. C. Cushing, Dr. P. H. Dudley, E. Gerber and J. E. Willoughby.

Probable Opening of Panama Canal.

Col. Geo. W. Goethals, chief engineer of the Panama Canal, is quoted as saying, in Washington last week, that, barring unforeseen accidents, the Panama Canal will be open for merchant ships as early as July 1. Battleships should be able to go through the canal by July 15 and the fortifications will then be in fighting order. Colonel Goethals has prepared a tentative list of the men whom he desires to be appointed heads of the eleven departments created by the new Panama canal law. They are all men who have worked with him on the isthmus. This list will be submitted to Secretary Garrison within a few days.

Louisville & Nashville R. R. Fined by Mississippi Court.

The Louisville & Nashville R. R. was fined \$402,000 and enjoined from doing intrastate business in Mississippi, by a decision in chancery court, at Gulfport, Miss., February 20. The case arises from the refusal of the road to obey an order issued by the state railroad commission in 1908 to stop its trains at Bay St. Louis. Suit was at once brought against the railroad and the case has been to the state Supreme court twice and the United States Supreme court once. It was brought back to the chancery court at Gulfport by Attorney General Collins, who prosecuted the case in person. The fine was based on \$200 a day for 2010 days' violation of the commission's orders. The road will file a supersedeas bond of \$804,000 and will appeal in the state supreme court again.

Arguments Concluded in Suit to Force Car Line's Testimony.

Arguments were concluded this week in the proceedings before Federal Judge Landis, at Chicago, to compel Frederick W. Ellis, vice-president of the Armour Car Lines, to disclose information to the Interstate Commerce Commission relative to the affairs of the concern. It is expected Judge Landis will announce a decision in the case next week. The matter is a sequel to the recent hearing before Com-

missioner Charles C. McChord, at which Mr. Ellis refused to answer questions relating to the earnings and business relative to the Armour Car Lines. The aid of the federal court was subsequently sought to compel him to testify. In summing up the arguments in behalf of Mr. Ellis, Frank Kellogg, his attorney, emphasized the following points: Private car lines are not common carriers; the commission has no power to compel a car line to show its cost figures on ice and the manufacture of cars; the order of the commission for the inquiry did not include an investigation of rebates to shippers nor relations between Armour & Co. and the Armour Car Lines. P. L. Farrell, solicitor of the commission, contended that the commission issued a broad order and is entitled to the information sought.

Petitions to Hold Water Lines Continue.

A number of other railroads in addition to those previously represented, have made application to be permitted to retain their water lines after July 1, the date on which the new law forbidding such ownership takes effect. The Southern Pacific Co., which owns 110,800 of the 200,000 shares of the Pacific Mail Steamship Co., having a value of \$11,080,000, and operating a fleet of steamers between San Francisco and Hawaii, the Orient and the Isthmus of Panama, informed the commission that after July 1 the steamship company will engage in traffic between San Francisco and ports in Mexico, Guatemala, Salvador, Honduras, Nicaragua and Costa Rica, between those Mexican and Central American ports and Europe and between the same ports and Atlantic and Gulf ports of the United States. It is set out that the traffic is to be "trans-shipped in connection with the vessels of other lines in no way connected with the petitioner," and that in no way will there be competition with the rail lines of the applicant. In another application the Southern Pacific asks permission to continue operation of its fleet of twenty-two steamers which operate between New York City and New Orleans, Galveston and Havana. These vessels, with docks and wharves, are valued at \$16,500,000. Among other recent applications are those from the Grand Trunk, the Erie, the Rutland, the Spokane, Portland & Seattle Railway and the Pennsylvania.

Sale of Liquor Discontinued on N. Y., N. H. & H. R. R.

The New York, New Haven & Hartford R. R. has issued an order, effective March 1, discontinuing the sale of liquor on its trains through its entire territory. "The New Haven takes this action," says the road's statement, "in the belief that, however custom may have sanctioned the practice, the sale of liquor on its trains in the state of Massachusetts, Rhode Island and Connecticut is not permitted by the laws of these states, which make no provision for state licensing. No liquor has been sold in New York state because the distance traversed there was believed to be too short to warrant taking out a state license. In regard to the sale of liquor on trains, the position of the New Haven in the past has been that it had no desire to sell liquor, but did so in response to the demand of its patrons. However, it is the policy of the company to conduct its business strictly in conformity with the laws of the states in which it operates, and it feels that the law in these three states does not provide for liquor-selling on trains it should be stopped. In taking this action discontinuing liquor-selling the New Haven is following a rule which many other large railroads have adopted in different parts of the country."

Fires Well Controlled on National Forests in 1913.

During 1913 the forces on the national forests fought 4520 fires, or nearly twice as many as started in 1912, the best year the forests have ever had. Notwithstanding the great

increase in the number of fires, Forester Graves considers that the showing made by the forest service was quite as favorable as that in the preceding year, because the damage done and the costs of fire fighting were no greater proportionately than in 1912. In both years practically 50 per cent of all fires were detected and extinguished before they burned over a quarter of an acre, and 25 per cent of both year's fires were put out before they covered 10 acres. Of last year's fires, 3278, or considerably more than the whole number of fires in 1912, were confined to areas of less than 10 acres, and in 1080 additional fires less than \$100 damage was done by each. In only 25 fires did the damage amount to \$1000. The aggregate loss in timber is estimated at nearly 59 million board feet, valued at about \$82,000, and the damage to young growth and forage is estimated at about \$110,000, making a total of about \$192,000. About 18 per cent of this loss, however, was incurred on private lands within the forests where 16 per cent of the fires had their origin. One encouraging feature reported by the forester is that the total number of fires set by locomotives was scarcely more than in the preceding year and represented only 12 per cent of all fires, as against nearly 19 per cent in 1912; also the proportion set by sawmills and other engines in the woods was considerably less than in 1912. This indicates very plainly, Mr. Graves says, that the public is awakening to the need of spark arresters and care with engines in the woods.

North Dakota Farmers Visit Wisconsin Dairies.

A party of between 50 and 75 North Dakota farmers have been making a visit this week, to dairy centers of the state of Wisconsin, in three special sleeping cars via Chicago & Northwestern Ry. Their purpose is to gain first hand information on the efficient methods employed in Wisconsin with a view to improving dairy conditions in their home state. During the stops visits will be made to the more extensive dairy farms, receiving stations and distributing plants and comprehensive studies made of each.

Instruction in Highway Engineering Popular in Illinois.

During the last two weeks of January, 1914, the civil engineering department of the University of Illinois held a special short course in highway engineering, with extremely gratifying results. The course was offered primarily to help the state's newly appointed county superintendents of highways prepare for their duties under the road law which became effective July 1, 1913. The total number to register was 191, and with the visitors the average attendance was in excess of 200. It is significant that of the 66 county superintendents of highways provided for in the new law, no less than 63 appeared at the first session and remained throughout the entire course, showing that these men were ready and willing to take advantage of the opportunity to gain knowledge concerning road engineering. In connection with the course an exhibit of road building machinery was held, many prominent manufacturers sending large shipments of road machinery. In addition there was an interesting exhibit of road models and pictures of road improvement belonging to the United States government. At the last session resolutions were passed asking that the course be offered annually, and it is probable that this will be done.

Southern Pacific Ferry Alameda.

In the construction of the new ferry steamer, Alameda, which, it is claimed, is the fastest and largest ferry boat on San Francisco bay, the Southern Pacific road made it a point to patronize home industry. The vessel made her trial trip Monday, February 23, and will make the distance between Oakland and San Francisco in five minutes less time

than is required by the other ferry steamers. The Alameda was built in California by California labor, and all the materials, such as hull, boilers, machinery, etc., that could be bought on the Pacific coast was purchased in California. The Alameda chamber of commerce and other civic bodies made the occasion of the trial trip eventful with a big celebration. The Alameda was constructed at the West Oakland shipyards. It is a double-end, side wheel passenger ferry boat and has a seating capacity of 1845. Like the Contra Costa the paddle wheels on each side will be operated by separate engines, four in all, allowing the vessel to be turned around in her own length in time of emergency. Special safety features consist of seven bulkheads up to main deck and five more extending to platform deck, any one of which may be pierced during collision without endangering the vessel. The cost is estimated at \$500,000. On the upper deck ample provision is made for many outside seats and the greater portion of these are protected overhead and on either side. The interior finish is of mahogany. Ventilation is provided by special ventilators on both decks. The dining room is located beneath the main deck, seating 76 passengers. The vessel is equipped with electric lights and searchlights for navigation at nights. Oil will be used for fuel. The general dimensions are: 292 feet, 4 inches, length over guards; 273 feet, outside of stern posts; 75 feet, 4 inches overguard breadth amidship; 42 feet moulded beam; 17 feet, 3 inches, from bottom of keel to top of main deck, amidship.

Results of Capacity Car Loading Campaign.

To what extent shippers have co-operated with the railroads in their campaign to prevent car shortages by loading equipment to maximum capacity is shown by the figures issued by the traffic department of the Universal Portland Cement Co., for 1913. This company shipped 10,383,111 barrels of cement in 53,585 freight cars in 1913, as compared with 7,686,047 barrels shipped in 43,097 cars in 1911. The figures indicate a maximum loading of freight cars in 1913 which was not the practice in 1911. An average of 194 barrels were loaded in a car last year, the loading having been increased from 178 barrels in 1911. This increase in carload saved the use of 4,747 cars which would have been required additionally to move last year's traffic on the basis of the loading in 1911. This industrial concern has reduced the number of cars required to handle an increasing business by loading the cars to capacity plus 10 per cent. A campaign was conducted with the trade and selling forces of the company so that orders would insure maximum loading of cars. Other shippers are carrying out the principles outlined for the prevention of car shortages, but the results obtained by the cement company on such a big scale have attracted special notice in transportation circles.

Safety Committee Takes Over Sanitation Measures, B. & O. R. R.

Under the reorganization of the general safety committee of the Baltimore & Ohio system, which was announced recently, the scope of the work has been broadened by a campaign of sanitation through which it is aimed to protect the health of employees by providing wholesome working conditions while at the same time guarding life and limb. On the general safety committee is a physician expert in sanitation, who devotes his entire time to matters concerned with hygiene and the personal welfare of the employees. Dr. Parlett is making an inspection of the restaurants of the railroad, where the traveling public and employees are served meals, and the rest-houses and other quarters at division and terminal points where employees spend their time. The sanitary conditions of passenger trains comes within the province of the general safety committee likewise, so that every

effort is being made to protect the health of the traveling public. The proper ventilation of trains will receive careful attention and state laws applying to the cleanliness of trains will be enforced. For several years the Baltimore & Ohio has maintained rigid regulations to insure the healthy condition of employees of the dining car department who handle the food served on trains. All cooks, waiters and other employees are examined by a company physician when employed and must submit to periodical examinations to show that their health has not become impaired. Such examinations are now being made by the general safety committee of the employees of restaurants and rest-houses. These employees are being examined by physicians and must hold certificates of health to show that they are free from contagious or communicable disease. Women employees are examined by female physicians in the employ of the company. An educational campaign is being conducted by the general

trucking galleries. This makes a terminal a quarter of a mile in length, the tracks extending under Hennepin avenue. There is a power house at the north end of the station yard, connecting with the main buildings by an overhead "pipe gallery."

Six roads use the new station: The Great Northern, the Northern Pacific, the Great Western, the Chicago, Burlington & Quincy, the Chicago & Northwestern and the Chicago, Minneapolis, St. Paul & Omaha.

The exterior of the new station is of tooled Kettle River sandstone, from the quarries in Sandstone, Minn. The trucking galleries and stairs to the train platforms are of reinforced concrete construction. The power house and stack exterior are of brick. The only wood used in construction was in doors and narrow casings. Entrance and inner vestibule floors are of art marble tile. The walls are wainscoted with Tennessee marble. Door frames and booths



New Passenger Station of the Great Northern Ry. at Minneapolis.

safety committee to impress upon the employees and their representatives on the local committees the importance of cleanliness, methods of combating the spread of contagious and infectious disease as well as matters pertaining to social hygiene.

New Passenger Station for the Great Northern Ry., at Minneapolis.

A new passenger station has recently been completed for the Great Northern Ry. in Minneapolis, Minn., and opened for service on Jan. 22. It stands on the river-front facing Hennepin Ave.

The station is built according to the following general arrangement: Main building with entrance on the street level; waiting room, 62x155 ft., and concourse 252x50 ft., on street level, with stairways and elevators leading to train platforms. There are twelve through tracks served by six platforms with "butterfly" type train sheds.

There is an overhead trucking gallery for handling baggage, mail and express, with elevators leading to all platforms at the far end of the station, so that baggage trucks are never in the way of passengers. These baggage trucks are driven by electric power and they are rubber tired, which will make the handling of baggage almost noiseless.

The mail and express building is on the site of the old station (across the street) and the two are connected by

around the waiting room are of ornamental cast iron. The women's retiring room has an art marble floor, with wainscoting of mottled gray Vermont marble. The smoking room has De Smet marble cement floor tile, with Tennessee marble wainscoting and the dining room (on second floor) has a marble tile floor and Vermont marble wainscoting. On the second floor are the offices of the chief train dispatcher and his assistants; division superintendent and station officials. The third floor is to be used for storage purposes.

A noteworthy feature in the new station is the manner of ventilation. Water-washed air is poured into the waiting room by means of large fans, while at the same time the vitiated air is removed by exhaust fans, and the temperature is kept even. During the summer the air will be cooled to a refreshing temperature by ice and pumped into the station at the rate of 35,000 ft. a minute.

The main waiting room and train concourse are lighted by large ornamental chandeliers with tungsten units. In the new depot, Minneapolis people are given their first sight of recessed lights at the base of all stairway landings, minimizing mis-steps in going down these stairways.

The electrical equipment of this new station is most extensive. For this purpose more than eleven miles of galvanized iron conduit was used, and more than 25 miles of rubber covered wire. More than 500 switches are used for controlling the various lighting circuits, in addition to which there are a number of remote-control switches for con-

trolling groups of lights from various locations in the station, and all of the remote-control points have small lamps back of a bull's-eye lens to indicate if the lights located at the distant point are burning or are cut off.

The power house, for furnishing the light, heat and power to the station, is located approximately 1000 ft. north of the building, the wires for supplying light and power and the steam for the operating pumps and for heating purposes

Figures are also given to show that the same condition prevails in the transportation of all commodities and steel products from many other points in Eastern trunk line territory.

The petitioners contend that the commission should not have found that the complainants' railroads are plant facilities, and they argue that the commission is not justified in the conclusion that "service performed for industries ad-

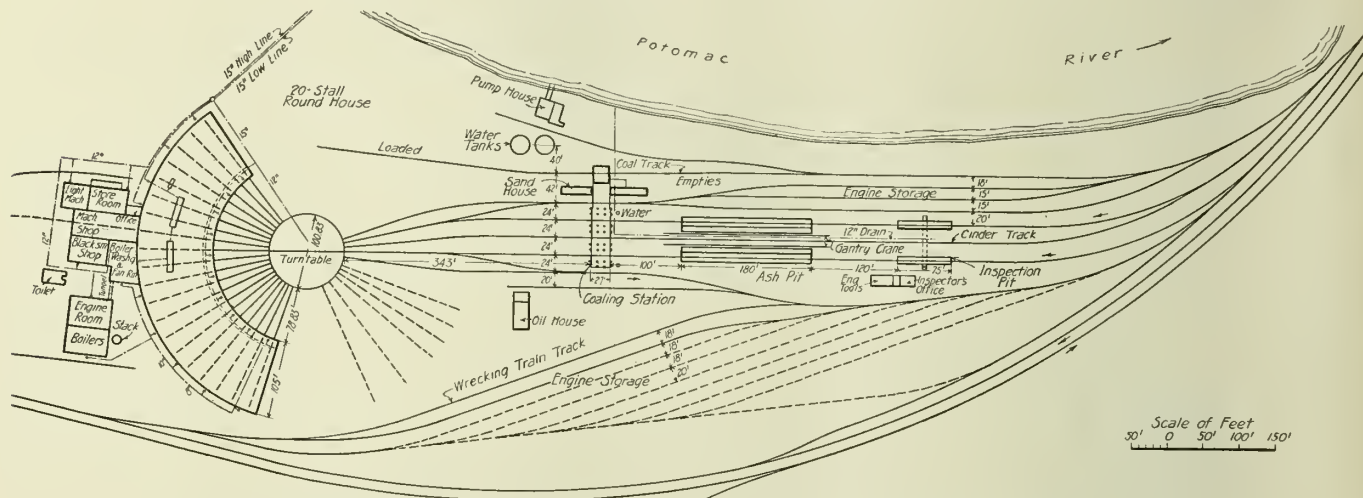


Fig. 1—Layout of Engine Terminal, Western Maryland Ry., at Maryland Junction, W. Va.

being carried through an aerial passage-way connecting the two buildings.

The generating plant consists of two simple and one compound engine directly connected to two 250-kilowatt and one 350-kilowatt direct current 220 volt generators, making a total of 850-kilowatt, or approximately 1200 horse power. All of the electrical equipment, including generators, switch-boards, panel-boards, conduit and wiring, was installed by the Minneapolis Electric Equipment Company.

Ask Rehearing On Industrial Lines Case.

Attorneys representing certain railroad subsidiaries of the United States Steel Corporation have asked the Interstate Commerce Commission to reopen the "matter of allowances to short lines of railroads serving industries." The action is taken on the assumption that trunk line railroads are arranging to immediately discontinue through rates with the Union Railroad Co., the Newburg & South Shore and the Lake Terminal R. R. The Union Railroad, controlled by the Carnegie Steel Co., operates more than 31 miles of track about Pittsburg; the Newburg & South Shore operates nine miles of road in Cleveland and Newburg, Ohio, connecting the Newburg Steel works, the Emma Furnace and Central works with diverging lines; and the Lake Terminal R. R., owned by the Federal Steel Co., performs switching service between various railroads entering Lorain and South Lorain, Ohio, operating more than 62 miles of track.

The brief filed with the commission contends that in the transportation of iron and steel products and of raw materials, including coke and coal, it has been the general custom from the beginning of the industry for the carriers to spot cars within the industry where they are to be loaded or unloaded and take each car when loaded or unloaded to the main line, and that freight rates on these commodities have been continuously constructed upon the basis of the cost of such service.

It is further contended that while for 441 miles, the distance from steel industries on the Union Railroad to New York, the average car revenue over eastern trunk lines on all commodities is \$66.69 it is \$112.54 for steel products.

adjacent to complainants' tracks give such industries an obvious advantage over a shipper who delivers and accepts his freight on a public team track." It is argued that the commission should not have found that the delivery of a car upon complainants' interchange track is a delivery for the purpose of assessing demurrage, nor that the admission of the industrial railroads to the modified per diem agreement is an "undue, unreasonable and unlawful preference and advantage to the industry."

The general effect of the report of the commission, if carried into effect, it is held, would be to unlawfully impose upon steel industries the cost of operating terminal facilities and to cause line carriers to discriminate against industries located along terminal railroads. It would advance rates on particular commodities, which rates are a part of long-continued adjustment, and the proposed change would disturb the whole rate situation; would disturb the grouping of rates into territories by making different ratings to and from industries in the same groups, and would rearrange the whole fabric of rates in this country.

The commission is asked to make an order directing trunk lines who were parties to the original submission of this matter to the commission from carrying out the proposed discontinuances of through rates pending the rehearing, and to make an order directing the trunk lines to continue existing through rates and allowances.

As the application for rehearing of the industrial railway case is regarded as one phase of the pending rate case, it is the purpose of the commission to consider it immediately. It is scarcely likely, however, that a determination either to deny or to grant the application will be reached before the regular conference of the commission in March.

The shrinkage or loss in weight of beef cattle in the course of shipment from western farms and ranches to the markets has been made a subject of special study by the United States Department of Agriculture, and what is believed to be the first authentic information on this subject has been compiled. The investigation covered three years in various cattle-raising sections of the West. The cattled were weighed at the point of loading, on arrival at

their destination, and again after having rest, feed and water. The weight was also taken when the animals were sold. The records include the weighing of Texas and North-western range cattle and calves and of corn-fed, silage-fed, and beet-pulp-fed cattle. In all, 265 shipments were weighed, comprising over 19,000 cattle. Many of these shipments were several days on the road and in such cases were weighed at the unloading points as well as at the first shipping point and at the market.

Protests Against Charges for Spotting Cars.

Determined protests will be made by shippers' organizations before the Interstate Commerce Commission on the occasion of the forthcoming hearing on the proposition of the railroads' making a special charge for spotting cars on industrial sidings. The hearing, according to the present program, is to be held February 27 and 28. The National Industrial Traffic League, which is an organization representing some 100,000 shippers of the central states, has decided to ask the commission to hold a number of special hearings for the purpose of giving shippers an adequate opportunity to present their side of the case. At a meeting of this organization the following was adopted: "Resolved, That the representatives of the association oppose the proposal to permit the carriers to impose an extra charge for the so-called spotting of cars for the following reasons: 1. That this service is a part of transportation service. 2. That it is already included in the rate. 3. That the spotting service, as defined at the hearings of the commissions is not actually performed, except in a very small percentage of deliveries.. 4. That if the spotting of cars is not a part of the transportation service, it is a local service and the question of an imposition of any charge therefor is for the state commissions and not for the Interstate Commerce Commission."

The Illinois Manufacturers' Association will also present arguments before the commission. John M. Glenn, the secretary, has sent a letter to the commission, of which the following are excerpts:

"It is the evident intent of your commission to authorize the railroads to make an additional charge for services which have always been included in the freight rates. We

respectfully protest against any such action on the part of the commission, as we consider it unfair and unjust discrimination against shippers who have supplied themselves at their own expense with additional terminal facilities of which the railroads secure the benefit.

"Our protest applies particularly against the proposed charge for spotting cars. All cars, even those carrying material for industries not equipped with spur tracks, must be delivered at some point, and must be spotted, whether that spotting is performed at the railroad's freight terminal, at its teaming track, or on the privately owned spur tracks within the inclosure of an industrial plant. This service is, and has always been, as much a part of the regular freight service as the actual carrying of the material in cars.

"It is and always has been a part of the cost of the freight service, and as such is covered by the rates. To superimpose an additional charge for this service is not only unscientific but unfair. It is manifestly unfair as between two industries, one of which has at its own expense introduced its own siding, and the other employs the siding built at the railroad's expense, to make against the former a charge for spotting a car and not to make a similar charge against the latter.

"We do not believe such a charge as the commission proposes can be fairly made, without attacking the entire structure of rates, for there are certainly glaring inequalities, which under a minutely accurate and fair system of rate setting would justify widespread changes."

Locomotive Terminal of the Western Maryland Ry., at Maryland Junction, W. Va.

The Western Maryland Ry. has recently completed, at Maryland Junction, W. Va., near Cumberland, Md., a new roundhouse. Figure 1 shows the layout of the terminal, which comprises also engine storage tracks, coaling station, ash pits, sand house, and electrically operated turntable, in connection with which there is the usual machine shop, blacksmith shop and heating plant.

The roundhouse has 20 stalls, each 105 ft. long, and a cross section is shown in Fig. 2. Provision is made for completing the full circle of 56 stalls. Remarkable features

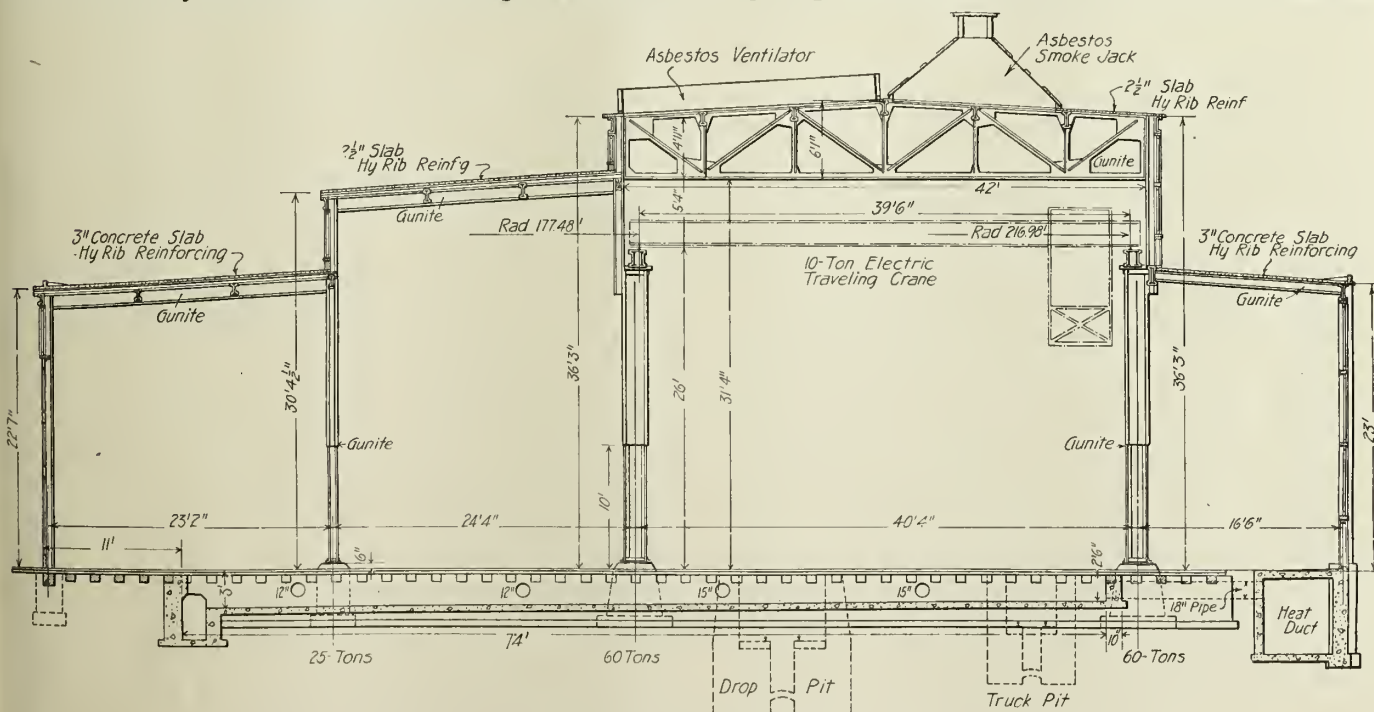


Fig. 2—Cross Section of Western Maryland Ry. Roundhouse at Maryland Junction, W. Va.



Fig. 3—Maryland Junction Roundhouse and Turntable, Western Maryland Ry.

are the cement-protected steel frame construction, a traveling crane and the unusual amount of light admitted to the building.

The framing and roof trusses are of steel, with steel beams supporting the roof, all covered with "gunite," put on by the Cement Gun Company. The building is in four bays, the highest one being of 40 ft. 4 ins. span, and in which there is a 10-ton electric traveling crane of 39½ ft. span. The roof consists of 3-in. reinforced concrete slabs, waterproofed on the outside.

The wall in the outer circle is low, and nearly the whole surface in this and in the ends is occupied by glass windows, which, together with the transom windows, admit a very large amount of light. The windows have metal sash of the tilting type. The floor is paved with brick, and the pit rails are fastened with screw spikes into wooden blocks molded into the concrete pit walls. The roundhouse doors are of wood. As may be seen in Figs. 2 and 4 the building has ventilators, but no smoke jacks projecting below the roof slabs. The ventilators and smoke jacks which stand on the roof are of asbestos sheet construction. There is a hot water system for boiler washing.

This work was done under the direction of Mr. H. R. Pratt, chief engineer of the Western Maryland Ry.

Argument on Bituminous Coal Rates East.

Hearing before the Interstate Commerce Commission, in which the main argument was based upon the cost-of-service standpoint. One of the most advanced cases in this phase of rate litigation.

On January 30th, last, a series of hearings was concluded on Interstate Commerce Commission docket numbers 5919 and 5920, being two cases brought by the Alpha Portland Cement Co. against the Baltimore & Ohio, the Western Maryland, the Cumberland Valley, the Philadelphia & Reading, the Lehigh Valley, the Central R. R. of New Jersey, the Delaware, Lackawanna & Western, the Lehigh & New England and the Pennsylvania R. R.. The subject of the complaint is the freight rate of \$2.00 per gross ton of 2240 lbs. charged by these carriers on bituminous coal originating in the Pittsburgh district of Western Pennsylvania and the Fairmont district of West Virginia for a haul of approximately 400 miles to the Lehigh cement region. Messrs. Louis H. Porter and Archibald Cox of New York appeared at all the hearings for the complainants, and the defense was represented by George Stewart Patterson of the Pennsylvania and W. Ainsworth Parker for the B. & O. and its associate lines. While the Alpha Portland Cement Co. was the only complainants of the entire region, the total

annual tonnage directly involved approximates 5,000,000 tons and the carriers claimed that any substantial reductions in these particular rates would necessitate the readjustment of other coal rates involving a considerable additional tonnage. At the first hearing in December, 1913, Mr. Porter presented an elaborate series of exhibits on:

First. The general condition of the Lehigh Valley companies for the years 1895 to 1912 inclusive.

Second. On the discrimination against the mill of the Alpha Portland Cement Co. at Martin's Creek in favor of other cement manufacturers in the Lehigh Valley region.

Third. The claim that slack coal should be accorded a differential in rate over lump coal.

Fourth. Tables contrasting car mile revenue, car mile cost and car mile profit by this haul compared with the average on all freight.

Fifth. Tables showing earnings per car mile on bituminous coal shipped from the Fairmont region to Martin's Creek, compared with other car mile earnings of defendant carriers.

Sixth. Tables showing train mile earnings on coal compared with average train mile earnings.

Seventh. Exhibit showing constructive rate on bituminous slack coal from Westmoreland region to Martin's Creek.

Eighth. Rates on coal compared with rates on other commodities.

Ninth. Tables showing comparative rates on bituminous coal from various producing centers.

Tenth. Tables showing relative freight and value per car of slack coal and other car load commodities.

Eleventh. Tables showing cost of transporting coal from the mines in West Virginia Fairmont region to Martin's Creek prepared by F. M. Coogan.

Twelfth. Exhibits approximating the cost of transporting coal from both the Fairmont and the Pittsburgh districts to Martin's Creek prepared by Mr. Jean Paul Muller.

The elaborate cost statistics consisted of two separate treatments following closely the methods used in former cases by Mr. Muller, who presented figures here only obtained by his so-called cost method, which uses, as a basis, the annual reports of the carriers, to the Interstate Commerce Commission and results in an average cost over six routes of the B. & O. and connecting lines running from \$1.10 to \$1.20 for a ton of 2240 lbs., while over the Pennsylvania lines the corresponding cost is less than 95 cents.

The same routes were treated by F. M. Coogan under a direct observation method in great detail resulting in costs substantially lower than those produced by the test cost method of from 89 cents to \$1.00 a ton. The most striking features of these hearings was easily the carrier's attempt to meet these cost statistics; and the Pennsylvania produced J. H. Fell, their

statistician, for the Pennsylvania accounting department, who criticised at great length the individual processes employed by Mr. Muller primarily on the ground that these account bases were necessarily used by him arbitrarily because he had no access to working records of the railroad which were accessible to the railway accountants.

Mr. Porter thereupon called attention to the results reported by the Pennsylvania R. R. in its annual report to stockholders, which sets forth a division of operating expenses between passenger and freight services for a long series of years, prepared from the inside, and called Mr. Fell's attention to the fact that on the \$112,000,000 operating expenses reported by the Pennsylvania for 1912 the difference between the Pennsylvania's own total assigned to freight service and that assigned under the Muller method was only 3-10 of one per cent, which for practical purposes seemed negligible.

Mr. Fell also admitted that sixty per cent of the total operat-

Matthews, in addition, expressing the opinion that cost of service could not be considered an important element in the making of coal rates because it could not be ascertained with accuracy, and that the relativity of rates was the main guiding factor in considering the reasonableness of any particular rate.

This case represents undoubtedly one of the most advanced from the cost-of-service standpoint, and all those interested in this most recent development in rate litigation, will study the commission's decision in this proceeding very closely.

Federal Power Supreme on Federal Lands.

The contention of the government that power companies can not secure rights of way across national forests without complying with the regulations of the secretary of agriculture has been completely sustained, according to the officers



Fig. 4—Interior of Maryland Junction Roundhouse, Western Maryland Ry.

ing expenses can be allocated by the Pennsylvania system direct to passenger and freight services, and that he has made a thorough study of this subject of the Pennsylvania. Mr. J. H. Walber, assistant to the third vice-president of the B. & O., then took Mr. Coogan's personal observations and pointed out differences between his own observations and those used in the complainant's exhibits. He was followed by Superintendent Tongue of the Cumberland Valley, Superintendent Stackhouse of the Philadelphia & Reading, J. H. Collins of the Lehigh Valley R.R. and General Coal and Ore Agent Matthews of the B. & O. The latter explained in detail the history and composition of the coal rate schedules for the Eastern movements and expressed an adverse opinion of the feasibility of differentiating between slack coal and run of mine coal in bituminous coal transportation in the same manner as is done between pea coal and other small sizes, and egg and soft coal in anthracite transportation. He admitted, however, that such a differentiation had been made in the past from the Monongahela river points to Cincinnati, prior to April, 1907. The Pennsylvania after serving notice that they would introduce from 4 to 14 additional witnesses abandoned their defense and contented themselves with the statements made in their behalf by R. H. Large, general coal agent, who gave testimony similar to that of Mr.

of the forest service, by the opinion of the circuit court of appeals filed on November 14 in the case of the United States versus the Utah Power & Light Co. In its decision, the court announces that congress has assumed complete control of the waterpower question, so far as the public lands are affected, and that a state in the exercise of its sovereign authority can not interfere with or transcend this constitutional power of congress.

Since December 15, 1900, the Utah Power & Light Co. has operated its hydro-electric power works on certain public lands in the state of Utah now forming part of the Cache national forest, and the United States sought to enjoin this occupancy until the company should comply with the provisions of the act of May 14, 1896. The power company alleged that its rights were secured and protected by the act of July 26, 1866, now section 2339 of the revised statutes.

The decision holds that the Act of May 14, 1896, empowering the secretary of the interior to permit under general regulations to be fixed by him, the use of, or rights of way upon, the public lands and national forest reservations for the purpose of generating, manufacturing, and distributing electric energy, repeals the act of July 26, 1866, insofar as it related to the subject of generating and distributing electric power

and that the company must acquire its rights of way in accordance with the provisions of the later act.

The court denies the company's contention that it was

protected in its tenure because that tenure was authorized by the laws of the state of Utah, exercising sovereign and exclusive jurisdiction with respect thereto.

Opening of the Yamhill Loop, Portland, Eugene & Eastern Interurban System

Description of 109 miles of electric railway, between McMinnville and Portland, which constitutes the first completed section of what is to be a very extensive interurban system in the Willamette valley, of western Oregon. A project of the Southern Pacific Co. involving both electrification and new construction.

The Portland, Eugene & Eastern Ry. began operation, on January 18, last, of electric interurban service on the first unit of what will eventually be an extensive system of interurban lines covering the Willamette valley, of western Oregon. The system is a subsidiary of the Southern Pacific Co., and the lines on which service is thus inaugurated were formerly the West Side division of the Southern Pacific, extending from Portland to McMinnville, by way of Hillsboro and Forest Grove; and the Yamhill division, reaching the same terminals by way of Oswego and Newberg. This is called the Yamhill loop and consists of about 109 miles.

The completion of the electrification is only the first event in the consummation of comprehensive plans undertaken by the Southern Pacific Co. several years ago. The entire scheme comprised, in brief, the taking over by the Portland, Eugene & Eastern and electrification of the two lines just mentioned, and like action concerning three other roads: The Willamette Falls Ry., extending South from Portland; the Corvallis & Alsea Ry., connecting Corvallis and Monroe, and the Salem, Falls City & Western Ry., which crosses the Willamette at Salem, and extends to Dallas. The project involved also the building of a new main line between Portland and Salem, a new line between Canby and Salem via the Mollala Valley, a new line between Monroe and Eugene, and the merging of the whole with the street railway systems of Salem, Albany, Corvallis and Eugene. Con-

struction on practically all of this work is at an advanced stage. The section between Eugene and Corvallis was opened for operation by steam, early last autumn, pending through electric service between Portland and Eugene. The accompanying map shows the relation of these various lines, and a somewhat extended account of the whole project was published in the Railway Review, May 10, 1913.

The entire system will constitute some 350 miles of road. It will cover a valley 50 miles in width by 125 miles in length, which in its possibilities of development can be compared with that district of southern California covered by interurban lines of the Southern Pacific Co. Practically all of the mileage comprised within the entire scheme will be re-constructed, and the steam service will be retained only on the main line of the Southern Pacific. The new bridge over the Willamette river, at Salem, of which a view is shown in the accompanying illustration, was opened for



Map Showing McMinnville Loop of the Portland, Eugene & Eastern Ry., and the Entire Interurban System as Now Under Construction.



Vertical Lift Drawbridge of the Portland, Eugene & Eastern Ry., Across the Willamette River, at Salem, Ore.

traffic, March 15, 1913. At Salem and Eugene new stations will be constructed in the business center of the city.

The Portland terminal of the Yamhill loop is the union depot. From there the double track line passes out Fourth street, through the heart of the retail district. The West Side line continues out Fourth street and swings westward to

substations being located at Eugene, Lake Creek, Corvallis, Salem, McCoy and Hubbard. The distance between substations varies from 22 to 25 miles.

The trolley wire, as previously indicated, will carry direct current at 1500 volts. The suspension will be the catenary type, with standard spans of 60, 90, 120 and 150 ft., the 150 ft.



Electric Substation at Oswego, Ore., Portland, Eugene & Eastern Ry.

Hillsboro and Forest Grove, thence to St. Joseph junction. The Yamhill line diverges at Fourth and Jefferson street, following the bank of the Willamette river to Oswego, thence skirting the beautiful Oswego Lake country residence district, to Newberg and St. Joseph. From St. Joseph to McMinnville and on to Whiteson, the temporary terminal of the present electrification, one track is used.

The two lines constituting the McMinnville loop, and the Beaverton cutoff from Beaverton to Cook, are served by three electric sub-stations located respectively at Oswego, Forest Grove and Dundee. Electric current is received from the Portland Ry., Light & Power Co. at Milwaukee, at 60,000 volts, 3-phase, 60 cycles. This energy is then transmitted over the railway's transmission line to the Oswego sub-station, a view of which is shown herewith. In this building are installed two 1000-kw., 3-phase transformers which step down the voltage from 60,000 to 13,200. Leaving Oswego sub-station there are two 13,200-volt transmission lines, one feeding Forest Grove substation and the other feeding Dundee substation. These are reinforced concrete fireproof buildings, and each contains two synchronous motor generator sets of 500 kw. capacity. The motor portion of the set consists of a synchronous motor wound for 13,200 volts and operating directly on the transmission line voltage. The generator of the set is a 500-kw. direct current, interpole generator delivering a voltage which will vary from 1500 to 1575.

The Oswego substation in addition to being a transformer substation also contains two 500-kw., synchronous motor generator sets with provision in the building for a third set when load conditions shall demand this extra unit. These sets are similar to the ones installed at Forest Grove and Dundee substation.

There will eventually be nine substations in all, the other

spans being used on tangents, and the shorter spans on curves of varying degree. Between Oswego and Dundee and between Oswego and Forest Grove the 13,200-volt transmission line is carried on the trolley poles.

The catenary construction consists of a 0000 grooved



Group of Officials of Portland, Eugene & Eastern Ry. on Tour of Inspection Prior to Inauguration of Electric Service. Sitting Left to Right: R. E. Strahorn, President; Mark Woodruff, Publicity Agent; R. T. Guppy, Chief Engineer; George O'Connor, Division Superintendent. Standing, Left to Right: T. L. Billingsley, Superintendent Electric Lines; Robert E. Smithwick, Division Engineer; R. E. Bane, Contractor; Member of Corvallis City Council.

copper trolley carried by a 7-16-in. galvanized steel messenger cable. The messenger cable is supported on insulators carried on angle iron bracket arms attached to the poles. A high grade of cedar poles has been used for this work, having 9-in. tops, and all pole butts are treated.

The lines throughout are paralleled by two telephone circuits, one circuit being used exclusively for telephone train dispatching. This circuit is No. 9 hard drawn copper. The other telephone circuit is the substation and emergency circuit, tying together all substations and emergency line headquarters. This circuit will be of No. 9 copper-clad steel wire. A telephone selector system is installed with selective calling apparatus in the principal stations and with nine telephone sets at all sidings.

The cars will be of steel construction throughout, approximately 56 ft. in length and seating 60 passengers. They will have the arch type of roof instead of the monitor deck. These cars will be of various classes, some being straight passenger and smoking cars, others combination baggage, passenger and smoker, and others baggage and express cars. All cars will be arranged for multiple unit operation with automatic control, the trains either to consist of straight motor cars or motor cars and trailers together.

The cars are equipped with four-motor equipment, each motor being wound for 750 volts, but insulated for 1500 volts. The motors are connected two in series when operating on 1500 volt circuits, but by means of a commutating switch the connections are changed so that when operating on the 600 volt city lines of the railway company each motor may be thrown directly across the trolley circuit. A roller pantograph trolley, pneumatically operated, is used.

For freight service there are provided a number of 1500-volt, 60-ton electric locomotives, equipped with apparatus and motors somewhat similar to that provided for the passenger coaches.

What a Prosperous Railroad Can Do.

BY FAIRFAX HARRISON, PRESIDENT, SOUTHERN RAILWAY.

In this address, delivered at a banquet of the Commercial Club, Cincinnati, Ohio, February 21, the author expresses his strong approval of wise and balanced regulation and his conviction that government ownership of railroads would never be successful in this country.

Until now the public utilities have been the principal objects of public regulation, but there are few to claim that that regulation has as yet been a complete success. We all must and do admit with inexpressible relief that regulation has abolished many abuses, but, without criticism, we must also recognize that it has not yet responded to a sense of responsibility for results. So far as applied to the railroads, regulation has until now been concerned solely with discovering and enforcing the obligations of the railroads, and in that respect it has achieved a large measure of success; but it has undoubtedly been handicapped by an indiscriminating attempt at the same time to recognize, foster and applaud that kind of competition which all experienced men know is responsible for many of the most flagrant abuses that have been regulated and abated. We know that the ideal is fair competition and fair regulation, but just as in the past much of the competition we have known has been unfair, so much of the regulation we have had has been unfair.

For myself, I believe and have always believed in the regulation of the railroads by public authority. I have seen the manifold good it has done, but I have never been blinded as to what has been the practical meaning of much of the regulation we have had until now. I have regarded it as the necessary pioneer work, and not to be judged as a full achievement. I have hoped steadily, and now believe confidently, that we are

about to realize a system of regulation which will recognize that a railroad has needs as well as obligations, and that there are abuses by the public of the needs of a railroad as great as any abuses by a railroad of its obligations to the public. The past divergence of interest between public authority and private industry was more apparent than real, but it has taken many years of legal warfare to achieve a realization at once public and private that the prosperity of the country is the supreme end for which both parties are working, and that a complete victory by the government which would leave industry prostrate can do little good to the people whom the government represents.

As I believe that public regulation can and will prevail, because it is adapted to our American conditions, so I believe that the American people will realize that, under American conditions, government operation of the railroads would be a



View of Passenger Station, D. & W. R. R., Scranton, Pa., Showing Tower and Aerials for Wireless Transmission.

national disaster. I believe I am stating the fact when I assert that government ownership of railroads has never been a success in a democracy; its only real success is under the kind of autocratic and military government which obtains in Germany. It may be questioned whether we are willing to accept that in order that the government may successfully operate our railroads.

Speaking out of my own experience, I venture to assert that prosperity will, under conditions as they exist today, be the best cure for most of the difficulties which the public has with the railroads today. Prosperity would by itself anticipate and forestall many of the complaints which are today haled into the legislature as the text for new regulatory laws.

To be prosperous a railroad must have a safe margin-of income over obligatory disbursements. Even though a railroad's gross receipts may amount to millions of dollars, it must be remembered that its operating expenses, taxes and fixed charges

also amount to millions. If the expenses merely balance revenues all growth must stop. This is a law which needs no Interstate Commerce Commission to enforce. Without prosperity there can be no enlargement of the production of transportation, even though there may be a pressing demand for it.

A really prosperous road is one which collects from the public charges fairly remunerative for the service it performs, and, after dealing fairly with its employees, is able to meet its obligations and pay an income to its stockholders commensurate with

the actual risk they have taken in their investment and the current return earned by similar investments in the markets of the world. It must still have left over, however, a surplus with which to carry on improvements in its plant and service, so that it may at all times keep abreast of the highest standards of the art of railroading, and itself give play to the initiative and genius of its managers in invention and putting into practice new methods for the promotion of the safety and convenience of the public.

Wireless Communication with Moving Trains, D. L. & W. R. R.

Description of a system with which the Delaware, Lackawanna & Western R. R. has been experimenting for almost a year, to afford a means of communicating between fixed stations and moving trains. A considerable degree of success has been obtained.

The Delaware, Lackawanna & Western R. R. has been operating for some time an experimental installation of wireless telegraphy for the purpose of affording communication between certain stations on the road and moving passenger trains en route. As long as a year ago, as announced at that time in the

accompanying illustrations give views of the passenger stations at these two cities, and show the structural steel towers which support the aerials. At the Scranton station there is a 4-wire aerial strung 165 ft. above the ground, and extending a horizontal distance of 750 ft. One end is hung from the steel tower visible in the photograph reproduced herewith, and the other is affixed to a smoke stack belonging to the company's shops at this place. Lead wires run down from the station end to the operating room on the second floor. The apparatus here is of the Marconi type and has a capacity of 2



View of Passenger Station, D., L. & W. R. R., Binghamton, N. Y., Showing Towers and Aerials for Wireless Transmission.

Railway Review, the installation of the apparatus was approaching completion, and shortly afterward a considerable degree of success was obtained. Within recent months the apparatus has proved to be very reliable and efficient, and in a number of notable instances has performed a service of great convenience and usefulness in minor emergencies.

The idea of wireless telegraphy between a moving train and a distant station is well within the established principles of radio-telegraphy, and there is nothing fundamentally novel in the apparatus used. The fixed stations, at present are two in number: at Scranton, Pa., and at Binghamton, N. Y. The

kilowatts. There is a motor generator located in the basement which when running at 1750 revolutions per minute converts the 60-cycle, 3-phase current, received from the central station into 500-cycle current at a voltage of 250. By means of a transformer, the voltage is stepped up to the neighborhood of 20,000. This high-voltage current is employed to maintain the charge of a battery of half a dozen Leyden jars. These are used to bridge a spark gap at the rate of about 1000 discharges per second.

At Binghamton the aerial is hung between two steel towers giving a horizontal length of 400 ft., and at a height of 175 ft.



Wireless Operator's Desk in Scranton Passenger Station,
D., L. & W. R. R.

above the ground. The equipment is otherwise similar to that at Scranton.

These are the only fixed stations so far equipped; but the company is so well pleased with its wireless experience that four more are to be erected and equipped. There will ultimately be six stations located respectively at Hoboken, Port Morris, Scranton, Binghamton, Bath and Buffalo, dividing the road into five sections corresponding to the divisions already employed in train operation.

The aerials on the trains consist of wires extending between short brackets which stretch the conductors from end to end of the car, at a distance of about 18 inches above the eaves of the lower deck, and approximately on a level with the crest of the upper deck. Originally only these two longitudinal wires were used to each car. The ends are connected across to make a rectangle, and the rectangles of the various cars, generally five to a train, are coupled together at the ends by a slack wire. More recently an additional aerial has been added to each car by stretching a wire longitudinally some 3 ins. above the middle of the roof, connecting with the transverse wires at each end.

The radius of transmission was at first 40 or 50 miles, and this distance would be sufficient to keep a train constantly in touch with one station or another. The transmission has been made more powerful, however, with the later developments, and now a train and station can communicate at a distance of 90 miles. It may be mentioned incidentally that the Scranton station is able to reach a wireless station in New York city, a distance of 90 or 100 miles in a straight line.

The transmission obtained by this apparatus is described, in general, as good. It is stated that it varies from time to time, as the train proceeds, possibly with the differing positions of the aerials as the train passes around curves, and with the effect of hills and other configurations of the country. A steel bridge overhead, it is said, causes the intensity of the impulses to diminish, but a tunnel, on the other hand, has been found on at least one occasion, to offer no apparent obstacle to the electrical waves, although it was 700 ft. in length, and

the overburden consisted of 50 to 60 ft. of earth and rock.

In making the installation the company was actuated principally by the additional efficiency of operation to be gained in having a means of communicating with the trains in transit; but an additional motive was present in the desire to give passengers the advantages of the facilities. The service is now open to any passenger, the road collecting 15 cents per message in addition to the regular telegraph tolls. The service is thus in a measure self-supporting. There is not much additional expense incurred in having an operator on board, for a trainman is instructed in the operator's duties, or an operator is trained to the railroad service.

As for the advantages it offers in conducting railroad business, there have been several instances where the wireless was used to send a message much needed to meet an emergency. On one occasion a conductor was summoned to take the place of one who had been taken sick on the train; on another occasion the service was demoralized by a severe sleet and snow storm which had interrupted the regular train dispatching service, and a schedule was restored temporarily by sending train orders by wireless. On numerous occasions the officials have found the apparatus very useful in receiving or sending in transit messages relating to railroad business; and numerous other emergencies of a similar nature can readily be imagined.

The Compañía del Ferrocarril de Soria, of Spain, is conducting an energetic campaign of education to improve agricultural conditions along its line. Railway stations are provided with little agricultural museums, according to a report by F. T. F. Dumont, United States consul at Madrid. Here the farmers and others interested can find all kinds of useful information, such as formulas for fertilizers and use of same; how to buy fertilizing material by the wagon load, prices being quoted delivered to the station nearest the purchaser's property; addresses of houses selling machinery, seeds, plants, and live stock, etc.;



Wireless Operator's Station on Passenger Train, D., L. & W. R. R.

models of statutes for forming agricultural societies; manner of soliciting subventions from the central government; the construction of district roads; and complete studies with details of different industries which might be introduced with success into the province of Soria. This manner of advertising has been extended to town halls, etc. Experimental fields were established near the different stations by the Centro de Estaciones Experimentales de Madrid, showing how to use fertilizers.

Results of Government Operation in Canada.*

FIGURES FOR 1913, JUST PUBLISHED, REFLECT DISASTROUS PERFORMANCE ON PART OF STATE-OWNED INTERCOLONIAL RY.

Canada's government owned and operated Intercolonial Ry., with 1462 miles, suffered a loss in net earnings for the year ending June 30 of \$412,000, and ended the fiscal period with a deficit from operations of \$161,000 against a profit of \$251,000 the year before. In the same time Canada's total railways, 29,304 miles, despite heavy increases in expenses, saved \$75,000,000 for net, a gain of \$6,000,000

ing \$1,758,000, entailing a loss in net compared with 1912 of \$142,000.

For the year while the total railways of Canada worked under an operating ratio of 70.9 per cent, the government owned road piled up a ratio of 101.3 per cent. How so great a disparity in operation was built up is shown in the following figures for the last fiscal year, compared with the previous year. The figures, excepting mileage, are in millions of dollars:

	Total Roads	Gain	Govt. Road	Gain
Mileage	29,304	2,577	1,462	0
Gross	\$257	\$37	\$12.349	\$1,346
Expenses	182	31	12.510	1,758
Net	75	6	*.131	†.412
Other revenues	17.5	4.5	.....	.....
Total net	92.5	10.5	*.161	†.412
Taxes	2.5	.5	none	none
Income	90	10	*.161	†.412
Operating ratio	70.9%		101.3%	

*Deficit. †Loss.



View of Passenger Cars as Equipped With Aerials for Wireless Transmisssion, D., L. & W. R. R.

over the year before. These figures from an analysis of Canadian railway operations for the last fiscal year just made by the Bureau of Railway News and Statistics, reflects vividly the failure of government railway operation by our northern neighbor.

The failure of this state-operated Canadian railway is even more striking after taxes have been disposed of, for while the private companies paid into the Canadian treasury some \$2,500,000 in taxes they ended the year with a gross corporate income of almost \$90,000,000, a gain of some \$10,000,000. The government line, in striking contrast, with no taxes whatever to pay, reported a gross corporate loss identical with its operating deficit, namely \$161,000.

Both total railways and the government line enjoyed increases in gross revenues for the year, the increase for the aggregate mileage amounting to \$37,000,000, and that for the small government road to \$1,346,000. While expenses in the aggregate, however, were amounting \$31,000,000, leaving a net gain of \$6,000,000, those on the government line completely outstripped the rise in operating revenues, climb-

*Bulletin by the Bureau of Railway News and Statistics.

During the year, it will be seen, the government line added no new mileage.

That this disastrous performance by the eastern Intercolonial is not exceptional is shown by the other Canadian government road, that on Prince Edward Island is the far West. This line, 279 miles long, reports gross operating revenues of \$390,000, a gain of \$12,000. Expenses, however, amounted \$56,000 to a total of \$512,000, leaving an operating deficit for this tiny government railway of \$122,000. Its operating ratio was the astonishing figure of 131.3 per cent against 101.3 per cent on the other government line and 70.9 per cent on the total Canadian mileage.

Railways in Canada as well as those in the neighboring United States have suffered from the rise in operating expenses. While gross earnings for 1913 rose 17 per cent expenses rose 20.7 per cent, the operating ratio rising from 68.7 in 1912 to 70.9 in 1913. During 15 years while earnings per train mile have increased 89.8 per cent operating expenses per train mile have climbed 105.9 per cent. Wages have played a very large part in the rise, having been 45.09 per cent of gross earnings in 1913 against only 39.79 the year before and 28.61 in 1910.

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SATURDAY, FEBRUARY 28, 1914.

The characteristic tone of the iron and steel market is that of strength and vitality, rather than of weakness, notwithstanding the absence of a considerable railroad demand, still withheld for well-known reasons. Two conditions point to continued strength, in fact, three: The unwillingness of manufacturers to sell for remote delivery; the unwillingness of consumers to buy far ahead, and, the steady accumulation of requirements of all kinds. Pipe and sheets are exceptionally active; plates and shapes, strong; basic pig and billets quiet, after weeks of activity.

An interesting illustration of the influence of design in locomotive details on the indirect cost of operation, is afforded by the experience of the Chicago & Northwestern Ry., on which road an original design of front end arrangement was developed three or four years ago. The need of the new device arose through dissatisfaction with the Master Mechanic's recommended arrangement on account of the difficulty of fitting the latter, which requires a different treatment for each individual class of engines, and because of its uncertain value as a means of checking spark emissions from the stack. In the new design, a description of which was given in the

Railway Review for Oct. 19, 1912, in addition to improving its spark-proof qualities, provision was made for adapting the same arrangement to widely varying types of locomotives which made it a feature less expensive to construct and maintain than the original arrangement, and likewise more readily accessible for inspection.

Its special value, however, is more apparent after three years of use with varying numbers of engines thus equipped. In 1911, when but few engines were provided with the front end, the fire-damage claims settled by the Chicago & Northwestern Ry., amounted to \$129,205.30; in 1912, with about half of the total number of engines equipped, the expense in this account was reduced to \$63,707.12, while in 1913 with approximately the total number of engines fitted out, the expense was further reduced to \$15,638.58. Contrasting 1913 with 1911 this represents a saving of \$113,566.72, or more than \$60.00 for each of the 1800 locomotives operated by the road. Could this saving be apportioned among the engines operating in the timber districts of Wisconsin and Michigan, where the fire hazard on this road is greatest, the saving per locomotive per year, would of course be but the more impressive.

Consideration of this instance leads to the thought there are doubtless other generally accepted details of engine and car construction more or less hampered by tradition and "recommended practice," that could be deviated from to very good advantage. Country-wide standards are undeniably beneficial when the parts or practices standardized are the best. The instance herein recounted, however, serves to strongly emphasize the inadvisability of establishing the restrictive standards that legislative and other agencies not infrequently threaten to do.

Last November the Delaware, Lackawanna & Western R. R. revised its schedules in such a manner as to discontinue four passenger trains daily (two trains each way) between Syracuse and Oswego, N. Y. The common council of Oswego and residents of several of the intermediate towns entered a complaint against the cancellation of these trains with the state Public Service Commission of the Second district. Extended public hearings were held, and the testimony of farmers, commercial travelers, bankers, manufacturers, postmasters, and other citizens affected was taken. The testimony of the complainants showed that the discontinuance of these trains had damaged badly the mail service of the people living along the line. The trains discontinued had been run for many years on practically the same schedule, and a very satisfactory and far-reaching mail service had been developed; also a convenient local and through express service had been built up. The attorney for the railroad showed to the satisfaction of the commissioner who held the hearings that the trains abandoned were not profitable. But the commissioner held from the evidence that the annual loss in revenue from the running of these trains was comparatively small, too small to overbalance the "convenience and necessity" of their operation.

In further elucidation of this viewpoint, the decision rendered in the case says: "It was brought out in the testimony that the city of Oswego has been granting concessions in one form or another to the Lackawanna, or its predecessor, for over half a century. Speaking for the Lackawanna road, its attorney said at the first hearing: 'It has certainly been a successful road through its entire system; it has been so successful in its business management that it is the strongest railroad in the world financially.' A common carrier in this fortunate situation can well afford to be generous with its patrons and to deal liberally with the cities and villages which have shown it favors in the past. It has no right to take the position that it is itself the sole arbiter of the service it should render to its patrons. Its contention that it has a right to abandon train service because passenger traffic is unprofitable is not well taken. It would be preposterous to think that a railroad could elect arbitrarily to abandon these services, and this is true whether the road be powerful and rich or whether it be struggling for existence."

A matter of somewhat similar nature probably will shortly be laid before the state railroad commission of Michigan. Complaints have been received by the commission that the Pere Marquette R. R., for the sake of reducing expenses, has closed a number of small stations on its lines, and has withdrawn certain passenger and freight trains from the schedules. There is every probability that the commission will cite the railroad to appear before it and make explanation; and so far as the position of the commission can be guessed at beforehand, it is anticipated that it will take the view that the railroad should not inaugurate economies of this kind that will inconvenience the patrons of the road who have been a source of revenue to the road during its existence in Michigan. The Pere Marquette in a sense comes under the category which the New York commission described as "struggling for existence," and it will be interesting to observe within what limits regulative bodies can maintain this line of argument.

Bread and Butter.

There is an old saying that "It is a wise man who knows on which side his bread is buttered," or something to that effect. There is no mean philosophy in this proverb, for notwithstanding we have, from childhood up, heard a great deal about the fat of the land, the flowing of milk and honey, and other things equally boastful about the vastness of our natural resources, yet the rapid decline in our exportations of wheat and the present practical necessity of importing beef from South America are causing not a few of far-seeing persons to meditate upon the question as to just how our bread is to be buttered in the future.

In all lines of activity, from the worker of the soil to the moving-picture man, each individual no doubt imagines his services indispensable to the welfare, if not to the existence, of the people, but any person

possessed of common sense (which some one has said is the rarest of all sense) knows that the farmer must supply both the butter and the bread of every one of us. Coming down to fundamentals, we all know that the farmer is not only the least dispensable of any element of our body politic, but absolutely essential to the very life of the country; and not far behind is the transportation industry, which, in this nation, is very largely conducted by the railroads. Such is no doubt the reason why, in magnitude of capital invested, as well as from other points of view, the railroad industry ranks next to agriculture, and it is not necessary to remark that no broad-minded railway management is inappreciative of the dependency of the transportation industry upon agriculture. Mr. James J. Hill, Mr. Howard Elliott, the late Mr. Samuel Spencer, the late Mr. W. W. Finley, the late Mr. Collis P. Huntington and many other eminent railroad men have given no small portion of their time to teaching and preaching the wise policy of fostering the interests of agriculture.

As many know, almost all of our large railway systems have organized departments for promoting the agricultural welfare of the territory from which they derive their traffic. All of these companies have bureaus of information for advising inquirers as to the location of available farming lands, the character and amount of produce which these lands can yield, the kind of produce demanded in certain localities, available markets, and much other useful information. Many of these railroads also send out special trains with exhibitions of products, and practical lecturers on soil fertility, dairying, stock raising and farming in general; and a large amount of practical literature on such subjects is being freely distributed by the railroads—all because they fully realize the sure foundation upon which the entire business activity of the country must be built in order to exist and thrive, and the railroads themselves, as much, if not more than some others, are depending, first of all, upon agriculture.

The foregoing does not cover every line of effort which the railroads are making to advance the interests of agriculture, and it is perhaps not necessary for the present purpose to go further into details, but we wish to speak commendably of a plan or method which the Lehigh Valley R. R. inaugurated several years ago and which seems to have been working satisfactorily. This road has an official, Mr. F. R. Stevens, known as "agriculturist," whose business it is to issue a weekly letter to farmers, which is published in the local country papers along the route of the road. Over a part of its route this road lies in rich agricultural territory, but there is much mileage where the farming is indifferent or poor, so that the interests with which the company is concerned in this direction are quite diversified, from productive grain farming to dairying, stock raising, truck farming, etc.

Mr. Stevens has made an intensified study of the territory, its resources and possibilities, and his letters seem to be most practical and useful. Valuable information and advice are given in relation to the practical requirement of the soil, methods of work, care of produce, the breeding of animals, poultry raising, marketing, etc. Inquiries are invited and replied

to, and the work of his department seems to cover a very wide range of usefulness indeed. His work is regular and constant, a large body of readers is reached with certainty, and the effect must be telling. Whatever the cost may be to the railroad company which employs him is no doubt found to be money well invested.

Storage Battery Motor Cars on the Prussian-Hessian State Railways

An account of the origin and development of motor car service on the Prussian-Hessian state railways, in which, somewhat contrary to the original expectations of outsiders, storage battery cars have given the best all-round results. Discussion of the direction which developments of the future are likely to take. Abstracted from an article in the Bulletin of the International Railway Congress.

Self-propelled cars were used to some considerable extent on European railways before the beginning of their present vogue in this country. The Prussian-Hessian state railways were among the first systems to adopt motor cars extensively; and a systematic program was outlined involving the utilization of these cars for three primary purposes: Filling up gaps in the

schedules, when the traffic does not justify the operation of ordinary steam trains; the improvement of the transportation of smaller districts into their political and economic centers by promoting the short-distance and suburban traffic at the hours there is not much other traffic; making connections with through trains. The extensive network of the Prussian-Hessian state railway includes every variety of traffic conditions, and after the early experiments to secure a practical type of car, it became apparent that a need existed for the precise service which the motor cars offered.

The first cars put into operation were propelled by steam, but they never proved popular with the passengers. In 1906 the railway administration took up the question anew. Designs were



Fig. 1—Map Showing Sections of the German Railways on which Storage-Battery Motor Cars Run. Radii of Smaller Circles, 50 Kilometers (31 Miles); of Larger Circles, 90 Kilometers (55.9 Miles), Corresponding to Cars Having Ranges of 100 and 180 Kilometers (62.1 and 111.8 Miles), Respectively.

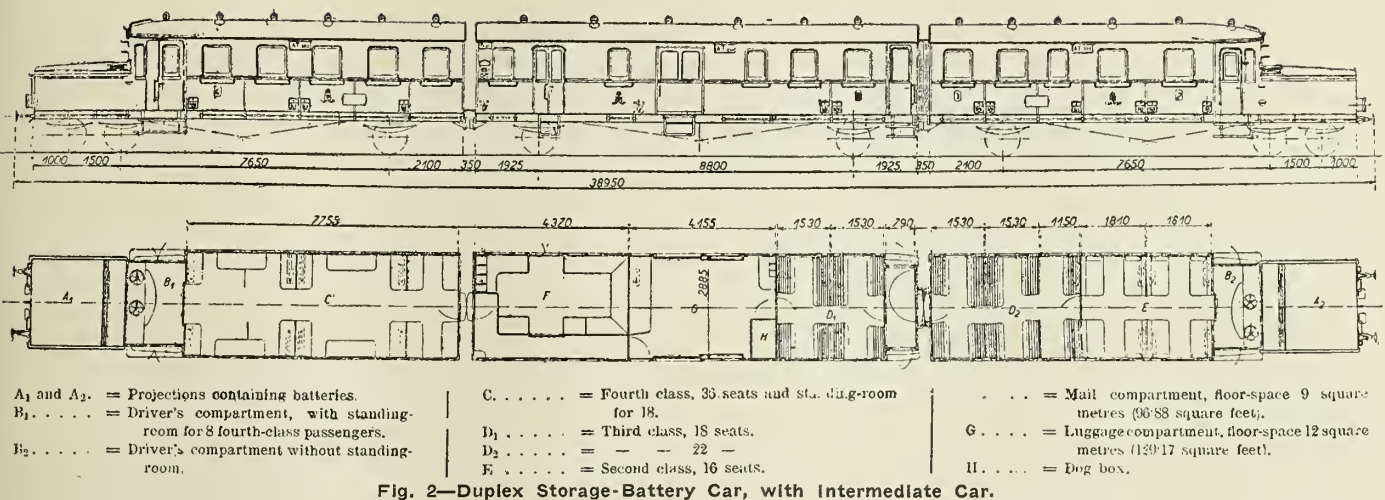


Fig. 2—Duplex Storage-Battery Car, with Intermediate Car.

prepared and orders were placed for two steam cars, six storage battery cars and one gasoline-electric car. All of these cars have been described from time to time in the technical press; but the storage battery cars gave the best results, in spite of the fact the same motive power had proved unsuccessful elsewhere, and their use has since been extended more than any of the other types.

The Bulletin of the International Railway Congress, for January, 1914, contains an article by Mr. Weyand, member of the boards of works, Berlin, from which we abstract the following account of the present character and importance of motor car service on the railway system above mentioned.

On Jan. 1, 1913, there were in use 137 storage battery cars, 10 gasoline-electric cars and 5 steam cars, representing a total cost of more than \$2,500,000. Under construction, there were 39 storage battery cars, 6 gasoline-electric cars and 2 Diesel-electric cars. Hence at the end of 1913 there will be about 200 motor cars in use. The existing 152 cars ran regularly on 180 separate sections of a total length of about 3,077 miles; the total per week averages about 14,170 car miles. There are 53 stations and substations at which the storage battery cars are charged.

The leading idea in the introduction of these motor cars was not the desire to reduce operating costs, which has frequently induced minor and financially weak railways to try motor cars, but the intention to improve transportation in certain particulars. Yet the financial results were by no means unsatisfactory and fully satisfied expectations from the very start.

The cars were at first arranged to have two classes, namely, third and fourth, with no provision for second class; except in the case of the storage battery cars, in which a small compartment is arranged to be convertible to second class, or again, to a baggage compartment. Compartments for smokers, women, and passengers with dogs, and lavatories are not provided. Hence many conveniences, which are to be found in even the simplest steam train, are absent. The public certainly approved the great improvement in transportation, but what was heard was, in most cases, only complaints about the shortcomings of the cars, namely the differences as compared with the usual steam trains. It was not recognized that the improvement in the communications was only made possible by these simplifications and that the lacking conveniences could very well be dispensed with on short journeys, such as were almost exclusively in question. Later, however, the complaints almost wholly ceased and the administration did what it could to improve real defects.

The overcrowding of motor cars is avoided by adding trailers in suitable cases. When there are rushes of traffic in connection with markets, excursions and workmen, on certain given days, steam trains are provided. Motor cars can also be utilized as special trains by larger societies. In cases where in consequence

of the introduction of motor car services a busy traffic developed, which the motor cars could no longer adequately cope with, steam trains were provided; this indicated a gratifying result of nursing the traffic by improving the schedules.

Special classes of employees soon had to be instituted for the motor-car services, namely motor-car drivers and motor-car conductors. It is true that there were many points in favor of specially-trained drivers, and at first these were exclusively employed, and the excellent locomotive staff could have been taken as pattern. The much simpler manipulation of the different appliances, and the easier work on electric cars, as well as the numerous instances of a similar kind to be found both at home and abroad, made it seem quite admissible to consider special technical training to be unnecessary. The drivers need only be able to set minor matters right in case of sudden small troubles on the line; otherwise repairs are attended to in the regular workshops by special trained men. The shorter training required and the lighter work justify, as compared with locomotive drivers, the classification of the motor-car drivers in a lower grade with lower pay. The motor-car conductors are trained as drivers and are later on promoted to the rank of drivers.

A question of great importance as regards the good quality of storage-battery cars is the maintenance of the batteries. The battery requires careful, constant and expert attention. This fact was fully recognized when storage-battery cars were introduced, and with one exception—for purposes of experiment—the maintenance of the batteries was left by contract to the manufacturers who supplied the batteries, whose interest in keeping the cars ready for service coincides with that of the railway.

The good results of this measure are proved by six years of collaboration, free from troubles of all kinds. It probably is not exaggerating to state that the quick development of storage-battery-car traffic on the Prussian-Hessian state railways is due to the great reliability these cars have been proved to possess, which is above all due to this method of settling the maintenance question. The future will show whether it will later on become possible, both technically and economically, to leave the maintenance completely to the railway employees.

The accompanying tables give the approximate results of operation of these storage-battery cars.

TABLE I.

	Mean.	Maximum.	Minimum.
Annual mileage per car	25,890	39,725	16,094
Average number of passengers carried, number	27.4	55.0	15.3
Cars at work, in per cent	77.8	of all car-days	
— in reserve, in per cent	9.0	—	—
— under repair, in per cent	13.2	—	—
Receipts per car mile, in cents . .	23.9	55.6	14.6
Expenses per car mile, in cents . .	20.0	32.0	14.6

TABLE II.

Division of Expenses.

	Mean.	Maximum.	Minimum.
	Percentages		
	Cents per of total	Cents per	Cents per
	car mile expenses	car mile	car mile
Interest and amortization of stationary installation and of cars	5.2	26.60	11.4
Charging current	5.0	25.15	9.6
Cost of heating	0.4	2.10	0.7
Cost of staff	4.0	20.25	6.4
Operating expenses (lubrication, cleaning, attendance at charging station, etc., stores and wages)	0.7	3.55	1.7
Maintenance of batteries including amortization	3.7	18.40	5.0
Maintenance of cars and their equipment, excluding batteries	0.8	3.95	2.1
Total	20.0	100.00	...

The three chief items of table I, mean mileage per car, mean number of passengers carried and mean expenses per car mile, very closely approximate the estimates worked out before the cars were introduced. It is worth noting, in view of the fact that it is often stated that storage-battery cars are only capable

is shown graphically in the accompanying map, Fig. 1. It shows the lines where there are charging stations and storage-battery car services. The names of charging stations are underlined; the concentric circles drawn taking these stations as centers, have radii of 50 and 90 kilometers (31 and 55.9 miles) respectively. Thus the surfaces enclosed by the larger circles show the districts in which motor-car services may be organized from the respective charging stations as centers, if cars having a range of 180 kilometers (111.8 miles) are used; in this diagram gradients are left out of consideration. Thus the larger circles include nearly the whole territory included in the network of the Prussian-Hessian state railways. Thus already at present, an accumulator car having a range of 180 kilometers (111.8 miles) finds so many charging stations available, that it could run by itself from Insterburg to Metz.

In order to meet the desires of the traveling public, deviations from the very correct principles that motor-cars should be as simple as possible, are permitted to the extent that in cases where a separate second class compartment is provided, this is in future to be equal to second-class compartments of ordinary passenger trains as regards room, comfort and quality of the equipment. A new arrangement of cars has also been introduced, namely a two-axle car with driving axles, close coupled between the two halves of an ordinary duplex accumulator car. In this way room is obtained for mails and baggage,

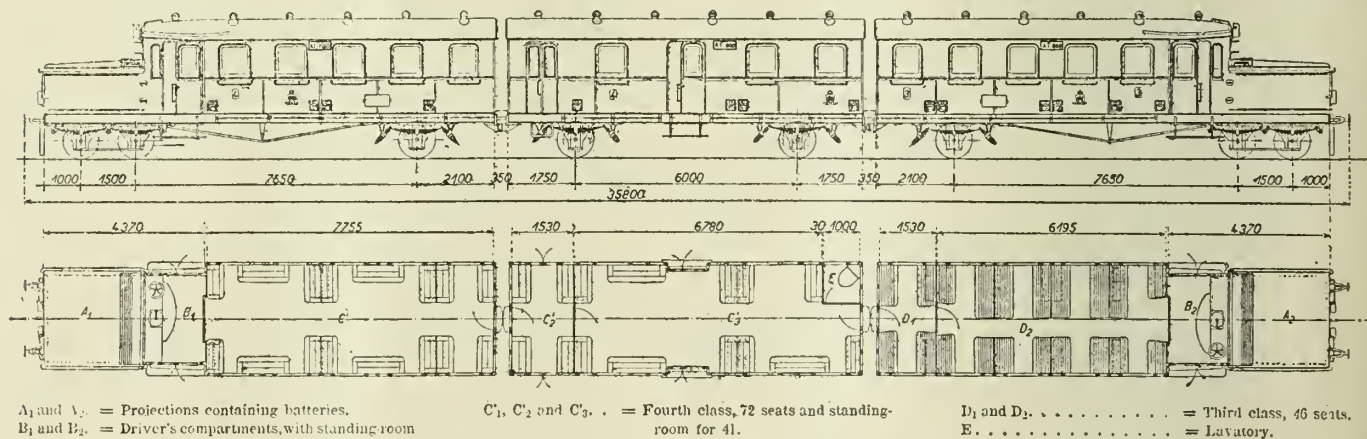


Fig. 3—Three Part Storage-Battery Car Train.

of poor utilization, that the annual mileage of the cars amounted in individual cases to nearly 39,768 miles, a value which certainly cannot be considered low. As regards the mean number of passengers carried, it may no doubt be assumed, leaving newly instituted services out of consideration, that there will be a gradual increase, resulting both from the growth of traffic generally, and from the stimulating influence of the more frequent services which motor cars in many instances provide.

Further development with motor cars is possible in two directions, namely they can be used over greater distances and the cars can be made more comfortable. The first measure would result in the better utilization of the cars, and in reducing the existing limitations in drawing up the schedules, and would make it possible to carry out the charging operations in one lot or at specially convenient hours.

Using batteries of the same kind, cars are now being built for ranges of 130 and 180 kilometers (80.8 and 111.8 miles). In cases where this is an advantage, the batteries of existing cars having a range of 100 kilometers (62.1 miles) are converted, when it is necessary to renew the plates, so as to have a range of 130 kilometers (80.8 miles). It is self-evident that the weight of the batteries, which forms an important part of the total dead weight of accumulator cars, is still further increased if the range is increased. Great attention is hence devoted to attempts to reduce the weight of the batteries.

The effect of increasing the radius of operation of the cars

and also for a larger number of passengers. Such an arrangement is shown in the accompanying illustration, Fig. 2; this train, consisting of three parts, accommodates 16 second-class passengers, 40 third-class passengers and 62 fourth-class passengers (including standing room for 8); that is a total of 118 passengers, and can also carry mails and luggage. Thus it is very suitable for replacing steam trains where the traffic conditions are of this kind. Where it is a question of long distance, these three-part trains are fitted also with lavatories. Three of these three-part trains are equipped with the new batteries described above, so that they have a range of 180 kilometers (111.8 miles). A similar train, to carry 167 passengers, but neither luggage nor mails, is shown in Fig. 3. Whether such large train units consisting of accumulator cars will give economical operating results remains to be seen.

The charging stations are divided into chief charging stations, to which the cars are allotted, and where smaller repairs necessary for the maintenance of cars and batteries are carried out, and intermediate charging stations. The cars must always return to the charging stations, often utilizing for the purpose short intervals between their runs, in order to complete their store of energy. In order to reduce the work at the stations, and save as much time as possible during switching operations, so as to have more time available for charging, it is advisable to arrange the charging sidings so that they can be reached from the tracks along the arrival and departure platforms.

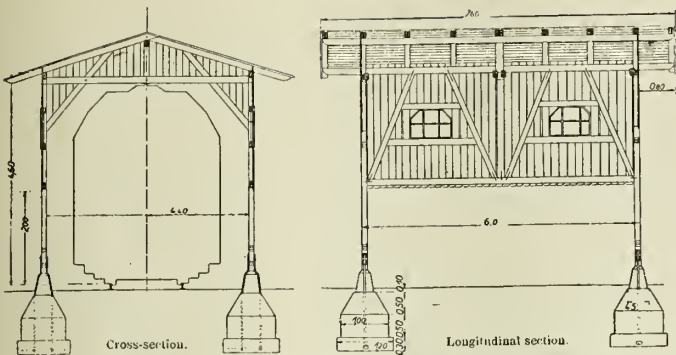


Fig. 4—Roofed Shelter Over a Charging Station, Storage-Battery Cars on Prussian-Hessian State Railways.

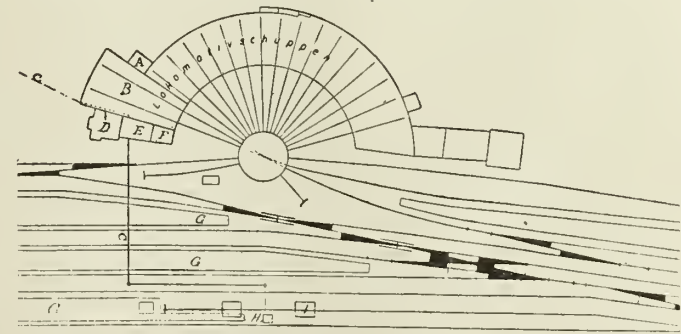
The following are necessary facilities for each charging station: sidings for the cars which are to be charged and for reserve cars, a machine room equipped with the necessary machines and switches (varying according to supply of current), a room for a machinist, a room for battery maintenance and a room for stores. It is important to protect the batteries, when opened for charging, against dust and damp. As the men engaged in maintenance work on the cars, and especially on the batteries, must be protected against weather, it will generally be advisable, in the case of chief charging stations, to roof over one or two charging sidings completely. To go further, for instance erect larger charging halls capable of holding all the cars simultaneously, is hardly necessary, considering the climate of Germany; and it would be difficult to justify this economically. In the case of intermediate charging stations, short roofed shelters, for instance as shown in Fig. 4, generally suffice; these are erected over the charging sidings at a distance corresponding to the positions of the batteries in the cars. The side walls of these shelters can, if desired, be continued to the ground.

The question of the whole arrangement of the charging station, for which existing buildings can often be utilized advantageously, can be solved in varied ways. A solution which, however, will perhaps but seldom be possible, is shown in the accompanying illustration, Fig. 5. Three bays of an existing locomotive shed were altered to suit motor-car requirements. The two bays used for cars had, owing to the great length of the cars, to be in such a position as to be accessible over the turn-table direct, without turning the latter; they are locomotive bays made longer. On both these bays cars can be charged by means of a charging cable placed between the two tracks. The third bay is converted into a machine room and workshop. A charging bay which is connected with the machine by an electric bell signal, is out in the open at the end of platform II

fire losses there is always the incidental and consequential interruption of operations. The nature of the business of transportation companies requires that more than ordinary precautions be taken to safeguard against and keep free from the interruption to their operations which fire loss and damage cause. Such interruption naturally varies with the importance of the property. As an illustration we might cite the destruction by fire of an interlocking tower with the subsequent detention or interruption in train service on up to the large terminal and shop properties, dislocating the machinery of transportation and requiring readjustment involving far-reaching consequences.

Possibly one of the marked features those who have been making a study of these subjects may have encountered, is that in the upbuilding of the transportation lines, the question of permanency could not always be taken into consideration. With the rapid growth and added requirements and necessary changes from time to time the question of conservation of properties has not been as seriously considered as it otherwise might have been. Railroad properties in the early periods were often crudely constructed, but of such a character as to supply the requirements of the times, and necessarily structures were found to have been built on very economical and not durable lines. With later stupendous and permanent growth of traffic, and with the expansion of the large trunk systems, improvements have been made to meet the changed and more fixed conditions and the work of rebuilding, or of erecting new structures, as with roadbeds, has been studied and prosecuted on a more advanced and higher standard. Enormous sums of money have been expended in improved building construction of the modern period.

We cannot but feel impressed with the enormous fire waste of this country, which averages approximately \$200,000,000 per year, and we realize the fire loss in railroad properties plays its part in such waste. In the study of protection against and prevention of such loss we are confronted necessarily with a mass of details in the proper comprehension of the subject and it is obvious that such essentials should be carefully studied out and such uniformities and standards adopted as will be helpful in curtailing to a large extent the bad experience of the past. We find in railroad properties a multiplicity of operations involving large values, varying from the usual hazards incident to rail transportation to the large repair and construction plants, including machine shops, planing mills, foundries, blacksmith shops, boiler shops, upholstery shops, carpenter and pattern shops, paint and car repair shops, locomotive erecting shops—all with their varied processes and the ordinary and special hazards involved. We also find the terminals with their large merchandise piers and freight houses, storage warehouses, coaling piers and so on to the minor properties along the line, including freight and passenger depots, signal and interlocking towers, coaling and water stations.



- Explanation of German term Lokomotivschuppen = Locomotive shed.
- | | |
|--|--------------------------------|
| A = Battery room. | F = Workshop. |
| B = Motor-car shed. | G = Platform. |
| C = Cable. | H = Cable house. |
| D = Store. | I = Roofed shelters. |
| E = Converter and switch room. | |

Fig. 5—Arrangement of Motor Car Shed in Existing Locomotive Shed, Storage-Battery Cars on Prussian-Hessian State Railways.

Railroad Fires and Means for Their Prevention.
By C. N. RAMBO.

SYNOPSIS.—This address, read before the Railway Fire Protection Association, constitutes a broad review of railroad fire hazards in general, together with a consideration of such means and organization as may be best suited to the prevention and suppression of fires on railway premises.

The enormous values invested in railroad property, aside from right-of-way, roadbeds, etc., and the large liabilities involving the carriers; can be readily comprehended. It is fair to assume that in considering fire hazards on railroads, we are dealing with a problem affecting billions of dollars in property values. When we glance at the enormous growth of the transportation lines in this country in the last twenty-five years and with the careful study now given by such corporations to all phases of safety and economy in operation, it can readily be seen that the question of fire protection and prevention should play no small part, for aside from the destruction of values brought about by

The subject of fire protection in a broad sense includes that of fire prevention, which, as distinguished from the term fire protection, concerns the removal of the causes of fires. The essential features to be considered by those who study the problem of fire protection are:

First: To construct buildings on fire-resisting lines as to minimize the possibility of fire starting and prevent its unrestricted spread and opportunity for serious loss. The proper time to guard buildings against loss by fire is during construction. One of the reasons why this is not always done, unfortunately, is on account of the initial cost. We must encourage the use of fire-resisting materials, the division of large areas as far as possible and the protection of buildings exposing each other. We have too frequently seen a class of buildings on railroads that is apt to furnish fuel for large conflagrations.

Second: To prevent fire from starting through the reduction and safeguarding of hazards inherent to the particular property. Elimination of the possibility of fires starting should be as carefully considered as the question of good construction and protection.

Third: To provide adequate private and public facilities for extinguishing a fire should it start and be prepared to fight a small fire before it becomes dangerous. All of the expense met with in the installation of fire-fighting equipment, water supplies, etc., can be counted as naught if the means to promptly use it is not trained and ready, and if it is not properly cared for and kept in serviceable condition.

We might therefore summarize the important factors in connection with these subjects briefly by asking ourselves the following questions: Are the materials used in constructing buildings incident to this class of property such as will prevent the possibility of combustion or the spread of fire? Are prompt means used to detect the presence of fire? Can the fire be promptly and definitely located? And are there ample facilities, directed by trained bodies of men, for extinguishing a possible fire in its incipency? There is an indifference on the part of some corporations to the adoption of methods in general use for the protection of their properties against loss by fire. It is obvious what this would mean in event of a fire starting.

The theory and practice of fire prevention and protection is a scientific study, including that of general construction, architecture, physics, economics, mechanics, hydraulics, electricity, chemistry, manufacturing processes and fire protection engineering. One of the first demands in connection with this study is that of good housekeeping, involving a multiplicity of detailed enforcements that will insure it through a large property as a matter of daily duty and through which means the possibility of fires may be largely avoided. This can be accomplished by the appointment of employees in each portion of a property with such authority as may be necessary, to see that cleanliness is observed and through the posting of official notices in prominent places requiring the carrying out of fire protection rules so prepared as to meet conditions usually found in railroad properties.

The protection of properties against fire is an important part of the duty of every officer and employee. Every firm in railroad property should be made the personal responsibility of some employee. It must be remembered that the majority of fire losses are preventable, and that they are largely a matter of lack of cleanliness and carefulness and that the great study of prevention must be along those lines.

An important part of the organized work such as can be undertaken by the Railway Fire Protection Association is to obtain from actual experience statistical facts bearing on losses and the causes thereof, and to educate along the lines as to the details of causes and as to the care and vigilance necessary to counteract them, so that a reduction in fire loss may be brought about. A knowledge of the causes of losses is essential for the proper comprehension of fire dangers. Many properties may have been immune from loss, but frequently there lurks the

opportunity for serious damage. Each cause should be fully understood and the necessary remedy applied. The matter of causes is a very broad subject and one requiring special study.

A very good classification of hazards, recently made by a prominent insurance official, divided them into physical, moral and temperamental. Those which are particularly applicable to railroad properties, are the physical hazard and the temperamental hazard; the first including such as are inherent in the property and its use, such as construction and the hazard of operation; the second including that which would be attributed to carelessness which produces fires, not purposely, but those which could have been prevented by a study of the causes of fires, with less indifference as to the effects which follow or as to the remedies to be applied.

With the consideration of the subject of building construction and the careful and systematic guarding of the housekeeping and operation to reduce or avoid hazards, we include that of fire extinguishing apparatus. An important fire fighting agency on railroad properties is the locomotive or yard engine used at terminals and large yards remote from public protection, so equipped for supplying water with the aid of fire hose as to give good service in event of fires in rolling equipment and its lading. Fire alarm systems are an important factor, particularly in large properties, to obtain prompt use of fire appliances through the prompt summoning of drilled employees and municipal departments.

The success of the fire prevention idea must be due entirely to well organized forces in all departments. Without system and organization through the help and authority of executives or the general management, such matters cannot be made an important factor with the men. The prevention of the occurrence of those things which hinder or retard the progress of operation or which are a menace to life and property is brought about or is reduced by education through instructions, rules, etc., issued under an executive order. In this way co-operation is secured amongst the rank and file. Fires like accidents, happen at unexpected times. Continued vigilance is therefore essential and without a general co-operation and knowledge of dangers we cannot escape their consequences.

The organization of the fire prevention and protection work on railroads must be undertaken with intelligence and a due regard to local conditions. It is necessary that the importance of the work be recognized by all in authority, the chief executive, the general manager, superintendents, foremen and agents in charge of property; all educated to the idea that there should be harmony of action. Education as to fire prevention requires thorough publicity, that all employees may be advised of its scope and that it may reach all parts of a system and that the old and prevalent idea of security against fire damage may be eliminated. With the large values involved and elaborate expenditures made for devices and appliances for extinguishing fires, it is important that the furtherance of the organization idea should be pushed for its intelligent and prompt use, without which the expenditures are of no avail when manual use is required of the equipment. Therefore in order to have the appliances serve the good purpose that was intended, it is necessary to so perfect the organization as to get the greatest amount of value therefrom.

Fires, even though promptly discovered, can very often not be handled by employees because of lack of fire-fighting equipment or lack of knowledge of how to handle it, and because it is quite usual in such contingencies for people to "lose their heads." Fires have to be scientifically and carefully sought out and fought. Experience has shown that the efforts of un-drilled employees, however well intended, will not control a fire as promptly as a disciplined force, made familiar with the protective apparatus by regular drill and practice.

Rigid and systematic inspection of all fire apparatus should also be made by specially delegated employees, preferably members of fire brigades, at least once a week; everything down to

the smallest piece of apparatus should be in its place and in good order ready for use, and a report of such inspection should be made to those in authority.

Fire prevention committees, fire marshals, chiefs or captains of fire brigades are all necessary parts of an efficient organization, and the inspection of buildings and their valuable contents for fire hazards by such committees or members of fire departments, possible uniformed or otherwise designated with authority, should be especially delegated to make at least weekly inspections and report to the authorities in charge on the conditions, and day and night watchmen should patrol all parts of the property for the same purpose, having their tours properly recorded on approved devices, to assure efficiency.

There should be monthly conferences of officers or local committees at which matters of general interest might be considered, with a view of continuing efforts for substantial improvements, for with all reasonable precaution there is still the factor that relaxation may be fatal. In passing it may be said that the improved construction in railway rolling equipment should eventually work a great factor of saving in the loss by fire on railroads, for a large part of their loss has been brought about through inflammable construction of equipment and character of its lading. With the reduction in the amount of inflammable equipment and safer methods of transportation in connection with hazardous commodities under the direction of the bureau for safe transportation of explosives, fires may be restricted in large congested yards.

All of these subjects must necessarily receive special consideration and treatment. The foregoing constitutes merely the enumeration of certain broad essential facts which must be taken into consideration to comprehend the requirements for the conservation of property and the lessening of the possibility of loss to it and life through fire and the consequences thereof.

Inquiry to Be Made Into Import Rates.

The Interstate Commerce Commission announced, on February 20, that it is about to begin on its own initiative an extended inquiry into the question whether it shall authorize the railroads to increase freight rates on import business. Under the present tariffs, commodities imported from foreign countries are assessed lower rates for shipments inland than identical goods produced in this country. This differential on import business has been sustained by the commission on the ground that it encourages trade. Now that American producers under the new tariff laws are obliged to meet sharper competition in the way of increased imports, general complaint has been made against the differential freight rate accorded the import business. Following is the formal order of the commission:

"It appearing that carriers subject to the act to regulate commerce in many instances maintain rates for the transportation from ports of transshipment to interior points in the United States of property imported from foreign countries which are less than the rates contemporaneously maintained by said carriers for the transportation from said ports to the same interior ports of like property which does not originate in foreign countries or which by the carriers' tariffs must move under what are known as domestic rates, and that formal and informal complaints have been made to the commission, in which it is alleged that the relationship between such import rates and such domestic rates is unreasonable and subjects domestic traffic within the United States to undue prejudice and disadvantage in violation of the act to regulate commerce:

"It is ordered that a proceeding of inquiry and investigation be and the same is hereby instituted by the commission on its own motion into the rates, practices, rules and regulations of common carriers by railroad or by railroad

and water governing the transportation from ports of transshipment to interior points in the United States of property imported from foreign countries and into the relationship existing between the rates for such transportation of imported property and rate for similar transportation of property originating in the United States or moving under domestic rates.

"It is further ordered that this proceeding and investigation shall be conducted with a view to the issuance of an order or orders requiring respondents hereto to cease and desist from charging, demanding, collecting or receiving rates and charges for or from enforcing rules, practices and regulations affecting the transportation of domestic and import traffic which result in relatively unreasonable charges upon domestic traffic or subject such traffic to undue prejudice and disadvantage as compared with import traffic."

Railroad Regulation Forging Ahead.

Mr. Levy Mayer, a prominent attorney of Chicago, speaking at the seventh annual banquet of the Chicago Transportation Association, February 24, severely criticised railroad management of former years, in respect to stock watering, overcapitalization and unearned dividend declarations. He expressed his belief, however, that these outrages are passing into oblivion. "Public agitation and exposure," he said, "are bringing these deplorable features to an end." Mr. Mayer said further: "The distrust and suspicion begotten by railroad dishonesty is illustrated by the fact that on the very able and powerful board of the Interstate Commerce Commission, possessing the direction and control, directly or indirectly, of nearly 15 per cent of the total wealth of the United States, there is said to be not one whose prior life has been devoted to the management and control of railroad property. Right here at home not one of the five members of our utilities commission has had railroad experience. And yet Illinois has a total railroad mileage of 12,000 miles, only one other state in the union having a greater mileage, Texas, which has 14,714 miles.

"Our railroad and other industrial enterprises, like our social and political institutions, are developing new conditions and forging ahead. This impetus cannot and should not be checked, but its development in the right, fair, and equitable direction can and should be controlled. Mere finding fault, however, the mere pointing out of wrong tendencies, will not right things. An outspoken, manly, and fearless concert of action, with right on the side of those agitating for redress, will get us to a safe haven."

Railroad Work As a Healthful Occupation.

Railway employees follow a calling more healthful than almost any other according to figures compiled from the United States census and compared with showings from foreign countries by the Bureau of Railway News and Statistics. The occupation of the railroad man, not only in the United States, but evidently the world over, is shown to be among those most directly conducive to health, while the expectation of life for the railway employee is higher by a wide margin than that of the average person who works for a living.

Figures for the United States covering 27 industries show that for every 1000 employees engaged there is a yearly mortality of about 15, varying from 23.8 in the case of coopers and 26.6 among flour and grist mill workers, to only 9.1 among plumbers, gas and steam fitters. How low in this scale of mortality the railroad man stands is shown by the fact that "steam railway employees" report only 10.8 deaths per 1000, compared with 15 for all classes. Most significant in the showing for railway men is the scarcity of deaths due to bodily infirmities, for while deaths due to accidents are higher than in any of the

other occupations reporting, mortality due to tuberculosis, pneumonia, heart disease and diseases of the nervous system is so far below that for almost any other calling that the total deaths per 1000 are held down to more than four less than the average for the 27 occupations.

That the outdoor activity of railway employees is beneficial abroad as well as here is shown by figures which are available for several foreign countries. In France, for instance, while the occupational death rate averages 8 per 1000 between the ages 25 and 34, 11.2 from 35 to 44 and 17.8 from 45 to 54, the railway death rate at the same ages is only 6.6, 8.7 and 13.1 per 1000 respectively. In Switzerland, as in America, the railway



Gas-Engine Driven Motor Car, The Daimler Company.

man's liability to accident, as might be expected, is above the average, according to available figures, yet even with this disadvantage the total death rate is considerably below the average. Tuberculosis especially claims far fewer victims, the average death rate per 100,000 between the ages 20 and 29 from this cause being 304 against only 150 for railway men.

In Great Britain not only is the railway man's death rate below the average, but the lesser mortality rate grows more striking with advancing age. The general death rate among wage earners is 6.4 per 1000 between 25 and 34 against the railway's 4.8. Between 45 and 54 years this margin of longevity for railway men has been extended to the difference between 18.7 for wage earners in general and 13.8 for railway men. It is striking that in Great Britain the death rate among enginemen is not only lower than the railway average, but much lower than the figure for working men as a whole. Of all workers 10.9 of every 1000 die between the ages 35 and 44 against only 5.6 among enginemen and firemen.

The Daimler Gas-Engine Driven Motor Coach.

Engineering, London, in its issue for Nov. 21, 1913, presents an exhaustive discussion on the Internal Combustion Engine as Applied to Railway Locomotion, read by F. W. Lanchester before the Engineering Section of the British Association, at Birmingham. A portion of this discussion has to do with the Daimler Company's design of motor coach, the purely descriptive portion of which, with the illustrations appearing in Engineering, is reproduced herewith:

The car in question, is a full-size 30-ton coach having a capacity for sixty passengers, and is propelled by two entirely independent power units carried externally on opposite sides of the main frame. Each power unit comprises a six-cylinder internal combustion engine arranged to drive through a gear-box on to the bevel transmission mounted on a prolongation of one of the truck axles; the transmission from the change-speed gear-box to the axle being made by coupling-shaft and Hooke's joint after the manner customary in motor-car practice. The engine and

change-speed gear are mounted on a pair of longitudinal members, which also carry at their ends a dynamo direct coupled to the engine, whose function is to start the engine and take care of the lighting system and of the air-compressor. The whole of the power unit so constituted is suspended from the transverse members of the coach frame on spring mountings, by means of which the effects of engine vibration, gear noises, etc., are eliminated.

Driving-cabins are fitted at each end of the coach, and the whole equipment is entirely symmetrical, so that, properly speaking, it has neither front nor rear. Reversing is effected by means of a double bevel-gear drive and dog-clutches in the axle gear boxes. The air resistance of the car as determined by model experiments is approximately half that of a normal plane of the area of maximum cross-section. In all the main features the proportions of parts, sizes of wheels, axles, etc., and strength of frame members, follow established railway practice; and the floor level, which is approximately the customary height, is unbroken from end to end, the whole of the power installation (which, with the exception of the controllers, rheostats, etc., arranged in the driving-cabins) is well below the floor level.

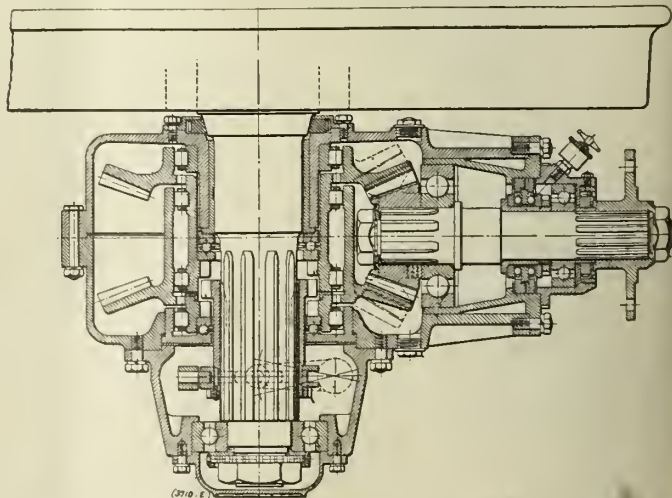
The design of transmission gear-box finally adopted is the outcome of considerable experiment and careful study of the problem. The most salient features of this gear are the magnetic-clutch actuation and the use of gear-boxes in tandem. A wide range of gear ratios has been provided, involving with engine speeds of from 800 to 1300 revolutions per minute, very low speeds to permit of practically simultaneous starting of the motor and the car, and from these on up to speeds in excess of 60 miles per hour.

Tariffs and the Responsibility of the Carrier Thereunder.

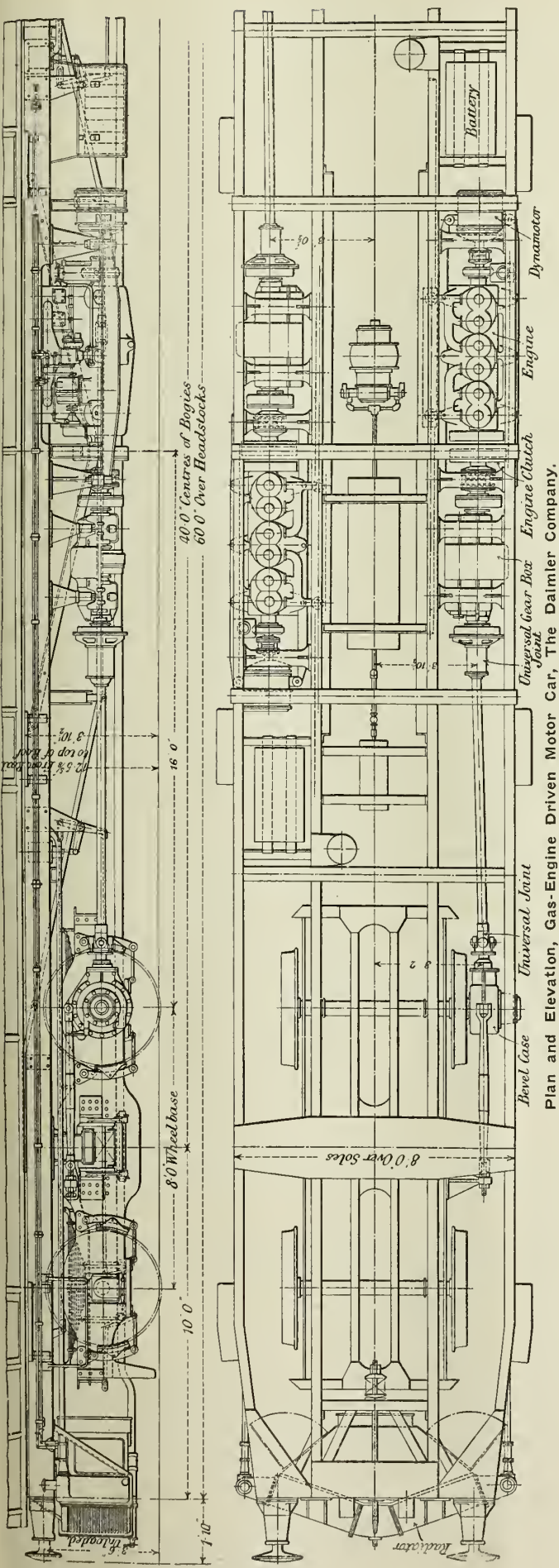
By E. D. HOTCHKISS, GENERAL FREIGHT AGENT, CHESAPEAKE & OHIO RY.

The following paper was presented at the December meeting of the Richmond Railroad Club. In it the author reviews the history of freight-rate making, and the influences that have brought such radical changes in practice during the past years.

The present day freight tariff is essentially the product of evolution and its history is contemporaneous with and illustrative of the history of that series of federal and state enactments that have so far removed transportation from the domain of trade and placed it effectually under federal and state control. In the light of this history, there are



Axle Gear-Box, Gas-Engine Driven Motor Car, The Daimler Company.



few of us that are inclined to question that this control has always rested here, but so long as interstate commerce was carried on by primitive means and was unimportant in volume it was not exercised, if, in fact, it was understood.

With the tremendous development of railroad and steamship transportation facilities, the method and conditions of our trade changed. The planter ceased to convert the cotton he raised and the wool his sheep produced into home-spuns, but found it more economical to market these products in New England and to receive in exchange the manufactured products of that section. The medium through which this change of method was accomplished was transportation and thus more and more one section of the country came in closer touch with and dependent upon the other for its special products. Obviously, under these changed conditions, transportation became inseparable from trade and the need under a sound public policy for the exercise of the federal control against the discrimination between individuals and communities possible while transportation was within the field of trade and subject to private contract became apparent and found expression in the enactment of the laws referred to.

Obviously, while transportation was a subject of barter and private contract, the freight tariff did not play an important role, for the most part it was contained within the general freight agent's hat or when it did assume the dignity of a printed document, it required a "key" to determine the measure of discount to which its terms were subject. These "keys" varied according to the magnitude of the business of the shipper and the sharpness of the competition. All of this is quite recent and in fact the great changes which have come about have been made within the last decade. It is true the interstate act has been on our statute books since February 4, 1887, but it was not until after the passage of an amendment in June, 1906, commonly called the Hepburn act, and the subsequent amendments of 1910, that it was vitalized and became the regulating force in transportation matters it is today. It may, therefore, be said that the present day tariff dates from 1906.

The carrier is now required to print, post and file with the Interstate Commerce Commission, tariffs which will not only show all its rates of transportation between different points on its own route and points on the route of any other carrier when a joint rate and route have been established, but it must also publish all such accessorial charges as storage, demurrage, icing, stockfeeding, etc. It must also publish all privileges and facilities granted and allowed, such as terminal switching, transit, inspection, elevation, etc. It must go further and publish any rule or regulation that may affect the value of the service rendered the shipper of consignee. There is no form of service which the carrier either with or without compensation may hold out to the shipper or consignee save that published, posted and filed in its tariffs. Having thus initiated the schedules, the carriers must abide, under severe penalties by them. Here rests the responsibility of the local freight agent. The extent of this responsibility is emphasized when it is pointed out that even the Interstate Commerce Commission itself is entirely without jurisdiction or power to modify, affect or alter the published tariff of the carrier save in the manner fixed by the act itself. One of the former commissioners speaking on this subject has gone so far as to say in effect that on the carrier having initiated its tariff, posted and filed it as provided by law, it has all the force and effect of an act on congress itself.

The law charges every person with a knowledge of rates. This is a practical absurdity, but it is nevertheless the foundation upon which the superstruction of the interstate act is built. Tariffs must, therefore, be posted for the convenient inspection of the public. The act as amended by the Hepburn bill requires that "Such schedules shall be plainly

printed in large type and copies for the use of the public shall be kept posted in two public and conspicuous places in every station where freight is received for transportation in such forms that they shall be accessible to the public and can be conveniently inspected." This provision is not materially different from that of the original act, but by the Hepburn act, the commission was also given discriminating powers to modify this requirement by special or general order.

Practical experience had, long prior to the passage of the Hepburn act, demonstrated the posting (out of the custody of the agent) two copies of a tariff in a freight station was a useless burden upon the carrier. It was impossible to prevent their almost immediate destruction or mutilation, while on the other hand there was no compensating advantage to the public by having the tariffs out of the custody of the agent. It had become almost an universal practice among carriers to place the tariffs in the custody of the agent, and to post a notice in two conspicuous places in the stations to the effect that the tariffs were on file with the agent and subject to inspection on application.

In the exercise of the power given them in the Hepburn act, the commission promulgated a general order, which in its essentials is the same in plan as that initiated by the carrier. By it the carrier is required to place in the custody of its agent all rate schedules applying at or from that station and to post a public notice of the fact. The carrier is required to supply such agents with suitable facilities for keeping the schedules in ready reference order. The agent is required to give any information contained in the tariffs; afford opportunity to examine any tariff without requiring or requesting the inquirer to assign any reason for such desire and to lend assistance to all seekers of information. The carrier shall also require its traveling auditors to check each station tariff file at least once each six months unless special traveling tariff inspectors are employed. The requirement of this order is a substantial concession and saving to the carrier.

The commission has announced in connection with the above that it depends on the honor and good faith of every official to whom the duty of carrying out this order rests and to resolve every doubt in favor of the spirit of the law. Here we have the joint responsibility of the local agent, division superintendent, traffic officers in charge of tariffs, and the auditing department. But we must not only post tariffs that the public shall have opportunity to meet the requirements of the law charging them with a knowledge of rates, the tariff must be intelligible and free from ambiguities.

While this unfortunately, has not always been true, great improvement in this direction has been made. By a set of rules promulgated by the commission after consultation with and advice of the railroad tariff authorities, uniformity in the arrangement of tariff matter has been reached. This, together with the removal of ambiguities from tariffs, has done much to simplify and make the meaning clear, but we have not by any means reached perfection. Much is yet to be, and will be accomplished in the light of experience and in this connection. A movement is now on foot—the initiative being correspondence between the chief executive of one of the western lines and the chairman of the Interstate Commerce Commission—looking to conference between the chief officers and the commission to the end that further improvements in tariff construction, if practicable, be accomplished. Theoretically, the language of the tariff should be as carefully chosen against doubtful meaning as that employed in a will. It took many generations of the brightest minds to reach the present degree of perfection in the latter, yet now we sometimes hear of wills being "broken" because of doubt of the language of the Testator.

The cost of compilation and printing of tariffs is properly a subject of serious concern to the carrier. This expense, already great, is increasing through the requirement for frequent reprinting of tariffs under those mandatory rules of the commission which require reissue after the volume of supplementary matter, both as to number of supplements and extent of matter has reached certain limits. Larger stocks of tariffs are required to meet the demands of the industrial traffic managers, tariff bureaus of chambers of commerce, boards of trades, etc. This increased cost calls for the ingenuity and skill of the traffic officer in bringing the number of tariffs within the smallest limit.

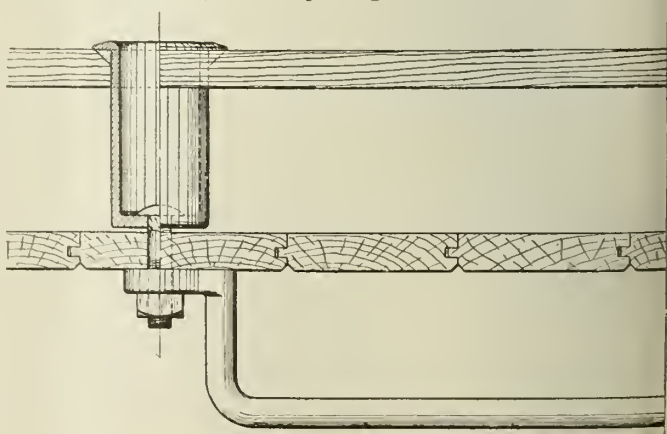
A great economy in this respect rests in competing routes uniting in common tariffs, between common points, thus cutting out that immense expense of duplication by individual issues. The writer has long since advocated common tariffs and has adopted them on the line he represents whenever the necessary concurrence of the other interested lines is secured. The main opposition to this plan has been the jealousies of the old established routes and trade names. The value of these factors is overestimated and entirely incommensurate with the great difference in the cost of producing tariffs under the two systems.

The vital consideration in transportation today is service. The route that offers this does not have to fall back on its pedigree of a long established trade name to secure its share of competitive business. It has been estimated that the cost of the recent reprinting of tariffs in official classification territory in the efforts of the carriers to secure a small advance in their rates will aggregate over two million dollars. It is conservative to estimate that this amount might have been reduced 25 per cent by the use of common tariff. The local agent can aid materially in effecting needed economies by carefully preserving and filing tariffs immediately on receipt. Cases have arisen wherein the cost of reprinting of a tariff is necessary to supply shortages in agent's public files, due entirely to the failure of the agent to preserve the original copy.

In closing, reference should be made to the importance of the strict observance of established tariffs by those charged with executing them. There are those of us who may think that the requirements of the law are too inelastic, unreasonable and unnecessary, but, good or bad, right or wrong, the law is too binding and the responsibilities and liabilities of the carrier too great to be jeopardized by any unauthorized and ill-considered acts on the part of employees charged with the duty of enforcing tariffs, however well meant.

The Wine Socket Washer.

As a means of simplifying the application of safety appliances to wooden box car bodies, the Wine Railway Appliance Co., Toledo, O., is placing on the market a socket



The Wine Socket Washer.

washer which eliminates the necessity of inserting a block or "cripple" between the inside and outside linings. The method of attaching ladder rungs and grab irons by means of this washer, is shown in the illustration. Notable advantages in its use arise from the saving in time in applying the irons and in the saving of the expense of removing and re-applying the sheathing for the purpose of inserting the blocking.

The Musolaphone Applied to Train Dispatching.

The musolaphone, or loud speaking telephone is becoming well known to railroad men through the installations made in many prominent places over the country, of the instruments as an announcing or calling system. But the latest improvements in this apparatus adapt it to the much more exacting service of a train dispatching system for railroad use, and its utilization in that service is one of the most interesting of the applications of this novel scientific apparatus.

In principle, or at least so far as concerns its elementary forms, the musolaphone installation is very simple. It consists in the first place of the transmitter or sending medium, which, where it is intended to convey the human voice, is in outward appearance similar to the common telephone. At the delivery end of the system is the reproducer, in which the sound is reproduced in its original volume, or magnified in volume to any degree wanted, or cut down in volume, as conditions may require. In addition, the amplifier is a device used where a large number of reproducers are served from one transmitter, or for long distance transmission.

The system is becoming quite commonly installed in public buildings, warehouses, factories and shops, as a paging system, or as a means of making announcements of any kind from a central point, throughout the plant. It is especially adapted to use in large passenger stations, for the size of the modern structures exceeds the capabilities of the train announcer, whose stentorian voice formerly was able to meet all requirements. By the musolaphone the announcement of incoming or outgoing trains is not limited to the concourse or the main waiting room; for the instruments are installed in the ladies' waiting rooms, rest rooms, smoking rooms, toilets and all parts of the building, and the announcements are made simultaneously, and with all necessary loudness and distinctness, in all parts of the station.

The Pennsylvania Railroad has placed the musolaphone installation in a number of its important passenger stations, and it probably will be adopted universally in the large stations of that railroad.

By way of other special applications, the musolaphone is used to transmit music, either from records or instrumental or vocal, and may be used to convey announcements in many special ways as suited to temporary or permanent public gathering places. In the ordinary large public building, the reproducer, bracket and horn, complete in one instrument, is fitted around the walls of the room at such intervals that no place is beyond the range of easy hearing. The sound comes from all the horns simultaneously; but it is a curious manifestation of acoustics, that the ear hears only one horn at a time, the sound seemingly proceeding entirely from the one horn nearest the listener. In other words, there is not the slightest confusion of sound waves impinging from the different directions. The volume of the sound may be regulated, and can easily be made such that the announcement is perfectly audible, even above almost any din of machinery or noise of crowds, that may be filling the room at the time. The sound as reproduced is very good in quality, and as easily understood as the original.

The application of this system to train dispatching service is found in the fact that a large number of instruments, representing as many stations, may be connected in mul-

tiple, or bridged in across the line. This would appear to be impracticable with the ordinary telephone system; or at least while the instruments may be capable of transmission under such circumstances, it is not considered a favorable installation for the exacting service of train dispatching circuits. However, the peculiar characteristics of the musolaphone instruments, with the amplification of the sound impulses obtained thereby, make such an installation, it is claimed, perfectly feasible. By its use then the dispatcher simply talks simultaneously to all of his stations on the circuit. In each station the sound is received in ample volume from the reproducer bracket and horn, located near the operator's desk. The operator is called by whatever speaking code may be arranged, and the operator whose order is about to be transmitted answers back from his desk instrument precisely the same as with the ordinary telephone dispatching system. There can be incorporated in the transmission of orders, every safeguard, in fact every detail of practice that is applied to other telephone dispatching systems; the main difference being that the calling is done by the voice of the dispatcher amplified in the reproducer, and that the operator receives the message as a voice filling the entire room, without the use of a head cage, or in fact without it being necessary to be seated at his desk.

It is apparent with this description that such a system eliminates the selector, which is the vital element of all other telephone train dispatching systems. No such piece of apparatus is needed, for the voice of the dispatcher is his own selector; and whatever uncertainties or complication or delay may be involved in the operation of the selector are eliminated by the musolaphone system.

The installations so far made of the musolaphone in dispatcher service, do not correspond to regular train dispatching requirements. They have been installed in the New York City terminal of the New York Central R. R., reaching out to the switch towers, some of them as far distant as 12 miles from the dispatcher's office. However, the operating conditions of this system are not those of the regular dispatching circuit. These are to be regarded as merely preliminary installations, and a full fledged demonstration has not yet been made. However, the apparatus is now available, and it is expected at an early date to have one or more installations in actual operation that will fulfill all the conditions of the most exacting service, and demonstrate that the surprising characteristics of this difficult transmission are successfully met. The appliances are manufactured and sold by the Musolaphone Corporation, 110 South Dearborn street, Chicago.

New Schuylkill River Bridge of the P. R. R., at Philadelphia.

The Pennsylvania R. R. is now working on a new bridge to replace the old one spanning Girard avenue, Lansdowne drive, the Schuylkill river and the Philadelphia & Reading Ry. tracks, in Fairmount park, in Philadelphia. This work constitutes an important part of the improvements under way on the line between West Philadelphia and North Philadelphia which, when complete, will provide a four-track railroad over the entire section, with an additional track in some places.

The old bridge over the Schuylkill river has been standing since 1866. It consists of a 250-ft. deck truss with masonry arch approaches. When work was first started the masonry in the old structure seemed to be in good condition. It was thought that with some minor repairs it could be utilized in the new structure, but when the traffic was diverted a thorough examination showed a number of weaknesses, due to the narrow construction in a high bridge, and to the very heavy engines which have recently been used on this line. This made it necessary for everything above the water line to be built new. The old river piers were supported by a crib work which, being always under water, was preserved in excellent condition. The

crib work was encased in concrete as an additional precaution, and the additions to the old piers and the new pier carried down to rock at an elevation 38 ft. below water level. Light wooden cofferdams were used and the concrete was placed by both the closed chute and the bottom-dump method.

Four different types of modern concrete bridge construction are being used in the sections of this bridge. The portion over the river consists of heavy circular plain concrete arches and faced with ashlar masonry. Over Lansdowne drive, where there was a lack of headroom, two segmental concrete arches heavily reinforced were used. The bridge over Girard avenue, which crosses at a skew of 33 degrees, is constructed of longitudinal steel girders supported on center and curb columns, and the entire steel work is encased in concrete. A standard concrete arch with no ornamentation is used to carry the tracks over the Philadelphia & Reading Ry.

An ornamental concrete railing of unusual design surmounts the bridge over Girard avenue and Lansdowne drive. This was cast in short sections in a yard especially fitted out for this class of work. The separate units were then placed and held by the upper and lower rails, which were moulded in place. In order to prevent the common annoyance of water leaking from the tracks to the streets, these bridges are made waterproof by five-ply Hydrex covered with bricks grouted in cement.

In addition to the usual conditions for telephone, telegraph and signal wires a separate conduit was placed across this bridge to carry power wires which would be required in the event of electrification of this line.

The Girard avenue and Lansdowne drive bridges are practically complete, and one-half of the bridge over the river is sufficiently completed to carry traffic. The work is being done by Eyre & Shoemaker, contractors, under the direction of A. C. Shand, chief engineer of the Pennsylvania R. R. The foregoing data are taken from literature of the Engineers' Club of Philadelphia.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS
AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR
THE NEAR FUTURE.

The regular meeting of the Traffic Club of New York was held Tuesday evening, February 24, at the Waldorf-Astoria hotel. H. H. Gross, president of the National Soil Fertility League, addressed the meeting upon the work of that organization, and upon the general subject of soil fertilization and the assistance of the United States government in promoting the best results, as provided in the new Lever agricultural extension bill, lately passed by congress. The advisory committee of the National Soil Fertility League is comprised of leading railroad executives throughout the country. The second part of the entertainment consisted of a motion picture lecture of Kolb Bros., "Shooting the Rapids of the Grand Canyon of Arizona." It is described as the most dangerous trip on this continent made in an open row boat.

The regular monthly meeting of the Railway Club of Pittsburgh was held at the Monongahela house, Pittsburgh, Pa., Friday evening, February 27. Mr. John A. Brashear delivered an address on "Personal Reminiscences of Scientific Advancement in the Last Half Century." Luncheon was served as usual.

An illustrated lecture on "The Bush Terminal; a Modern Freight City," was given by R. E. Ireton, director of the educational bureau of the Bush Terminal, at the Brooklyn Engineers' Club. Mr. Ireton told how the 200 tenants avoid the necessity of paying fire insurance premiums through the fireproof character of the buildings there and in the neighborhood; of the fact that there is no delay in handling freight;

that the docks are so spacious as to be able to accommodate fifty large steamers at one time; that the facilities for direct shipment to foreign points are remarkable because seventeen different steamship lines ply between the terminal and every known quarter of the globe. "The terminal," he said, operates ten great industrial buildings, seven huge docks, 130 capacious warehouses, twenty-five miles of railroad track, a yard with accommodations for two thousand standard freight cars, and a flotilla of barges, carfloats, lighters, tugboats and other auxiliaries for heavy freight movement. All or any of its facilities may be increased from time to time without the slightest disturbance to existing arrangement—so perfectly adjusted, co-ordinated and elastic are the several parts of this unrivalled institution, the ideal site for economic production or distribution—originated, built and operated by an American genius, Irving T. Bush."

At the regular monthly luncheon of the Traffic Club of Chicago, held at hotel La Salle, February 26, W. H. Lyford, general counsel of the Chicago & Eastern Illinois R. R., delivered an address on the subject of "Chicago Railway Terminals." Mr. Lyford declared that the terminal problem in that city is of tremendous magnitude. He pointed out that there are 31 trunk lines of railroad reaching Chicago, owned by 24 separate companies. "All of these lines," he said, "come into terminals within an area of about a square mile, in the center of the city. From this small center they radiate like the spokes of a wheel in every direction except due east." In commenting upon the present condition of the passenger terminals in this city Mr. Lyford continued: "I think I may safely say that only one of the passenger terminals in this city, the Northwestern, is in any sense permanent. All of the others have already outgrown their usefulness and will soon be entirely changed and rebuilt or combined on broader lines. The Union station on the West Side is to be replaced with a monumental structure in the same neighborhood. The Pennsylvania, Burlington and St. Paul, which use it, want to remain on the West Side, and the people of this city are willing that they should do so. The Northwestern will, of course, remain where it is. I predict that all of the other lines in the city will join the Illinois Central in the magnificent station which it is about to construct on the lake front at Twelfth street. That station should be capable of taking care of all of us for fifteen or twenty years at any rate, and if we should then outgrow it, some of us can move west of State street, where we own ample property for a passenger station for all time."

Railway and Engineering Literature.

La Salle Extension University, 2715 Michigan avenue, Chicago, has published a series of treatises on transportation topics in connection with its courses of non-resident instruction in interstate commerce and railway traffic. "Freight Classification," by E. R. Dewsnup, professor of railway administration at the University of Illinois, is a simple and practical treatment of freight classification which will be valuable alike to the layman and to the experienced traffic man. A unique feature of this book is the appendix. The information contained therein has never before appeared in any one publication. Appendix A contains descriptions of territories, groups, and points used in the handling of traffic as described in various publications of the carriers. Appendixes B and C contain definitions of traffic terms and abbreviations in common use. Appendix D shows detailed application of classifications both within and without their respective territories. "Reducing Freight Charges to a Minimum," is by J. F. Strombeck, president of the Strombeck-Becker Mfg. Co., Moline, Ill. It is a practical presentation of the subject. In "Freight Claims," W. A. Trimpe, attorney, Chicago, Ill., who was formerly connected with one of the largest firms in the country handling freight claims, sets out in concrete form the proper methods for handling such troublesome matters. "Routing Freight Shipments," was written by J. F. Morton, assistant traffic director of the Chicago Association of Commerce, Chi-

cago, who is an expert in routing freight shipments and who prepares the "Package Car Service Bulletin" for the association's journal, "Chicago Commerce." The four volumes mentioned above were issued some months ago, and the series has lately been augmented by other works, as follows: "Freight Rates, Official Classification Territory and Eastern Canada," by C. C. McCain, chairman, Trunk Line Association, and William A. Shelton, La Salle Extension University, is bound in three covers, of which the first volume is on all-rail rates east-bound; the second on Canadian percentage territory rates, rail-and water rates and development of percentage system; and the third on port, inter-colonial and local rates. "Bases for Freight Charges," is a book of 62 pages, by C. L. Lingo, traffic manager, Inland Steel Co. "Statistics of Freight Traffic" is a pamphlet by Julius H. Parmelee, statistician, Bureau of Railway Economics; and "The Industrial Traffic Department" is by W. N. Agnew, traffic manager, International Steam Pump Co.

* * *

Stone & Webster, 147 Milk street, Chicago, have issued their manual containing brief descriptions of the companies under the management of that organization, with earnings for the year 1913. For the year ending December 31, 1913, the combined capitalization and earnings of the electric railway, electric lighting, gas and water power companies managed by Stone & Webster Management Association, as follows: Bonds and coupon notes outstanding, \$86,512,100; preferred stocks outstanding, \$38,092,100; capital and common stocks outstanding,

\$61,911,200; total, \$186,515,400. The total disbursements for the year 1913, for interest on bonds and notes and for dividends were \$8,616,581.79.

* * *

The Mesta improved pickling machine is described in bulletin M, issued by the Mesta Machine Co., Pittsburg, Pa. These machines are in almost universal use where hand methods of cleaning sheets by the acid process are not in vogue. Special care has been taken in the design to produce a device requiring the minimum of power and acid in attaining the desired results.

* * *

The Street locomotive stoker, type C, representing the latest of the three stages of development through which this apparatus has passed, is described in catalogue No. 13 by the Locomotive Stoker Co., 30 Church street, New York. One of the most important of the recent improvements to these machines lies in the use of a constant-speed engine equipped with a variable-speed drive for the conveyor, giving a more satisfactory means of control than is possible with the throttling method alone.

* * *

The National Tube Co.'s bulletin No. 19 contains a complete list of products manufactured and supplied by this firm. The 953 separate items listed are arranged in alphabetical order, making the bulletin a ready reference to the extensive line of tubular goods which the company is prepared to furnish.

The Railway Supply Man's Point of View

Building a Business.

No. 1—LOYALTY.

We announced recently in these columns some subjects which we would treat, and as they pertain very largely to the foundations upon which a business is built they will be taken up and treated under this general heading, the different phases being discussed in forthcoming issues.

Loyalty is so essential to the success of any undertaking that a discussion of it as it relates to any organization engaged in the manufacture of railway supplies seems almost a waste of time. However, with loyalty absolutely essential to success, and more essential to permanent success than almost any other one thing, we can hardly afford to be silent in regard to it.

An individual can be loyal in a losing cause that is right, or he can be loyal in a winning cause that is wrong. These things have happened a great many times in the history of the world; but if a man is intelligently loyal to himself, it will follow that he is loyal to a cause which is right, and that which is right must succeed, even if defeated apparently for a good many years. Of course those who believe that the world is gradually getting worse all the time will not agree in this premise. Fortunately, however, such people are few, and the great body of intelligent citizens of this commonwealth of ours believe in the continuing progress of those things which are right.

Taking this for granted, then, if a man is intelligently loyal to himself, he is going to be loyal to the institution which is doing the right thing. The business corporation which is doing the right thing,—which, year after year, is manufacturing for railroads equipment of the best character,—appliances which shall give maximum service, inspires loyalty among the individuals who compose the working organization.

Given a fair amount of intelligence, which is something we must grant to every man, the individual who is loyal to the company with which he is connected is of value to

that company in just so far as his ability permits of his usefulness. The man who works for the pay check, and for that alone, is of very little value to any railway supply manufacturer who expects to continue permanently in the business of selling to railroads. Such a man is working only for the present, and of necessity does not represent the true motives behind the manufacturer who is attempting to make and sell something which will give real service. Loyalty on the part of the individual consists of more than simply telling what a fine concern he is working for. It means being alive and alert at all times to do something,—to do everything which will be of benefit to the company that employs him. The man who is thoroughly loyal to the interests of his employer makes himself, because of this fact, absolutely indispensable to the employer and his business.

Real loyalty,—true loyalty,—right loyalty, consists first in being loyal to one's own best ideals, and then in being loyal to the business house with which he is connected, provided he does not have to sacrifice his loyalty to high ideals in being loyal to the concern for which he is working. It very often happens that a man says: "I cannot be loyal to such and such a concern because I don't believe they are doing the right thing." At the same time, however, he continues to draw his salary from the concern and does not give them all that he should in return for it.

A man in this position has just two things to do: he must convince himself that he is right or that the concern is right. If the company for which he works is correct, then it is time for the employee to change his ideas. If he finally makes up his mind that he is correct and that his employer is wrong, it is time for him to look for another job.

Prompt Delivery Secures Order for American Locomotive Builder.

The Australian government recently placed an order with the Baldwin Locomotive Works for four locomotives for the Transcontinental Railway. This action caused serious debate in the federal parliament, and according to a recent report by John P. Bray, United States counsel general, at Syd-

ney, brought forth the following statement from the assistant minister of home affairs: "Every manufacturer of engines in Australia was approached, to ascertain if they could be supplied in Australia. Without exception, the firms replied that they could not give speedy delivery. He then decided to invite quotations for quick supply from over-sea firms. The Baldwin company, of America, made the most satisfactory offer. The price of the Clyde Engineering Co. for engines of this type was \$30,148, but these American engines were costing \$23,573 at Port Augusta, or \$25,305 at Kalgoorlie; the question of price, however, did not enter into the case. The need for speedy delivery is that for every 50 miles of track laid an engine is required, and the tracklayers are putting down 1½ miles a day, so that a locomotive is required at each end of the railway every 2½ months. Inquiries were made of over-sea firms doing business in Australia, and the representatives of Baldwin's offered to ship the engines from the United States in 15 weeks. British and Scottish firms wanted 11 and 12 months."

A Large Modern Plant and Its Manager.

J. ALLAN SMITH, PRESIDENT OF THE U. S. LIGHT & HEATING CO.

Mr. J. Allan Smith was born in Willoughby, Ohio, June, 1872. He graduated from the Case School of Applied Science at Cleveland in 1895. He then took a two years' "student's course" with the Westinghouse Electric & Mfg. Co. at East Pittsburgh. After about a year's service with the Fort Wayne Electric Corp. in 1899 he went to Wooster, O., and there spent a year managing and building for the Fort Wayne Electric Corp., an entire new electric light plant. He became manager in 1899 after the reorganization of the Fort Wayne Electric Corp., which then became known as



J. Allan Smith, President, U. S. Light & Heating Co.

the Fort Wayne Electric Works. In 1900 he was sent to Boston as manager of the New England territory, where he remained until 1907, when he went to the General Electric Co., and was with them for two years.

He became general manager of the U. S. Light & Heating Co. May 1st, 1909, vice-president and general manager about a year later, and president on April 17, 1913.

A little over two years ago the manufacturing of this company, which had previously been conducted in three distinct

factories, at New York, Buffalo and Milwaukee, was concentrated in a magnificent new plant in Niagara Falls. This plant was built on strictly modern lines and attracted the favorable attention of engineers from all over the country. It was so large that it was felt that it would suffice for the needs of the company for years to come. However, in less than two years from the erection of the original plant it was absolutely necessary to double the floor space.

All products of this company are now sold under one trade name, namely U-S-L. These products comprise axle equipments for electric lighting of railroad cars; storage batteries for the operation of automatic railroad signals; storage batteries for the propulsion of electric cars and trucks; storage batteries for isolated light plants—that is, for the benefit of the people who cannot be served from wires from central stations; starter and lighter for automobiles, which is now the standard equipment on many prominent makes of cars.

A consideration of this list of products and the relations to each other reveals the fact that the engineering and manufacturing experience, which is required to make any one a success, dovetails in perfectly with the scientific production of all the rest.

Mr. Smith has recently returned from a business trip of several months in Europe, where he has been cultivating a broader field for U-S-L products.

SUPPLY TRADE NOTES.

—The National Steel Car Co., in its first annual report for the year ended November 30, 1913, shows a surplus of \$175,153 in the income account. The general balance sheet is as follows:

Assets.	
Property and plant.....	\$3,261,214
Inventory of raw and manufactured materials.....	493,107
Accounts and bills receivable.....	398,014
Prepaid insurance, taxes, etc.....	4,276
Cash	51,348
Total.....	\$4,207,961
Liabilities.	
Preferred capital stock.....	\$1,500,000
Ordinary capital stock.....	2,000,000
Accounts and invoices payable and pay rolls.....	550,807
Profit and loss surplus.....	157,153
Total.....	\$4,207,961

—Bertram Smith, who started in the storage battery business in 1899, with the old National Battery Co., of Buffalo, and was secretary and treasurer for three years, has been appointed assistant manager of the Edison Storage Battery Supply Co., of San Francisco, which company handles the Edison battery on the Pacific coast. Since the absorption of the National Battery Co. by the United States Light & Heating Co. Mr. Smith has been manager of the latter company's battery department in Chicago.

—W. F. Bauer, who has been connected with the storage battery and railway car lighting business for many years, has severed his connection with the United States Light & Heating Co. to become assistant manager of the railway department of the Edison Storage Battery Co., Orange, N. J. Mr. Bauer was with the Pullman Company in Chicago and Jersey City and with the Wagner Palace Car Co. in the earlier days of electric car lighting. From 1903 to 1905 he was chief electrician of the Missouri Pacific Ry. at St. Louis. Leaving the operating end he became sales engineer for the Electric Storage Battery Co., Chicago, and in 1907 he took a similar position with the National Battery Co., and later became manager of the United States Light & Heating Company's railway department in Chicago. Mr. Bauer will continue to make his headquarters in Chicago, having immediate supervision over the sales of the railway department for the West and Southwest.

—At a banquet at the Fort Pitt Hotel on the night of February 21, at which the Veteran Employees' Association of the Westinghouse Electric & Manufacturing company was organized, E. M. Herr, president of the company, announced that the electric company was planning to pension its em-

ployees, somewhat under the same system as is in force in the Westinghouse Air Brake Company. Aside from the pension announcement all the 325 employees who have been in the service of the company for more than 20 years, organized the veterans' association. The following officers were elected: President, William Friedel; vice-president, James J. Barrett; secretary, Charles H. Long; treasurer, E. W. Davis; trustees, Harry Boyer, Paul Kreauter, and J. W. Kleinknecht.

—O. P. Wilson, of the purchasing department of the Westinghouse Electric & Manufacturing Co., has resigned to accept the position of assistant general manager of the Norma Company of America, 20-24 Vesey street, New York City, manufacturers and importers of high-grade ball bearings, roller bearings, precision instruments, etc. Mr. Wilson has been connected with the Westinghouse company for fourteen years.

—The Okonite Company, 253 Broadway, New York City, is mailing out specimens of some electric cables, in a remarkable state of preservation, which have a history dating back ten to fourteen years, as follows: They were manufactured and installed in underground conduits in 1900 and 1904 to connect with the trans-Atlantic and other deep sea cables of the Commercial Cable Co., the route being from their main office in New York city to a point on the seashore of the eastern end of Coney Island. The United States government having decided to dredge a channel into Jamaica bay, and the cables of the Commercial Cable Co. crossing the line of their proposed operations, the cable company was notified by the government to remove its cables, and it met the issue by transferring its landing place from Coney Island to Far Rockaway, which is well outside of the zone of dredging operations. This necessitated the laying of an underground connection from the main office in New York city to Far Rockaway, a distance of 22 miles, and the contract for the making of this connection was awarded to the Okonite Company and consisted of three 14-conductor lead covered cables installed in underground conduits which, when the installation was complete, tested well in excess of the specifications which were most exacting. The transfer of the ocean cables and the connection with the office having been accomplished, there was no further use for the cables over the Coney Island route, so it was decided to take them out of the conduits and relay them as extra conductors over the Far Rockaway line. This work is now in progress and as the sections are relaid and connected, tests show the electrical and physical condition of the conductors to be practically unimpaired after fourteen and ten years of uninterrupted service.

RAILWAY NEWS.

Atchison, Topeka & Santa Fe.—The Gulf, Colorado & Santa Fe Ry. has authorized the expenditure of \$106,915 for improvements at various points, including \$75,816 for grade revision between Temple and Cleburne, Tex.; nearly \$4000 for bridges, trestles and culverts; over \$6000 for sidings and spur tracks and about \$2600 for yards.

Atlanta, Birmingham & Atlantic.—The Federal court at Atlanta, Ga., has ordered the sale April 22 of the Atlanta, Birmingham & Atlantic R. R. and its allied interest, the Georgia Terminal Co. of Atlanta. The sale is ordered on petition of the Old Colony Trust Co. of Boston, trustee for the bondholders, and is to satisfy a total indebtedness of \$22,573,715. Victor L. Smith, of Atlanta, as master commissioner, will make the sale. The road has been in the hands of receivers since January, 1909.

Atlantic Coast Line.—At a special meeting of the stockholders of the Atlantic Coast Line Co. of Connecticut February 20, it was unanimously voted to reduce the capital stock from \$17,640,000 to \$8,820,000 and to distribute from the assets of the company, in exchange for this reduction, about half of its holdings in the common stock of the Atlantic Coast Line R. R. Co.

Canadian Northern.—A bill was introduced in the legislature of the province of British Columbia February 21 granting the Canadian Northern Pacific Ry. an additional guarantee of \$10,000 a mile for 511 miles, with interest at 4½ per cent, and the principal until 1950, amounting to \$12,360,200.

Central of Georgia.—The Central of Georgia Ry., according to report, will construct second-track and reduce grades and curves between Columbus, Ga., and Atlanta, Ga., and between Columbus and Birmingham, Ala.

Chicago & Wabash Valley.—See Railway News under Chicago, Indianapolis & Louisville Ry.

Chicago, Indianapolis & Louisville.—The Chicago, Indianapolis & Louisville Ry. is said to have purchased a 30 day option on the Chicago & Wabash Valley R. R. The price agreed on is said to be \$100,000. A press report says that if the sale is made the Chicago, Indianapolis & Louisville will extend the road.

Chicago, Rock Island & Pacific.—The Chicago, Rock Island & Pacific Ry. has asked the approval of the Illinois public utilities commission to an issue of \$7,500,000 two-year, 6 per cent notes, to mature February 16, 1916, secured by first and refunding bonds of the St. Paul & Kansas City Short Line R. R. and Rock Island, Arkansas & Louisiana R. R. A part of the proceeds will restore to the treasury of the company approximately \$4,000,000 expended from income within the last five years, a part will be used in paying the principal of equipment trust notes and the balance, about \$3,500,000, will be applied to additions, betterments, and acquisitions to be made in the near future.

Detroit, Toledo & Ironton.—Articles of incorporation were filed at Dover, Del., February 21, for the Detroit, Toledo & Ironton Railroad Co., with capital stock \$12,500,000, to acquire by purchase, construct, maintain and operate by steam or otherwise railroads and railroad lines without the state of Delaware, including the Detroit, Toledo & Ironton Ry. and all its branches extending through the states of Michigan, Ohio, Kentucky and West Virginia.

Great Northern.—The proceeds of the proposed issue of \$19,000,000 new stock by the Great Northern Ry. are to be used for additional main or other tracks, new rolling stock and terminal properties and other acquisitions, additions and improvements for use in connection with or in extension of, any lines of railway, branches, telegraph or telephone lines owned by the company or by any railway company of whose shares of capital stock at least a majority are owned by this company, and for the acquisition of the stock, bonds and other securities of Montana Eastern Ry. Co. or of any other company which lawfully it may acquire, as from time to time may be authorized by the board. The new issue which is subject to ratification by mail by 75 per cent of the existing \$231,000,000 stock, raises the total of the same to \$250,000,000.

Louisiana & Pacific.—It is reported that the DeRidder branch of the Louisiana & Pacific Ry. has been extended a distance of about six miles from Bundick to Hoy, La.

Norfolk & Western.—The Norfolk & Western Ry. it is said, plans to construct third track between Columbus and Portsmouth, Ohio.

Northern Central.—The Northern Central Railway Co., a part of the Pennsylvania Railroad system, for the year ended December 31, 1913, earned \$13,563,722 gross and \$1,059,357 net. The former is an increase of \$719,006 and the latter a loss of \$383,087. The year's balance for dividends was \$1,703,072, a decrease of \$122,362. Reference is made in the report to the sale of the company's 10,487 shares of common and 10,000 shares of preferred stock of the Baltimore & Ohio R. R., for which were received 18,487 shares of Southern Pacific Co. in accordance with the agreement with the Union Pacific R. R. The belief is expressed that the Southern Pacific shares can be disposed of on terms advantageous to the company.

Savannah & Southern.—The Savannah & Southern Ry. has built an extension from Norden to Lanier, Ga., 2.2 miles.

Southern Railway.—The sale of \$10,000,000 5 per cent three-year notes of the Southern Railway, secured by the general mortgage 4 per cent bonds, of the company, has been announced by President Fairfax Harrison, who says in substance: This new capital is to be applied in carrying out plans for improvements and betterments which were included in the general plan made at the time the development and general mortgage was created in 1906. The particular improvements now to be undertaken are chiefly additional and enlarged shops, yard and other freight terminals. These improvements will be undertaken at once and pushed to completion as rapidly as possible. In addition to the improvements provided for, as above stated, the company has also arranged to finance, through a ten-year equipment trust, the acquisition of additional modern rolling stock, largely of steel construction, representing an aggregate cost of more than \$5,000,000. Bids are now being received and orders for immediate construction will be placed promptly. A press report says that part of the proceeds of the \$10,000,000 bond issue will be used to com-

plete the Stevenson extension, which has remained unfinished during the last four years. The line is graded from Chattanooga to Stevenson, Ala., and was originally designed for the routing of trains of the Memphis division into Chattanooga. Piers for a bridge across the Tennessee river have been completed for some time, and the bridge steel is at Bridgeport, Ala. The tunnel through Lookout mountain has been completed.

Trinity & Brazos Valley.—The Trinity & Brazos Valley Ry., according to report, will spend \$250,000 for rebalasting 84 miles of its roadbed, and for the construction and repair of bridges.

Wabash Railroad.—Tentative plans for the reorganization of the Wabash Railroad have been informally announced. The preferred and common stocks will be assessed \$20 each and new stock of one class will be issued in exchange for the former issue, the preferred getting 110 or 120 as against par for the common. New 5 per cent income bonds will be issued in exchange for refunding 4s at about 110 of new bonds for 100 of old. A new refunding bond issue will be created to provide for future financial requirements, some of which will be issued for immediate needs. If the assessment should be paid it will provide about \$18,500,000 of \$25,000,000 cash needed at this time. Another \$2,225,000 is ex-

Ry., with headquarters at Portland, Ore. E. B. Heath has been appointed trainmaster at Portland.

H. A. Boomer, formerly general superintendent of the Lake Erie & Western and Northern Ohio railways, is now general manager, with headquarters at Indianapolis, Ind.

Daniel Cunningham, division superintendent of the Chicago, Burlington & Quincy R. R., with headquarters at La Crosse, Wis., has been appointed chief examiner of train rules.

W. F. Thiehoff, superintendent of the Chicago, Burlington & Quincy R. R., at Beardstown, Ill., has been appointed superintendent of the Northern division, with headquarters at La Crosse, Wis., succeeding Daniel Cunningham.

Frank Cone, assistant superintendent of the Chicago, Burlington & Quincy R. R., at La Crosse, Wis., has been appointed superintendent at Beardstown, Ill., succeeding W. F. Thiehoff, transferred.

E. Van Hecke has been appointed superintendent of the Amarillo division of the Chicago, Rock Island & Pacific Ry., at Amarillo, Tex., succeeding A. E. Walker, transferred.

James T. Leary, general auditor of the Baltimore & Ohio R. R., effective February 19, has been appointed comptroller of the company to succeed the late Capt. Geo. W. Booth. Mr. Leary is a graduate of Cornell university, class of 1880. He



E. E. Kerwin, Who Recently Became General Superintendent of the Minneapolis & St. Louis R. R.



James T. Leary, Who Has Been Appointed Comptroller of the Baltimore & Ohio R. R.

pected to come from settlement with the Wabash-Pittsburg Terminal R. R.

PERSONALS.

W. K. Bixby has resigned as a receiver of Wabash Railroad.

J. M. Rodgers resumes his duties as statistician of the Norfolk & Western Ry., effective March 1, and on the same date W. B. Moss is appointed assistant statistician.

F. Davidson has been appointed purchasing agent of the Chicago, Indianapolis & Louisville Ry.

A. E. Walker, superintendent of the Amarillo division of the Chicago, Rock Island & Pacific Ry., at Amarillo, Tex., has been transferred to Eldorado, Ark., as superintendent of the Louisiana division.

J. L. White has been appointed assistant to president of the Chicago, Indianapolis & Louisville Ry., with office at Chicago.

Robert T. Railey, general attorney for Missouri of the Missouri Pacific Ry. system, at St. Louis, Mo., has resigned, effective March 1.

J. McGuire has been appointed assistant superintendent of the Portland division of the Spokane, Portland & Seattle

first entered railway service with the Pennsylvania R. R. as a clerk in the mechanical department at Fort Wayne, Ind., in June, 1882. In May, 1883, he was promoted to the chief clerkship in the office of superintendent of motive power of the same company, and in November, 1899, was made chief clerk to the general superintendent motive power of the Pennsylvania Lines West of Pittsburgh, with headquarters in that city. He came to the Baltimore & Ohio in June, 1901, as assistant to the general manager, at Baltimore, and was advanced to general auditor in April, 1902, having held that position for the last twelve years.

E. E. Kerwin, whose appointment as general superintendent of the Minneapolis & St. Louis Ry. has been mentioned in the Railway Review, was born at Turner, N. Y., December 18, 1861. He entered railway service as a water boy with a section gang on the New York, Lake Erie & Western R. R., was later trackman and operator and agent at various points in New York and New Jersey. From March, 1885 to 1890 he was operator, agent and dispatcher with the Union Pacific R. R., Chicago, Milwaukee & St. Paul Ry., and Chicago, St. Paul & Kansas City Ry. Mr. Kerwin was trick dispatcher on the Iowa Central Ry. at Marshalltown, Iowa, from March, 1890, to May, 1893; chief dispatcher of the same road at Keithsburg, Ill., from 1893 to 1895, and trainmaster at Oskaloosa, Ia., from 1895 to 1902. From November, 1902, until he recently resigned to take his new position at Minneapolis,

Minn., he has been superintendent of the Central R. R. of New Jersey, at Jersey City, N. J.

E. E. Hamilton, chief clerk to the third vice-president of the Baltimore & Ohio R. R. system, has been promoted to the position of supervisor of operating statistics. Mr. Hamilton will have supervision over the tonnage, hours of service, earnings and expenses and the statistical bureaus, and his jurisdiction will extend over the lines of the Baltimore & Ohio, Baltimore & Ohio Southwestern, Cincinnati, Hamilton & Dayton and the Staten Island Rapid Transit railways.

Morton Riddle, who on February 10, became general manager of the Florida East Coast Ry., was born in 1869. He entered the service of the Norfolk & Western Ry in 1887 and he was engaged in engineering work with that company and the Cleveland, Cincinnati, Chicago & St. Louis Ry. until 1890. Mr. Riddle entered the service of the Atlantic Coast Line R. R. as roadmaster. He was appointed superintendent in 1900 and in 1904 became assistant chief engineer. On January 1, 1905, he was appointed superintendent of that company. He held this position until his recent resignation when he accepted appointment as general manager of the Florida East Coast Ry.

E. D. Levy, whose appointment as general manager of the St. Louis & San Francisco R. R. has been noted in these



E. D. Levy, Promoted to the Position of General Manager of the St. Louis & San Francisco R. R.

columns, was born in Paris, Tex., October 16, 1879, and educated in the public schools of Paris and Dallas. He went to work as stenographer for the Santa Fe Refrigerator Dispatch in Chicago, February 1, 1898, and later was stenographer in offices in the operating departments of the Michigan Central R. R. in Detroit; the Chicago, Milwaukee & St. Paul Ry. in Chicago; the Atchison, Topeka & Santa Fe Ry. in Topeka, and at Needles, Cal.; the Fort Worth & Denver Ry. at Fort Worth, Tex.; the Mexican Central Ry. in the city of Mexico; the Kansas City Southern Ry. at Texarkana and the Gulf, Colorado & Santa Fe Ry. at Galveston. From May 1, 1904, to August 15, 1906, he was chief clerk to the general superintendent of the latter road and then entered the service of the St. Louis & San Francisco as assistant superintendent of car service at Springfield, Mo. Mr. Levy was appointed superintendent of transportation June 1, 1907 and he became assistant general manager May 1, 1911. His appointment as general manager is effective March 1.

TRAFFIC.

N. H. Abel is appointed, effective March 1, assistant passenger traffic manager of the Chicago & Alton R. R., with office at St. Louis, Mo. He succeeds R. J. McKay, resigned.

Walter B. Shirk has been appointed general live stock agent of the Missouri Pacific-Iron Mountain system, with office at Kansas City, Mo. He succeeds F. C. Fletcher, who resigned

to become traffic manager of the Union Stock Yards Co. at St. Joseph, Mo.

J. W. Willis has been appointed general agent of the Atlantic, Birmingham & Atlantic R. R., with headquarters at Talladega, Ala., succeeding C. A. Land, resigned to take service with another company.

W. C. Mueller has been appointed general agent of the passenger department of the Chicago & Alton R. R., with office at Kansas City, Mo., vice W. H. Abel, transferred.

H. L. Gray, effective March 1, is appointed division passenger agent of the Illinois Central R. R., at Dubuque, Iowa, vice J. M. Morisey. A. J. McDougall is appointed district passenger agent at St. Paul, Minn., vice Mr. Gray, and J. M. Morisey is appointed district passenger agent at Indianapolis, Ind., vice Mr. McDougall.

C. H. Evans has been appointed industrial agent of the Missouri, Kansas & Texas Ry., with headquarters at St. Louis, Mo., succeeding R. G. Hanson, Jr., resigned.

H. H. Berterman has been appointed general agent of the passenger department of the Cleveland, Cincinnati, Chicago & St. Louis Ry., with office at Columbus, Ohio, succeeding B. C. Kelsey, resigned to engage in other business.

W. C. Teare has been appointed traveling freight agent of the Seaboard Air Line Ry., with office at Cincinnati, Ohio, succeeding H. M. Williams, resigned to accept service with another company.

J. W. Jacobs, commercial agent of the St. Louis & San Francisco R. R., at Corpus Christi, Tex., is appointed general freight and passenger agent at Kingsville, Tex., effective March 1. He takes the place of the late Harry Neff. C. B. Davis, traveling passenger agent at Houston, Tex., will succeed Mr. Jacobs at Corpus Christi. W. S. Smith will succeed Mr. Davis as traveling passenger agent with headquarters at Houston.

H. M. Williams has been appointed traveling freight agent of the Atlanta, Birmingham & Atlantic R. R., with office at Cincinnati, Ohio, succeeding L. J. Steinhauer, resigned to engage in other business.

ENGINEERING.

E. G. Tilton, chief engineer of the San Pedro, Los Angeles & Salt Lake R. R., with office at Los Angeles, Cal., has resigned.

J. K. Conner, first assistant engineer of the Lake Erie & Western R. R., at Indianapolis, Ind., has been appointed chief engineer, with office at Indianapolis, succeeding W. G. Atwood, resigned.

F. H. Buchanan has been appointed signal engineer of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, Pa., effective March 1. Mr. Buchanan succeeds the late W. McC. Grafton.

J. C. Auten, division engineer of the Philadelphia, Baltimore & Washington R. R. at Wilmington, Del., has been appointed principal assistant engineer, succeeding C. I. Leiper, promoted.

J. B. Hutchinson, Jr., division engineer of the Pennsylvania Railroad at Williamsport, Pa., has been appointed division engineer of the Monongahela division, with office at Pittsburgh, Pa., succeeding E. B. Wiseman, transferred.

J. Dwyer has been appointed roadmaster of the Portland division of the Spokane, Portland & Seattle Ry., with headquarters at Portland, Ore.

John A. Galvin has resigned as architect of the Louisville & Nashville R. R. to accept a position with the Division of Valuation, Interstate Commerce Commission. J. C. Haley has been appointed architect to succeed Mr. Galvin.

J. E. Crawford, whose appointment as chief engineer of the Norfolk & Western Ry. was noted in our previous issue, was born at San Diego, Cal., December 1, 1876. He was educated at the University of Pennsylvania and immediately after his graduation in 1895 took a position as draftsman with the Pencoyd Iron Works. From 1898 to 1903 he was designer for the Pencoyd Iron Works. Mr. Crawford went to the Norfolk & Western in 1903 as acting bridge engineer. He was appointed bridge engineer in 1904 and in 1913 became acting chief engineer. His appointment as chief engineer of the Norfolk & Western Ry. and the Williamson & Pond Creek R. R. is effective March 1, 1914.

MECHANICAL.

F. R. Pennyfather, district master mechanic of the Canadian Pacific Ry., at Cranbrook, B. C., has been appointed master mechanic of the Manitoba division with headquarters at Winnipeg, Man., succeeding R. Preston.

George G. Ommanney has been appointed special engineer to the president of the Canadian Pacific Ry. He will perform such duties as may be assigned to him from time to time.

D. E. Fitzgerald has resigned as assistant superintendent of motive power of the St. Louis & San Francisco R. R.

OBITUARY.

A. B. Adams, division master mechanic of the Gulf, Colorado & Santa Fe Ry, at Silsbee, Tex., died suddenly February 16, aged 49 years.

Douglas T. Chase, formerly general superintendent of the Atchison, Topeka & Santa Fe Ry., died at Macon, Ill., February 20, aged 78 years.

D. Clem Deaver, immigration agent of the Chicago, Burlington & Quincy R. R., with office at Omaha, Neb., died in that city, February 23.

Frank N. Hall, superintendent and general freight and passenger agent of the Moncton & Buctouche, Ry., aged 48 years, met death in a railway accident near Moncton, N. B., February 20.

Arthur M. Richards, former superintendent of the Chicago & Alton R. R., died at his home in Chicago, February 26. Mr. Richards was born in Chester, England, in 1838.

John P. Hess, junior assistant superintendent of the relief department of the Baltimore & Ohio R. R., died in Baltimore, February 20. He was connected with that department of the railroad for the last 32 years.

NEW ROADS AND PROJECTS.

Alabama.—According to report the Alabama, Tennessee & Northern Ry. is contemplating building its own line from Calvert, Ala., south to Mobile, about 35 miles.

See also Railway News under Southern Railway.

Arkansas.—The Helena Southwestern Ry., it is said, will start work in about 60 days on the construction of its proposed 20-mile line from Helena, Ark., southwest to Pillows Hill, Ark. E. C. Nelson, Helena, is interested.

British Columbia.—Contract for constructing the Kettle Valley Ry. between Ospey lake and Coldwater Summit, B. C., is reported to have been awarded recently to Guthrie McDougall Co., Portland, Ore.

A bill has been introduced in the legislature at Victoria, B. C., to provide for an extension of the Pacific Great Eastern Ry. from its junction with the Grand Trunk Pacific Ry. at or near Fort George, in a northeasterly direction into the Peace River country for a distance of 330 miles. The bill also provides for a bond guarantee on the new extension of \$35,000 per mile at 4½ per cent.

California.—See New Roads and Projects under Idaho.

Florida.—J. B. Walker, chief engineer of the Tampa, Atlantic & Gulf Ry. says that location surveys have been completed and it is expected that the company will be ready for construction within the next 60 days. See Railway Review of February 7 and 21.

F. B. Lynch of St. Paul, Minn., president of the Southern Colonization Co., according to a report, has organized the South Florida & Gulf R. R. with \$500,000 capital stock for the purpose of building a line about 36 miles long from Kenansville, near Whittier, Fla., to Bassenger. It is stated that there are 25 miles of graded railroad bed out of Kenansville, which can be used for the line, and sufficient ties for 12 miles of track are on hand. Construction contracts have been let to M. Reed and others, and work is expected to begin within a few days upon arrival of rails. The officers of the railroad company are C. H. Armstrong of Rochester, Minn., president and chief engineer; Walter F. Schrock of Shokopee, Minn., vice president; Henry F. Beautler of Kissimmee, Fla., secretary and treasurer.

Georgia.—The extension of the Waycross & Western R. R. from Arabia to Sirmans, in Clinch county, Ga., has been completed. From Sirmans the new road proposes to extend to Milltown and other points.

The Atlantic, Waycross & Northern R. R. is preparing to construct a proposed extension from Kingsland to Folks-ton, Ga.

Idaho.—L. O. Leonard, Boise, Idaho, president of the proposed Butte-Boise & Winnemucca Ry., a line projected from Butte, Mont., to Winnemucca, Nev., has abandoned the plan of building to Winnemucca, and the charter of the company is to be amended, authorized capital stock

increased to \$125,000,000, and the name changed to the Butte, Boise & San Francisco R. R. The original plan called for the construction of about 650 miles of railroad. It is now proposed to build from Butte, Mont., to Boise, Idaho, thence west and south through southeastern Oregon, and south to San Francisco, Cal., a distance of 1066 miles. The estimated total cost of construction is \$60,000,000. It is stated that from Butte to Boise the average cost will be about \$55,000 per mile. Arrangements have been made for ample terminal facilities at Butte, Boise and at San Francisco. English and Belgian capitalists, it is said, will finance the project.

Manitoba.—The Greater Winnipeg Water District has recently awarded contracts for material for constructing 85 miles of railroad as follows: Rails, Algona Steel Corp., Winnipeg, Man.; splice bars, Steel Company of Canada, Winnipeg; switches, frogs, spikes and bolts, United States Steel Products Co.

Missouri.—Press reports state that the board of directors of the Chicago, Burlington & Quincy R. R. has authorized the construction of new lines in Missouri to give that company its own St. Louis-Kansas City line. Construction from Mexico to Moberly is said to be contemplated, also from some point on the present line west of Monroe to Moberly, and thence west to Kansas City, with a branch to St. Joseph, Mo. The report is probably in error in stating that such construction is to be undertaken this year. It is known that the company has had this work under consideration for some time and the matter was informally discussed at a recent meeting of the board in New York. No official announcement has been made.

Montana.—See New Roads and Projects under Idaho.

New York.—The New York Public Service Commission of the second district has granted a certificate of public convenience and necessity to Frontier & Western R. R. This is a proposed spur of the projected Buffalo Frontier Terminal R. R.

North Carolina.—Dan River Ry., which proposes to build a line from King to Asbury, N. C., about 30 miles, has organized with H. D. Miller of Clemmons, N. C., president; E. T. Kapp of Bethania, N. C., secretary and treasurer; E. C. Butler, Hamilton, N. Y., vice president, and D. W. Wilcox, general manager. Report says that rails have been purchased and construction work is to be begun at once.

J. P. Clarke, vice-president and general manager of the North Carolina Public Service Co., and also of the Carolina & Yadkin River Ry. has been quoted as saying he was perfecting plans to build a line of railroad from High Point, N. C., to Winston-Salem, 18 miles and High Point, to Greensboro, 16 miles.

Oklahoma.—English bankers are receiving subscriptions for \$2,000,000 first mortgage 5 per cent 30-year gold bonds of the Oklahoma Pacific R. R., dated January 1, 1914, forming part of an authorized issue of \$6,000,000 bonds. An advertisement states that the company was incorporated in Oklahoma in August, 1913. Common stock "fully paid," \$6,000,000. Line projected to extend from Oklahoma City westerly via Powers, Hinton, Cordell, Dill City, thence northwesterly, via Sayre and Cheyenne, Okla., to Canadian, Tex., on the Atchison, Topeka & Santa Fe Ry. Rights of way and terminal lands have all been paid for with the common stock. The proceeds of the sale of these bonds, after deducting the expenses of this issue, will be received by the mortgage trustees and will be payable to the construction company, the Southwestern Building Co. of Oklahoma, against engineers' certificates of actual work done. It is estimated that the net proceeds from the issue of the \$6,000,000 first mortgage 5 per cent bonds will be ample to build and equip the 180 miles of main line and 23 miles of sidings, and provide a sufficient working capital. Directors: W. T. Van Brunt, railroad constructor (formerly director of the Railroad Securities Co. and president of several railroads controlled by the late E. H. Harriman), New York; E. H. Cook, president of State National Bank of Oklahoma; S. L. Brock and F. C. Colcord, Oklahoma City; R. A. Brown, St. Joseph, Mo.; I. H. Kempner, Galveston, Tex.; C. D. Simpson, New York; H. H. Hoover and G. M. Hohl, Hobart, Okla.

Contracts will be awarded at once for the construction of the proposed spur from Beaver City, Okla., north across the North Canadian or Beaver rivers to a point on the Wichita Falls & Northwestern R. R. The work will involve the construction of 464 ft. of pile trestle. J. S. Trindle, Liberal, Kan., is engineer.

Oregon.—See New Roads and Projects under Idaho.

South Dakota.—The Fairmount & Veblen Ry., says a

report, will immediately begin surveys for a contemplated extension to Webster, S. D.

Texas.—The Nueces Valley, Rio Grande & Gulf Ry., will begin soon the construction of the proposed line from Kitty, Tex., 25 miles into McMillen county. J. W. Brooks, Belleville, Tex., is chief engineer.

Survey for the proposed railroad from Brownsville, Tex., to tidewater, a distance of 22 miles, is being made. The road will cost about \$400,000, one-fourth of which was given as a bonus by Brownsville people.

The San Angelo & Gulf R. R. is projected from San Angelo, Tex., southeast to Aransas Pass harbor on the Gulf of Mexico. Grading work, it is said, has been finished on 38 miles of the road bed. The track laying on this section will be carried on by the company, but the balance of the road will be built by contract. Some of the work will be heavy west of New Braunfels and there will be two steel bridges on the line. U. G. Dotson is president of the company and A. B. Thurston, of Yoakum, Tex., is chief engineer.

West Virginia.—The Norfolk & Western Ry. is reported preparing to build the Tug River & Kentucky R. R. for which it recently obtained a charter in Kentucky. The new line will run from Naugatuck, W. Va., through coal fields in Kentucky, and to a point near Iaeger, W. Va.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Buffalo Creek R. R. has ordered 3 eight-wheel (0-8-0-S) switching locomotives from the American Locomotive Co.

—The St. Louis, Brownsville & Mexico Ry., Beaumont, Sour Lake & Western Ry. and the Orange & Northwestern Ry. are preparing specifications and within a short time will ask for bids for 18 to 20 locomotives. These will probably be consolidation type (2-8-0) engines.

—The Delaware, Lackawanna & Western R. R., reported in a previous issue of the Railway Review as having ordered locomotives, has ordered 4 Pacific type (4-6-2) passenger locomotives from the American Locomotive Co. and 14 Pacific type (4-6-2) freight locomotives from the Lima Locomotive Corporation.

—The Verde Tunnel & Smelter R. R. has ordered 2 switching (0-6-0-S) locomotives from the American Locomotive Co.

—The Chile Exploration Co. has ordered 2 consolidation (2-8-0) locomotives from the American Locomotive Co.

—The Nevada Northern Ry. has ordered 2 consolidation (2-8-0-S) locomotives from the American Locomotive Co.

—The Cuba Railroad has ordered 2 ten-wheel (4-6-0-S) passenger and 6 ten-wheel (4-6-0) freight locomotives from the American Locomotive Co.

—The Harbor Commission of Quebec has ordered 1 six-wheel (0-6-0) switching locomotive from the American Locomotive Co.

—The Buffalo, Rochester & Pittsburgh Ry. has ordered 10 mikado (2-8-2-S) freight locomotives from the American Locomotive Co.

—The Missouri & North Arkansas R. R. has ordered 3 mikado (2-8-2) locomotives and 1 ten wheel (4-6-0) locomotive from the Baldwin Locomotive Works.

—The report that the New York Central Lines were in the market at this time for additional locomotives has been denied.

Freight Cars.

—The St. Louis, Brownsville & Mexico Ry. and allied lines of which Frank Andrews is receiver, are contemplating the early purchase of 600 steel underframe freight cars.

—The Butte, Anaconda & Pacific Ry. is said to be in the market for 157 cars.

—The Southern Railway, reported in a previous issue of the Railway Review as in the market for additional freight cars, has issued an inquiry for 1300 box cars, 500 flat, 125 stock and 25 poultry cars.

Passenger Cars.

—The St. Louis, Brownsville & Mexico Ry. and allied lines are contemplating the purchase of about 15 passenger train cars.

—The Portland Eugene & Eastern Ry. is reported in the market for 3 baggage, mail and express cars.

Iron and Steel.

—The Cleveland & Youngstown Ry. has ordered about 1000 tons of reinforcing bars from the Lackawanna Steel Co.

Bridges.

—The Pennsylvania Railroad is taking bids on three subways at Morrellville, Pa., and a new bridge at Dornick Point, Pa.

—The Cincinnati, New Orleans & Texas Pacific Ry., according to report, will erect a new double track bridge over the Ohio river at Cincinnati, Ohio. The structure will have space for a wagon way, street cars and pedestrians.

—The Eastern Maine R. R. (Maine Central) would be authorized to construct and operate a bridge, without a draw, across the Penobscot river between Bangor and Brewer, Me., in a bill passed by the House.

—The New York, New Haven & Hartford R. R. has awarded contract to Lewis F. Shoemaker & Co. for 100 tons of steel for two bridges at Groton, Conn.

—The Chicago, Rock Island & Pacific Ry. has awarded contract to the American Bridge Co. for 1000 tons of steel for the Seventy-ninth street crossing, Chicago.

—A report says that bids will be asked for soon for track elevation work in South Philadelphia, Pa., for the city and Pennsylvania Railroad, about 5000 tons of steel.

—The Chicago, Indianapolis & Louisville Ry. has ordered 124 tons of bridge steel.

—The Great Northern Ry., it is said, is in the market for 4000 tons of bridge material.

—The Winston-Salem Southbound Ry. will build a steel bridge at Linden street, Winston-Salem, N. C., to cost about \$30,000.

—It is reported that the Delaware, Lackawanna & Western R. R. will spend about \$750,000 on the elimination of grade crossings in Syracuse, N. Y., while the city's share in the expense of this work will be \$250,000.

Buildings, Terminals, Etc.

—The Union Terminal Co., Dallas, Tex., has awarded contract for the construction of the Dallas union station to James Stewart & Co., of New York, Chicago and St. Louis. It is expected that the work will be begun within ten days. The total cost will be about \$600,000.

—The Bessemer & Lake Erie R. R. has awarded contract to Roberts & Schaeffer Co. for a 400-ton reinforced concrete locomotive coaling station at Branchton, Pa. Contract price, \$25,000.

—Illinois Central R. R. will enlarge its yards at Dubuque, Iowa.

—The Chesapeake & Ohio Ry. contemplates enlarging its shops at Huntington, W. Va.

—An officer of the Southern Railway has been quoted as saying that the company will spend about \$750,000 to build a new classification yard in Memphis, Tenn.

—See Railway News under Southern Railway.

—The Philadelphia & Reading Ry. will erect a new station at Pottstown, Pa.

—The Chicago, Milwaukee & St. Paul Ry. is said to have prepared plans for new station buildings to be erected at Iron Mountain, Mich., at a cost of \$35,000.

—The Texas & New Orleans R. R. has prepared plans for new wharves, cotton sheds and other terminal facilities at Clinton, Tex.

—Fire on February 21 destroyed the passenger station of the New York, New Haven & Hartford R. R. at Hartford, Conn., entailing a loss of between \$250,000 and \$300,000.

—The Canadian Northern Ry. will erect a \$300,000 station at Calgary, Alta.

—The recent annual report of the Northern Central Ry. says that the enlargement of freight terminals in the city of Baltimore makes it evident that this work can not be much longer deferred without causing very serious congestion and a considerable increase in the expense of handling traffic, especially in the Calvert district, where the volume of traffic is beyond the capacity of the present tracks and station. Therefore, freight yards at Monument and Constitution streets and at Aliceanna street and Central avenue were improved; and the real estate has been acquired and final plans are being formulated for pier extensions at Canton. The necessary real estate required for the enlargement of the Calvert street terminals was also purchased and the com-

pany has entered into negotiations with the city of Baltimore for the necessary revision of streets to materially enlarge the yard and station at that point.

The Lennox Serpentine Shear.

The Lennox serpentine shear, a new type of machine now being offered by Joseph T. Ryerson & Son, is designed particularly for the straight and irregular cutting of sheets and plates. This machine will handle not only straight cutting but also in or out curves having a minimum radius only slightly larger than the diameter of the blades. The blades are set in approximately a horizontal plane, giving a very large cutter bearing on the sheet or plate and consequently, very little distortion in the cutting. The upper cutter is positively driven, while the lower cutter is mounted in an adjustable sleeve, so that its position may be varied to allow for different thicknesses of material and for redressing. In addition to this, a cam is provided so that the lower blade can be dropped enough to permit the removal of sheets without reversing the machine.



The Lennox Serpentine Shear.

The machine is driven by means of a two speed pulley, giving slow speed for intricate curve cutting and high speed for straight work. The main drive shaft is extended and squared on one end so that a hand crank may be used if power is not available. The shear illustrated has a capacity for cutting No. 10 gage material and lighter, while other sizes having capacities of No. 16 gage, $\frac{1}{4}$ inch and $\frac{3}{8}$ inch material can be furnished. All machines are arranged for either belt and hand power or direct motor drive.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, FEB. 17, 1914.

Clasp brake for railway trucks, 1,087,100—Lars J. Berg, Chicago, Ill.
Scrapper for electric rails, 1,087,109—Gustav A. Demmler, Forest Park, Ill.

Car stake, 1,087,133—John Mittermeyer, Rice Lake, Wis.
Weather strip for car windows, 1,087,146—Harry H. Schroyer, Chicago, Ill., assignor to The Acme Supply Co., Chicago, Ill.
Car heating system, 1,087,164—Edward E. Gold, New York, N. Y., assignor to Gold Car Heating & Lighting Co., New York.
Dump car, 1,087,184—Ralph V. Sage, Westmont, Pa.
Packing ring, 1,087,213—Edward B. Campbell, St. Louis, Mo., assignor to Sta-Tite Packing Ring Co., St. Louis, Mo.
Car coupling, 1,087,222—Simeon K. Dickerson, Cleveland, Ohio.
Automatic controlling device for heating apparatus, 1,087,231—Edward E. Gold, New York, N. Y., assignor to Gold Car Heating & Lighting Co., New York.
Car seat spring, 1,087,247—Paul G. Leistner, St. Charles, Mo.
Composite railway tie, 1,087,281—William J. Crawford and Edward R. Inman, Franklin, Pa.
Switch latch, 1,087,297—Julian H. Kendig, Pittsburg, Pa., assignor to Buda Company, Chicago, Ill.
Cushioning means for railway cars, 1,087,305—W. Britton Lane, Evanston, Ill.
Outside flush door for box cars, 1,087,346—Thomas F. Barton, Chicago, Ill.
Railway signal fusee, 1,087,348—Walter C. Beckwith, Fostoria, Ohio, assignor to Charles C. German, Fostoria, Ohio.
System for cleaning and refilling locomotive boilers, 1,087,362—Frederick A. Gale, Chicago, Ill.
Rail fastener, 1,087,392—Henry C. Nunn, Fort Gay, W. Va.
Freight car roof-construction, 1,087,407 and 1,087,408—John J. Tatum, Baltimore, Md., assignor to P. H. Murphy Co., Parnassus, Pa.
Automatic track sander, 1,087,421—Halstead T. Aydelott, Birmingham, Ala.
Safety appliance for locomotive boilers, 1,087,496—Joseph B. Kilkenny, Walla Walla, Wash.
Rail joint, 1,087,505—Frank H. Oliskie, Johnstown, Pa.
Uncoupling device for freight cars, 1,087,509—Henry M. Ramsey, Altoona, and Justus A. Rickabaugh, Pittsburg, Pa.
Circuit changer for electric railways, 1,087,537—Benjamin F. Hutches, Jr., Allendale, N. J.
Dies for reworking car wheels, 1,087,582—John M. Hansen, Pittsburg, Pa., assignor to Forged Steel Wheel Co., Pittsburg, Pa.
Apparatus for the manufacture of car-wheels, 1,087,583—John M. Hansen, Pittsburgh, Pa., assignor to Forged Steel Wheel Co., Pittsburgh, Pa.
Door operating mechanism for dump cars, 1,087,616—Ralph G. Taylor, Davenport, Iowa, assignor to The Bettendorf Company, Bettendorf, Iowa.
Insulated rail joint, 1,087,623—Howard L. Wood, Columbus, Ohio, assignor to The Rail Joint Company, New York, N. Y.
Brake shoe, 1,087,676—John J. Morse and Walter S. Gemmer, St. Louis, Mo., assignors to General Appliance Co., St. Louis, Mo.
Metallic tie and track fastening, 1,087,678—Gottfred Olson, International Falls, Minn.
Nut lock, 1,087,740—Joseph D. Duffy, St. Cloud, Minn.
Nut lock for track bolts, 1,087,740—Joseph D. Duffy, St. Cloud, Minn.
Oil burner, 1,087,741—Charles Eckland, Stockton, Cal.
Car door operating mechanism, 1,087,764—William E. Harris, Scottsboro, Ala.
Crossing gate operating mechanism, 1,087,770—Jacob E. C. Jacobsen and Charles A. V. J. Segersten, Nyack, N. Y.
Railway safety device, 1,087,773—John Johnson, Hazeldell, Pa.
Rail joint, 1,087,775—James W. Jones and Thomas M. Jeter, Rockwell, Fla.
Stock car, 1,087,779—William Kaylor, Muskogee, Okla.
Railroad tie, 1,087,819—Peter J. Peck, Chicago, Ill.
Fire door operating mechanism, 1,087,820—Elof Pehrson, Lethbridge, Alberta.
Automatic train control mechanism, 1,087,823—William Pick, New York, N. Y.
Train order holder, 1,087,828—Carpenter J. Quay, Meadville, Pa.
Motor car, 1,087,832—David P. Sanders, Lancaster, Pa.
Grain door, 1,087,837—Herman J. Schweitzer, Putney, S. D.
Rail joint, 1,087,844—Perry L. Smith, Las Vegas, Nev.
Railway tie, 1,087,855—Otto L. Weimar, Philadelphia, Pa.
Automatic coupling and air valve operating mechanism, 1,087,862—Arthur T. Ames, Blanchard, Me.
Rail spike, 1,087,912—Hugh T. Hughes, Youngstown, Ohio.

RAILWAY REVIEW

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No. 10.

MARCH 7, 1914.

Vol. 54.

Commissioners of Western States to Appear in Rate Hearing.

Railroad commissioners of six western states met in Kansas City, Mo., last week, and concluded the making of plans for offering testimony against the proposed 5 per cent advance in eastern railroad rates, in the hearings which the Interstate Commerce Commission is shortly to resume. The commissioners claim to have compiled somewhat elaborate analyses of comparative credit of railroads' industrial companies, the ability of the railroads to sell their securities, expenditures of railroad companies for maintenance and other factors involved in the case. "The analysis made," the commissioners state, "in nearly every instance refutes the representations made by the railroad companies." Clifford Thorne, chairman of the Iowa state railroad commission, has been selected as the authorized representative on behalf of the states to present the evidence, at Washington, next month. The other conferees were: H. T. Clarke, chairman of the Nebraska railway commission; John M. Atkinson, of the Missouri public utilities commission; John M. Kinkel, of the Kansas commission; W. H. Stutsman, president of the board of railway commissioners of North Dakota, and F. C. Robinson and J. J. Murphy, railway commissioners of South Dakota.

Counsel to the Interstate Commerce Commission.

Joseph W. Folk, solicitor of the state department, has been appointed chief counsel to the Interstate Commerce Commission, an office which has just been created. A salary of \$10,000 per year is attached to the position. The commission has also announced that Dr. Charles W. Needham, ex-president of George Washington University, had been appointed assistant counsel. Both Mr. Folk's and Dr. Needham's appointments will be effective March 1.

To Make Prompt Refunds on Lemon Rate Adjustments.

California fruit growers who paid the higher freight rate on lemon shipments to the Southern Pacific Co. during the recent lemon rate case before the Interstate Commerce Commission will be refunded their excess payments immediately, as a result of the successful application to the Interstate Commerce Commission by the Southern Pacific and other carriers for special permission to make immediate and informal refunds. The grant of this permission means, in effect, that instead of having to wait from five to nine months for their money, the growers will get it from the Southern Pacific with no delay. The United States Supreme court recently affirmed the commission's decision prescribing a dollar rate on lemons to all trans-continental points. The reduction amounts to about \$400,000, the specific reduction having been fifteen cents per hundred. Charges on between 20,000 and 30,000 carload shipments are involved in the refund. When the commission announced the new rates in 1909, shippers who did not give bonds to protect the carriers in the event that the new rates were upheld, paid the old rate with the understanding that the difference between the new and the old charge should be refunded in case the new one was not upheld. As soon as the Supreme court affirmed the commission's decisions, the railroad applied for

permission to make immediate refunds. Ordinarily, the commission's stringent rule that refunds must be passed upon by the commission after being submitted on regular blanks would have applied. The Southern Pacific has also exhibited remarkable generosity in another way. When the advanced rate was first published, a number of friendly shippers paid it without protest and never filed claims, which, under the law, are now outlawed by the statute of limitations. The Southern Pacific, however, has applied for permission to refund excess charges to these shippers, too.

Bad Storm in the East.

A severe blizzard, which brought with it an extremely heavy snowfall, demoralized railroad traffic and seriously interfered with business generally, in the East, on Monday and Tuesday of this week. The storm was most severe in New York and Philadelphia, and the district between, and in this part of the country railroad business was practically at a standstill for a time. For example, there was a space when the Pennsylvania Railroad had no wheels moving between New York and Philadelphia, and trains scheduled for departure were held in the station for many hours, waiting until the line could be opened. With the middle of the week, rising temperatures speedily relieved the situation.

Louisville & Nashville R. R. Reduces Passenger Fares in Kentucky.

The Louisville & Nashville R. R. has announced that passenger fares within the state of Kentucky will be reduced from 3 to 2½ cents per mile, effective possibly by April 1 and certainly not later than May 1, according to the announcement. The reduction will apply to all lines operated by the L. & N. for its own account, except a few branches and new lines, not specified in the announcement, but on which the passenger business does not pay now or is conducted at a loss. The determination of the company, it is set forth, is voluntary and taken "in order to equalize the rates in its home state with the rates effective or to be made effective on or before the date mentioned," in Tennessee or Alabama. The company does not withdraw from its contention that its 3-cent fare is "not wholly remunerative and is not unfair to the public;" but applies the lower rate "in deference to public opinion," in fulfilling promises heretofore given that Kentucky would fare as well as other states and in the "hope that increased volume of traffic will save material losses." There is a bill pending in the Kentucky legislature which would stipulate a 2-cent passenger rate on all railroads in Kentucky.

New Jersey Railroads Petition for Repeal of Full-Crew Law.

Railroads of the state of New Jersey have petitioned the legislature to repeal the state full-crew law, which makes the number of cars in a train the determinant of the size of the train crew. The letter states that the respective companies are facing a financial crisis "such as has not been experienced in this part of the country in the last 25 years." Already, according to the petitioners, this law, which was enacted last year, has caused a wasteful expense equivalent to the interest on at least \$7,394,607 of capital stock, and without increasing safety. The actual expense to the companies has been \$295,784. The petition for the repeal is signed by the following railroad presidents: Samuel Rea, Pennsylvania and West Jersey & Seashore railroads; W. H. Truesdale, Delaware, Lackawanna & Western; F. D. Underwood, Erie; E. B. Thomas, Lehigh Valley; George F. Baer, Philadelphia & Reading and Central Railroad of New Jersey; A. H. Smith, New York Central, and J. B. Kerr, New York, Ontario & Western. The railroad executives point out that their companies pay to the state annually \$7,513,413 in taxes, "more than one-half the sum expended for public schools" in New

Jersey, and that they also pay annually in wages to citizens of New Jersey approximately \$47,671,481.

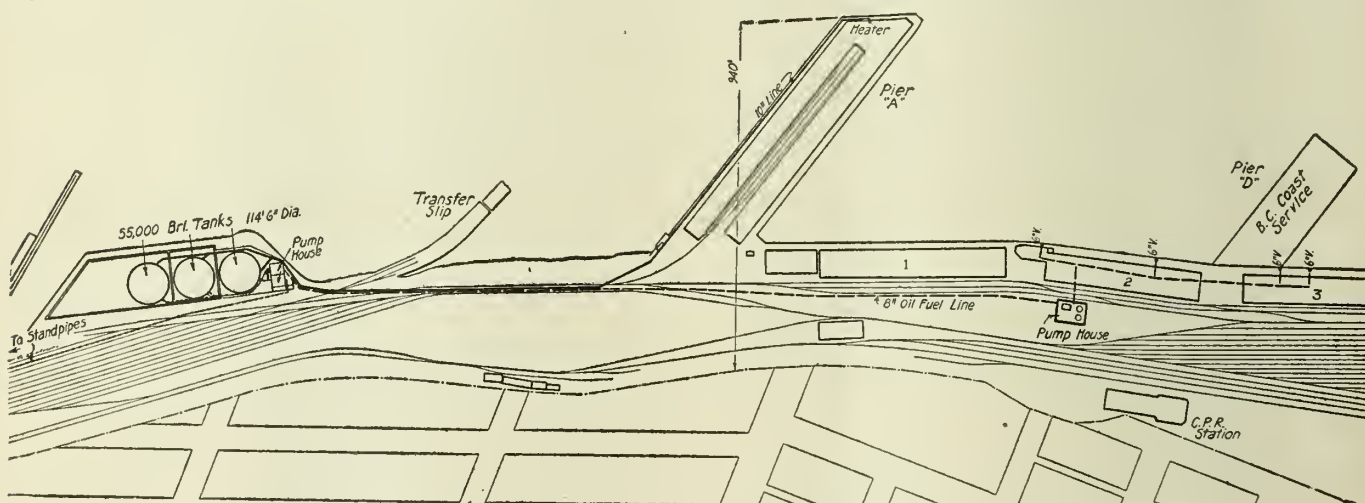
Steel Rebate Charges Farcical.

In pursuance of the recent resolution of the United States senate directing the Interstate Commerce Commission to investigate the charge that the United States Steel Corporation has been receiving rebates from railroads, a hearing was held in Washington, D. C., March 2. Commissioner Harlan, who presided, examined David Lamar, of New York, and William H. Green, of Creighton, Neb., upon whose allegations the Senate based its action. The resolution did not require the commission to make a formal investigation unless this was warranted in its preliminary inquiries. The session was entirely devoid of sensational developments. Green testified he had no personal knowledge and presented David Lamar as a witness. Mr. Lamar then gave what purported to be a history of the organization of the United States Steel Corporation and the names of industrial and other railroad lines controlled by it and then proceeded to read copiously from Commissioner

ing fare to railroads, unless the courts shall declare invalid the law of the state prescribing a free pass list. This ruling is at variance with the policy recently enunciated by the Interstate Commerce Commission, and has placed pass holders in a peculiarly embarrassing situation. On the one hand the state's legal representative has pointed out their obligations not to pay their fare, while on the other hand the railroads have threatened suits should they refuse, and in some instances have ejected holders of passes for their refusal. It is said the railroads are planning an appeal to the legislature setting forth the embarrassing position in which they are placed by the conflicting rulings of the Interstate Commerce Commission and the state.

Central Railway Club.

The March meeting and annual dinner of the Central Railway Club will be held at the Statler hotel, Buffalo, N. Y., Thursday, March 12. The executive committee will meet at 10 a. m. and transact such business as may require attention,



Receiving Dock and Storage Tanks on Burrard Inlet, Fuel Oil Installations, Canadian Pacific Ry.

Harlan's opinion in the industrial lines case and also from the petition filed by the department of justice in the dissolution proceedings now pending. This was the extent of the evidence offered.

Future of the Express Business.

Express companies have sent the following letter to express company operatives throughout the United States: "The establishment and extension of the government parcel post has checked if not actually reduced the company's gross earnings, and a question of great moment is presented by the recent order of the interstate commerce commission materially reducing express rates on Feb. 1, 1914. While a most careful study has been made, it is impossible, on account of the magnitude of the task, for any one to determine in advance what effect the new rates will have on the company's revenues during the course of the year. The most sanguine expectations, however, are entertained as to results. This is the express situation today, and the question is being asked by every employee, What is the future of the express business in this country? So long as express service is a material factor in furthering commercial progress, just so long will shippers and the public see to it that that service is retained. Success in this direction will rest very largely upon the individual efforts of employees."

Pass Situation in New Jersey Confused.

Attorney General Wescott, of New Jersey, has given to State Controller Edwards an opinion that it is the duty of all state officers and employees holding passes to resist pay-

without interfering with the club meeting at 2 p. m. The feature of the business session in the afternoon will be the annual report of the standing committee on rules of interchange, Mr. W. H. Sitterly, chairman. The annual dinner will be held at 7:30 p. m. Among the speakers and guests, will be Messrs. B. D. Caldwell, president of the Wells, Fargo & Co.; George A. Post, president of the Railway Business Association; D. I. Roberts, president of the United States Express Co.; Major Charles Hine, former vice-president of the Southern Pacific Co., and W. T. Noonan, president, Buffalo, Rochester & Pittsburgh R. R. Mr. Caldwell will be toastmaster, and in addition to a musical program there will be addresses by Mr. Post, Mr. Roberts and Major Hine.

Pennsylvania R. R. Believes Holding of Norfolk & Western Ry. Is Legal.

The United States department of justice has been looking into the relations between the Pennsylvania Railroad and the Norfolk & Western Ry. with the idea of effecting a separation of the two roads or bringing suit under the Sherman anti-trust act. The opinion of department officials is that the two roads are competitive. The Pennsylvania owned on Jan. 1, 1913, \$41,762,900 common and \$11,320,000 preferred Norfolk & Western stock. On Oct. 31, 1912, the outstanding stock of the Norfolk & Western was given as \$120,312,400. The department has had an eye on the connection between these two roads for several months. Recently representatives of the Pennsylvania were told that the department looked upon the roads as competitors and

suggestion was made that Attorney General McReynolds would like to see a separation. No assurances were given the department at that time and none have been given since, that the Pennsylvania intends to give up its Norfolk & Western stock.

On the other hand, President Rea, of the Pennsylvania, issued a statement, on February 28, in which he makes it clear that his company will allow the courts to determine the legality of any attempt on the part of the government toward forcing a dissolution of the two systems. Mr. Rea said:

"Last year the attorney general intimated his view that the ownership of Norfolk & Western Ry. stock by the Pennsylvania Railroad and affiliated companies was legally open to question. This was regarded by the board of directors of the Pennsylvania Railroad as imposing upon them the duty of most carefully reconsidering the question of the legal right of the company to hold these shares, as this company would greatly regret engaging in any controversy with the department of justice. Not only the company's own counsel, but also independent counsel were requested to review the whole case and to give their opinion as to the legality of the company's position.

"Having carefully considered the matter, the directors of

the Pennsylvania Railroad found themselves in this position: As a business proposition, they were convinced that a sale of these shares would be detrimental to the interests of the company's stockholders. As a matter of experience and general policy, they were convinced that the relations between the Pennsylvania and the Norfolk & Western systems were as essential and beneficial to the public they served as they were to the companies themselves. As a matter of law, they were advised by counsel that these holdings were proper.

"As trustees, therefore, for the 89,000 shareholders of the Pennsylvania Railroad, the directors felt that in the absence of an authoritative determination by the courts, they would not be justified in gratuitously resolving adversely to the interests of the shareholders the doubt intimated by the attorney general as to the legality of the ownership. The directors thereupon took action accordingly, which was promptly communicated to the attorney general, with assurances that if the department of justice should finally determine that it was properly required to institute legal proceedings, this company would co-operate with the department in any steps the department might deem appropriate to secure a prompt determination by the Supreme court of the United States, of the law governing this situation."

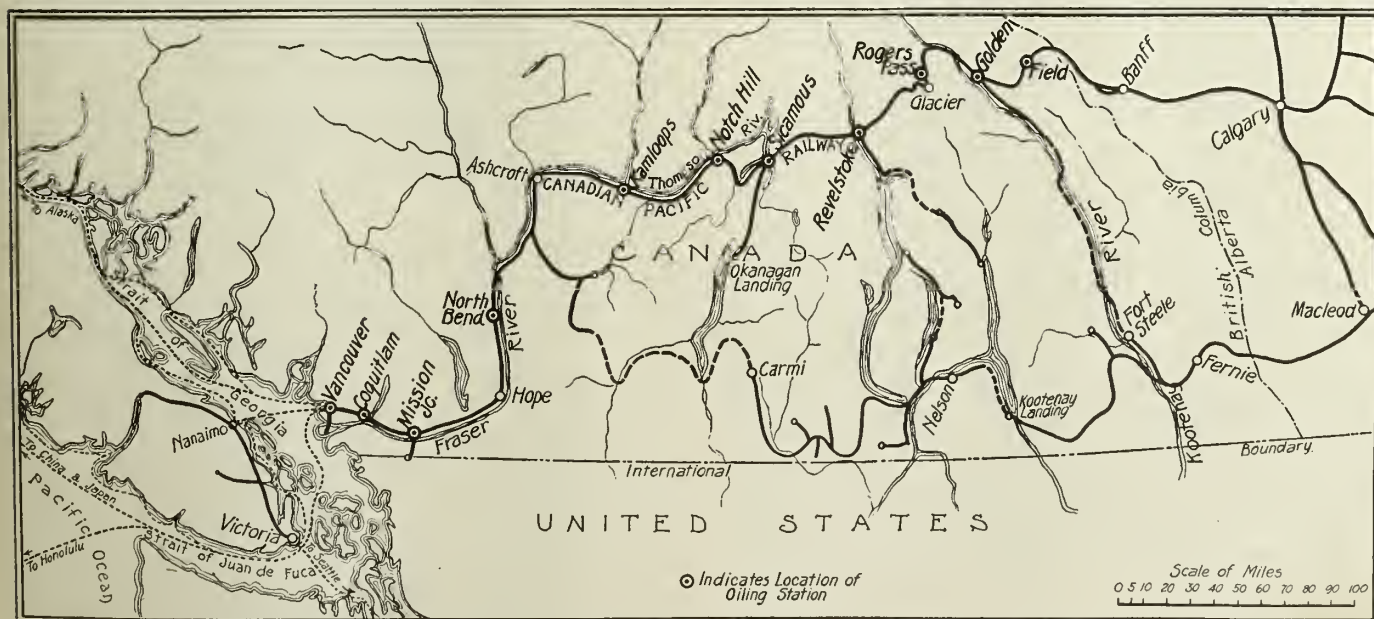
Fuel Oil Storage and Distributing Facilities, Canadian Pacific Ry.

SYNOPSIS.—The Canadian Pacific Ry. has, during the past two years, converted the locomotives operating on 500 miles of its main line in British Columbia from coal to oil burners. Fuel oil is brought by boat from southern California to the road's docks at Vancouver, B. C., at which point the main storage reservoirs are located and from which it is distributed by means of tank cars to the several distributing stations along the route.

In common with other roads operating in the Pacific Coast territory west of the Rocky Mountains, the Canadian Pacific Ry. has adopted crude oil as fuel for its locomotives in order that the fire risk in the timber preserves through which it passes, may be lessened. This decision was arrived at in the spring of 1912, the road at the same time determining also to convert its coast-wise steamers into oil burners. The contract for the oil supply was ac-

cordingly let to the Union Oil Co. of California, which company proceeded to erect a 55,000 barrel storage tank on the railroad company's waterfront property on Burrard Inlet at Vancouver. During the summer of 1912, the road established a series of oil supply stations at convenient points on its main line between Kamloops and Field, B. C., comprising the Mountain and the Shuswap subdivisions.

Extensions to these facilities were made in 1913, to the end that fuel oil distributing and storage plants were provided, covering also the Columbia division, between Vancouver and North Bend, the result being that the entire British Columbia grand division between Vancouver and Field, with the exception of that portion of the line lying between North Bend and Kamloops, on which coal burners are used, is equipped for oil burning locomotives. In keeping with these extensions, the Union Oil Co., during 1913, erected two additional 55,000 barrel stor-



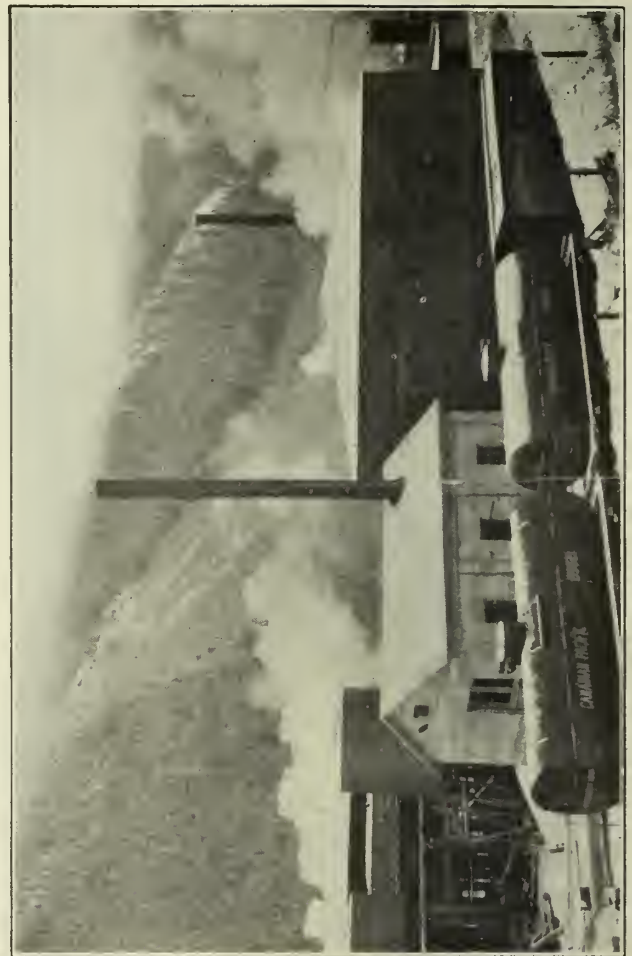
Map of Canadian Pacific Lines in British Columbia Showing Location of Fuel Oil Stations.

age tanks at Vancouver, making its present storage capacity at that point 165,000 barrels. The distributing stations thus far established by the road, with their respective storage capacities are as follows:

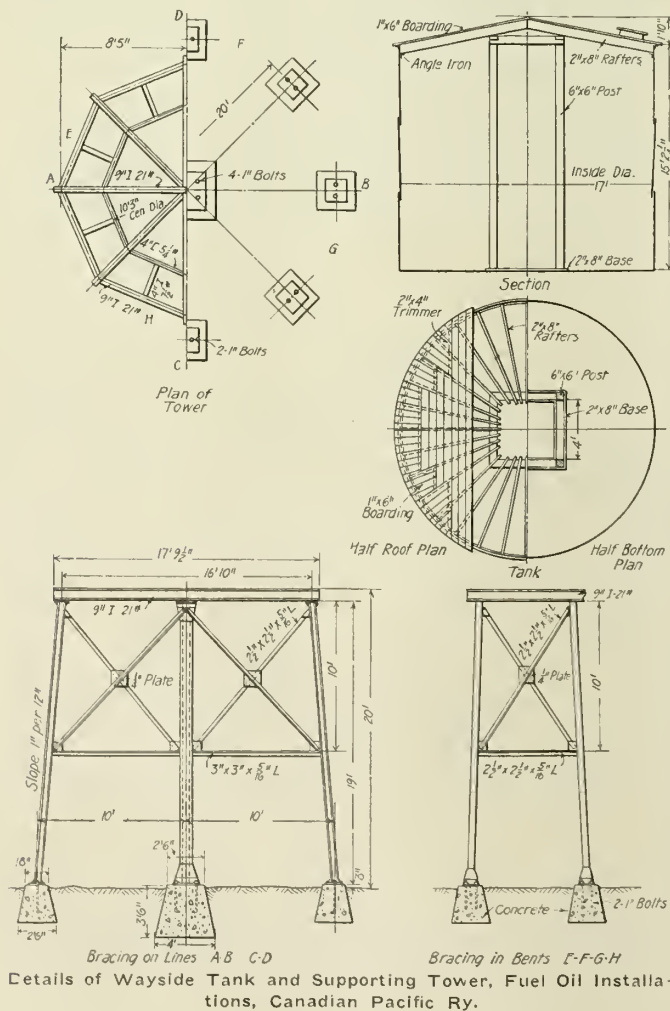
Vancouver.....	Two	1000 bbl. tanks for boats in coast service.
	One	1000 bbl. roadside tank at engine terminal.
Coquitlam	One	22,000 bbl. storage tank.
	One	600 bbl. roadside tank.
Mission Junction	One	600 bbl. roadside tank.
North Bend	One	15,000 bbl. storage tank.
	One	600 bbl. roadside tank.
Kamloops	One	15,000 bbl. storage tank.
	One	600 bbl. roadside tank.
Notch Hill	One	1000 bbl. storage tank.
Sicamous Junction	One	600 bbl. roadside tank.
Revelstoke	One	22,000 bbl. storage tank.
	One	600 bbl. roadside tank.
Rogers Pass	One	15,000 bbl. storage tank.
	One	600 bbl. roadside tank.
Golden	One	600 bbl. roadside tank.
Field	One	15,000 bbl. storage tank.
	One	600 bbl. roadside tank.

There are thus a total of ten roadside stations supplying oil to locomotives in addition to the two 1000-bbl. service tanks at Vancouver for the benefit of coast-wise steamers, and seven storage tanks at the various distributing stations for holding reserve supplies for locomotives. The location of the various oiling stations is indicated in the accompanying map of the Canadian Pacific lines in British Columbia.

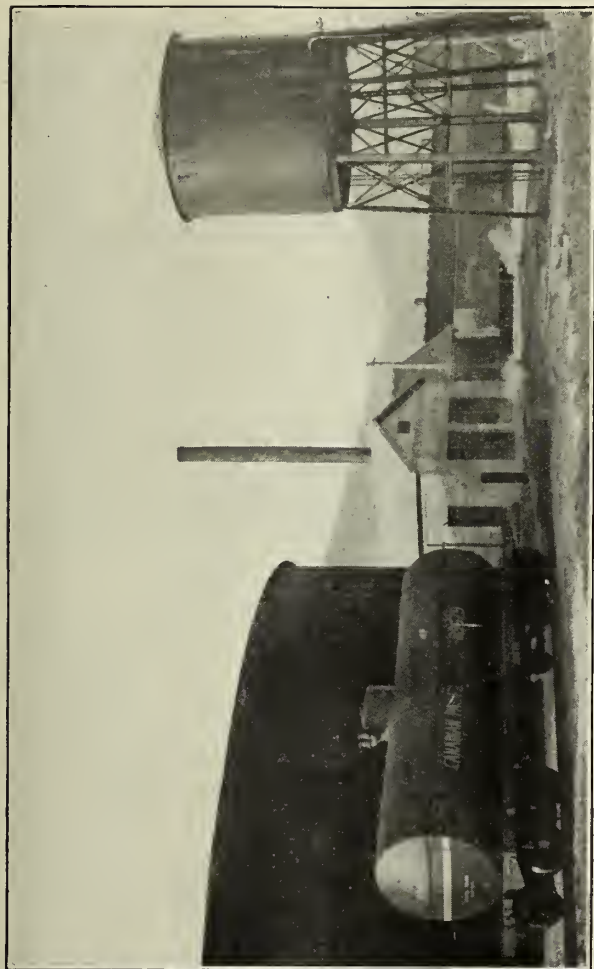
In unloading the tank steamers on arrival at the docks in Burrard Inlet, the oil is pumped to the 55,000-bbl. storage tanks



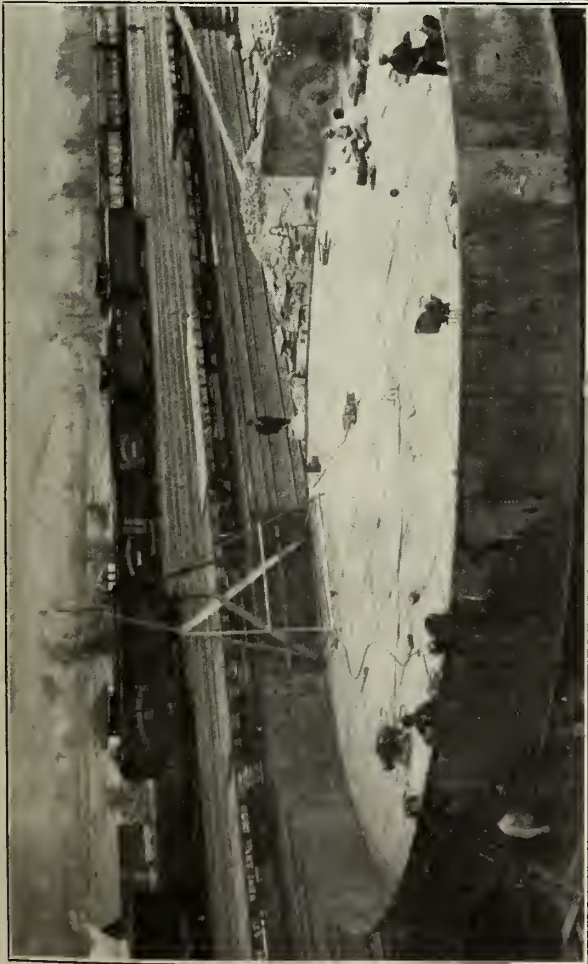
Pump House, Storage and Wayside Tanks at Field, Fuel Oil Installations, C. P. Ry.



Wayside Tank Under Construction at Golden, Fuel Oil Installations, Canadian Pacific Ry.



Pump House, Storage and Wayside Tanks at Revelstoke, Fuel Oil Installations, Canadian Pacific Ry.



Storage Tank Under Construction at Kamloops, Fuel Oil Installations, Canadian Pacific Ry.



Structural Support for 1000-Barrel Tank at Notch Hill, Fuel Oil Installations, Canadian Pacific Ry.

through a 10-inch pipe line reaching to the outer end of the pier, by means of pumps aboard the oil company's steamers. During the winter season, the oil, before entering the pipe, is passed through a heater, into which steam is admitted, in order to improve its flowing qualities. The length of the 10-inch pipe line from the end of the pier to the main storage tanks, is approximately 2500 feet. For the boat service, the oil is again pumped from the large storage tanks, through an 8-in. pipe line, to two 1000-bbl. measuring tanks. From these latter tanks the oil is again pumped into pipe line along the front of the docks to the different steamer berths, and conducted on board steamers through heavy oil hose. The pumping equipment for the boat service consists of a 500 barrel per hour 9 by 12-inch Duplex, plunger and ring pump, making 27 strokes per minute and driven by a 35 h. p. motor, which pumps the oil from the measuring tanks into the pipe line on the docks. The pump taking oil from the large storage tank into the measuring tanks is a 500 barrel per hour Fairbanks-Morse duplex compound Coalinga type steam driven pump, 15 by 24 by 6½ by 18 ins. in size and making 34 strokes per minute.

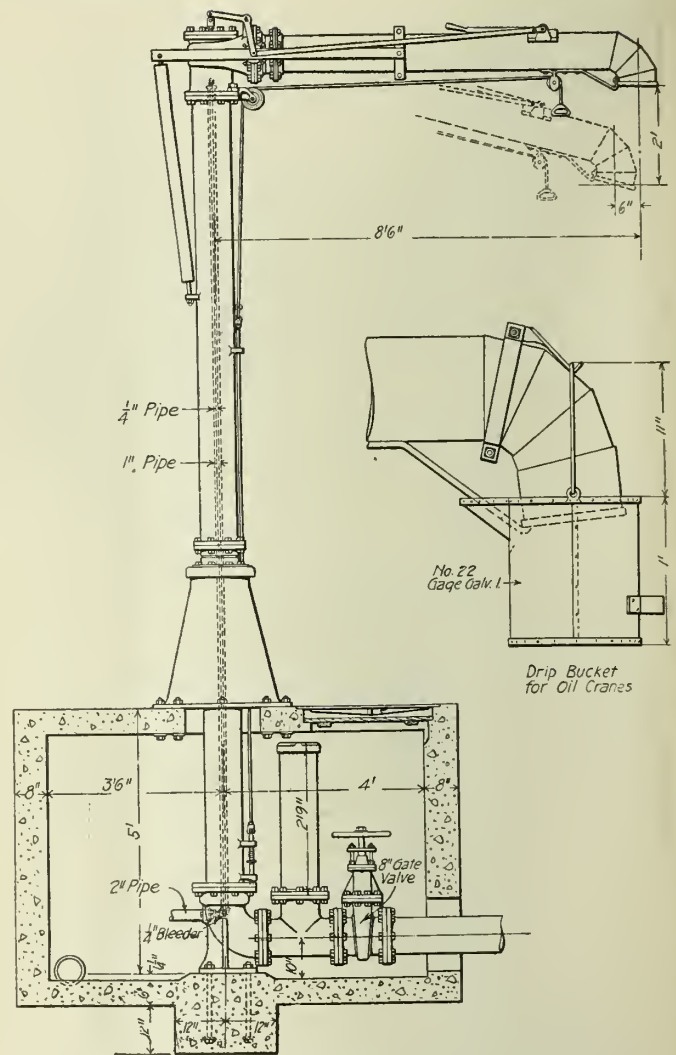
For transporting oil from Vancouver to the different stations along the line, tank cars holding approximately 240 barrels each are used. Between two sidings in the vicinity of the storage tanks, eight standpipes are erected to which the oil is pumped through a 6-inch line from the storage tanks into the cars. For this service a Dow 500 barrel per hour steam driven pump is used. At the terminal points for each subdivision, large storage tanks of fifteen or twenty-two thousand barrels capacity have been erected. The tank cars are unloaded into concrete catch pits as shown in the illustration, from which oil is again conducted into a large concrete sump, also shown. The smaller catch pits are located in such a way that three tank cars can be spotted and unloaded without uncoupling.

From the large sump the oil is pumped into the large storage tanks, and again, as necessity demands, pumped from these

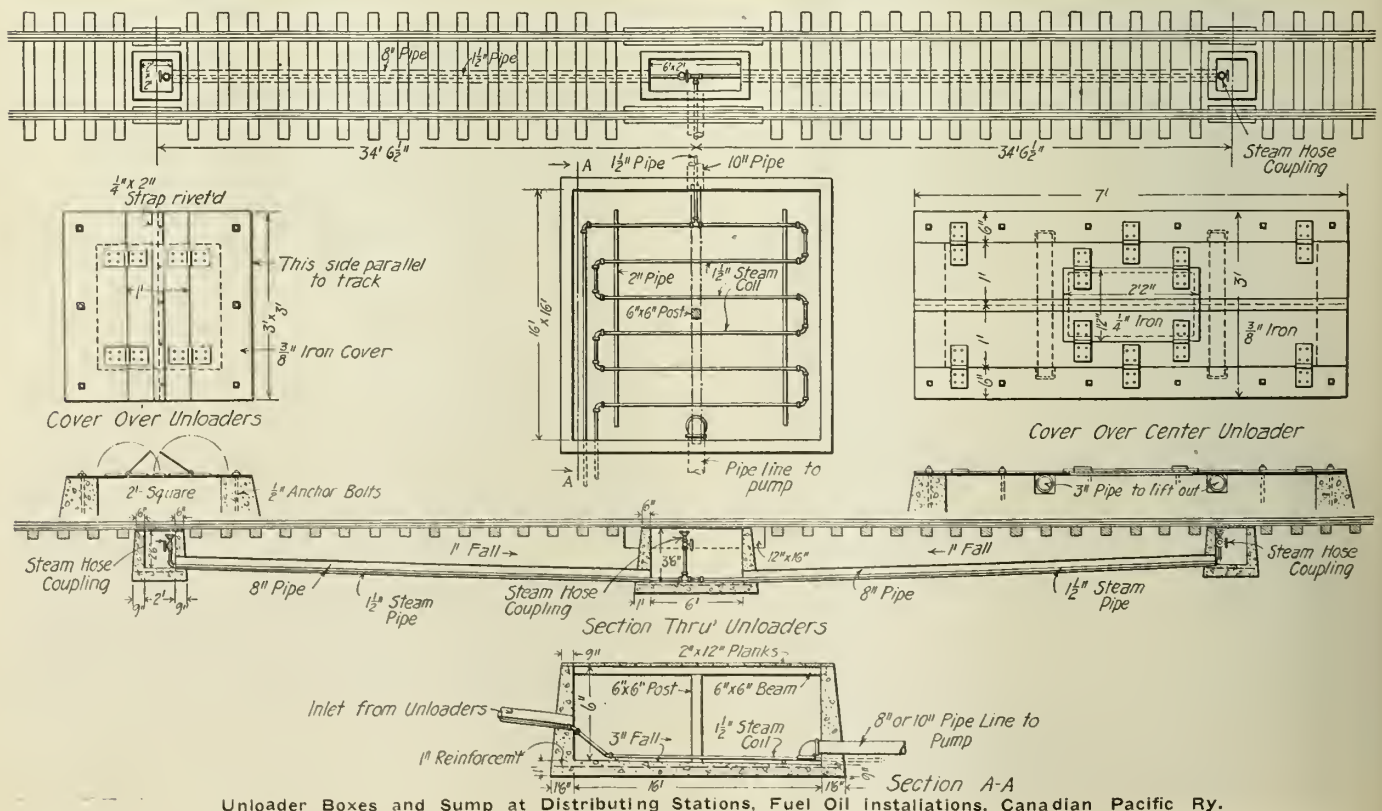
into 600 barrel roadside measuring tanks, set on structural steel towers. From the roadside measuring tanks, the oil feeds by gravity through standpipes into the engine tenders. The standpipes adopted are of the Snow pattern, and are set up on concrete pits as illustrated. In order to avoid spilling oil, drip buckets have been put on all oil stand pipes. The oil standpipes are located in such a way, with respect to water standpipes, that only one stop is necessary for taking both oil and water. The quantity of oil taken for each engine is measured in the tender oil tank, and daily checks on the total quantity of oil taken at each fuel station are made by gaging the measuring tank, which in each case is calibrated for volume, a table of contents being furnished each man in charge of a pumping station. At the intermediate pumping stations, the large storage tanks are dispensed with, the oil being pumped directly into the measuring tanks.

At the larger pumping stations, pumping equipment in each case consists of 12 by 6 by 12-in. duplex plunger and ring Worthington steam pumps, 100 per cent valve area. At the smaller stations the pumps are of the same variety, 9 by 5 by 10 ins. in size. For feeding oil to the stationery boilers in the pumping stations, duplex oil sets 3 by 2 by 3 in., Worthington type, are used, being either double or single as may be required for the horse power of the boiler installed. At the terminal points where compressed air is available, it is used for the atomizing of oil when starting fires. After steam has reached sufficient pressure, the air is cut off and steam substituted. At each of the smaller stations where air is not available, small vertical boilers have been installed in the pump houses, so that it is not necessary to fire the locomotive boilers with wood in order to generate enough steam for atomizing while the fires are being started. The use of wood for this purpose has been found injurious to the fire brick setting in the fire boxes of the boilers. The burners used in the boilers are of the Schurs type, and have been found very satisfactory for the heavy California oil being used. Owing to the viscosity of the oil, sharp bends in all pipe lines have been avoided, pipes having been bent in preference to putting in elbows and long sweep fittings having been used wherever possible.

Owing to the severe winter weather prevailing between North



Oil Columns at Distributing Stations, Fuel Oil Installations, Canadian Pacific Ry.

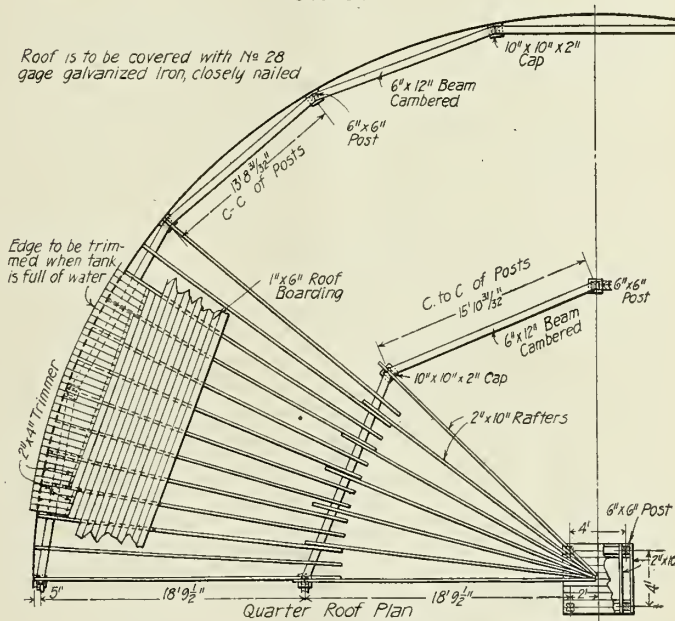
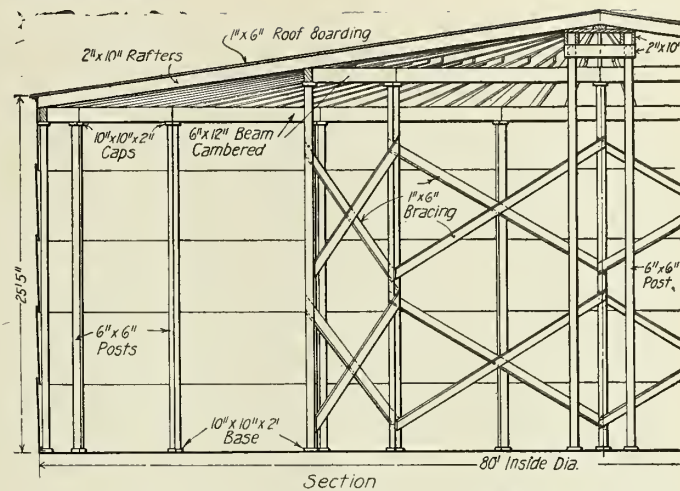


Unloader Boxes and Sump at Distributing Stations, Fuel Oil Installations, Canadian Pacific Ry.

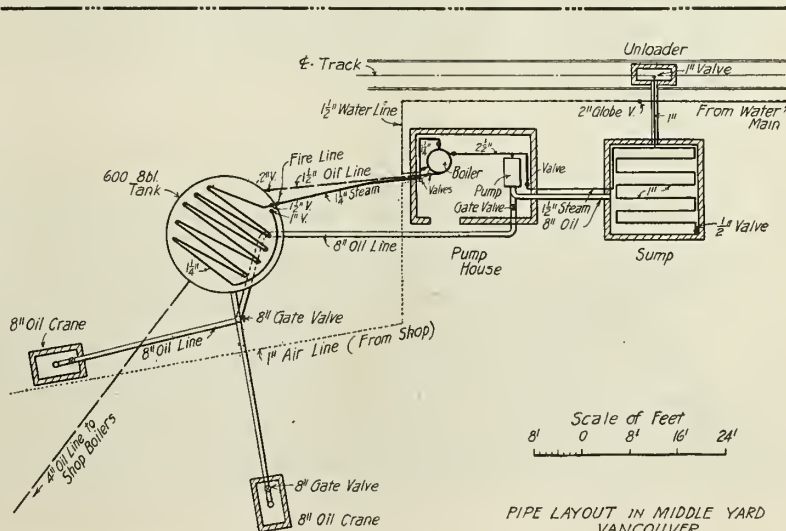
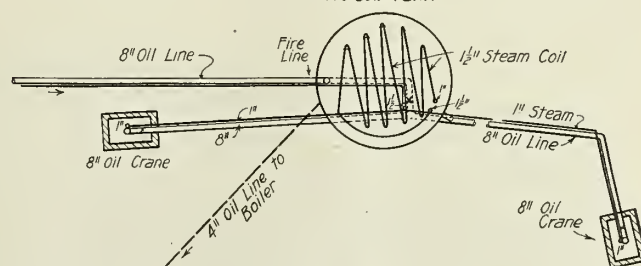
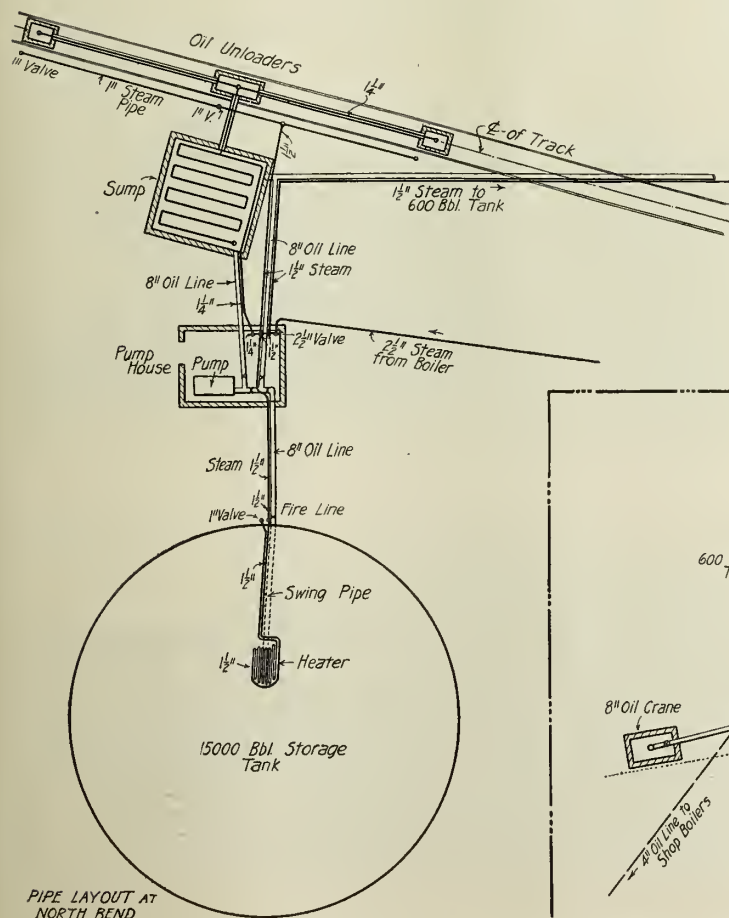
Bend and Field, it was found necessary to provide means for heating the oil to make it flow readily. All tank cars are supplied with steam coils, and when over the catch pits, steam hose is attached in order to increase the fluidity of the oil. Steam is supplied in each case from the oil pump house, and cars are thawed out in a very short time. Steam coils are also provided for in the large sumps, and in bottoms of tanks as shown. In the smaller measuring tanks the whole volume of oil is heated. In the large storage tanks, however, it was not found necessary to heat the whole volume of oil. It is taken out of the tanks through a swing pipe which is always kept about 18 ins. from bottom of the tank. A cradle of steam coils was built to heat the oil in the immediate vicinity of the suction end of the swing pipe only, providing a system which thus far has not given any trouble. At the bottom of oil tanks, drain valves are provided in order to drain off the water which collects at the bottom of the tanks.

For fire protection, steam lines are laid from the boilers in the pump houses up to tops of the tanks, discharging under the roofs, so that fire on top of the oil can be smothered immediately. The roofs for the tanks are of wooden construction, and are covered with Johns-Manville asbestos roofing, as are also the roofs of the pump houses. As there is only one pump at each fuel station, suction and delivery between the receiving sump and the storage tanks, and between the storage tank and the measuring tank, is arranged through a manifold in the pump house. A relief valve is provided in the manifold in order to guard against the danger of injuring the pumps or the piping through excessive pressure when, perchance, the valves are so adjusted as to otherwise offer this possibility.

The installations above mentioned were made under the direction of Mr. H. Rindal, division engineer of the Canadian Pacific Ry. at Vancouver, B. C. Mr. J. G. Sullivan is chief engineer of the Western lines of this system with office at Winnipeg, Man.



Construction of 20,000-Barrel Storage Tanks.
600 Bbl. Tank



Typical Pipe Layouts at Distributing Stations, Fuel Oil Installations, Canadian Pacific Ry.

Pacific and Mountain Type Locomotives, C. R. I. & P. Ry.

SYNOPSIS.—The following, in addition to being a descriptive account of recently constructed heavy passenger engines of strictly modern design, gives test data showing the very appreciable extent to which operating costs have been reduced by their use.

Recent developments in railroad transportation have demonstrated that the most efficient way to handle heavy traffic is by means of powerful locomotives and in large train loads. Powerful operating units, having demonstrated their ability to reduce operating costs in freight service, have attracted the attention of motive power officials to their heavy passenger service. Remarkable reductions in operating costs have been acquired by the Rock Island lines by the adoption of heavy Mikado locomotives. This policy was the direct cause of putting into passenger service, thirty large and powerful Pacific type locomotives and two of the heaviest Mountain type locomotives ever built, which have recently been delivered to the Rock Island lines by the American Locomotive Co.

The Pacific type engines are operating at present between the following points:

	Max. grade per mile.
Rock Island, Ill., to Valley Jct., Ia.....	58 ft.
Valley Jct., Ia., to Council Bluffs, Ia.....	69 ft.
Phillipsburg, Kan., to Goodland, Kan.....	53 ft.
Goodland, Kan., to Limon, Colo.....	53 ft.
Rock Island, Ill., to Trenton, Mo.....	79 ft.
Herington to Liberal, Kan.....	42 ft.
Liberal, Kan., to Tucumcari, N. M.....	53 ft.

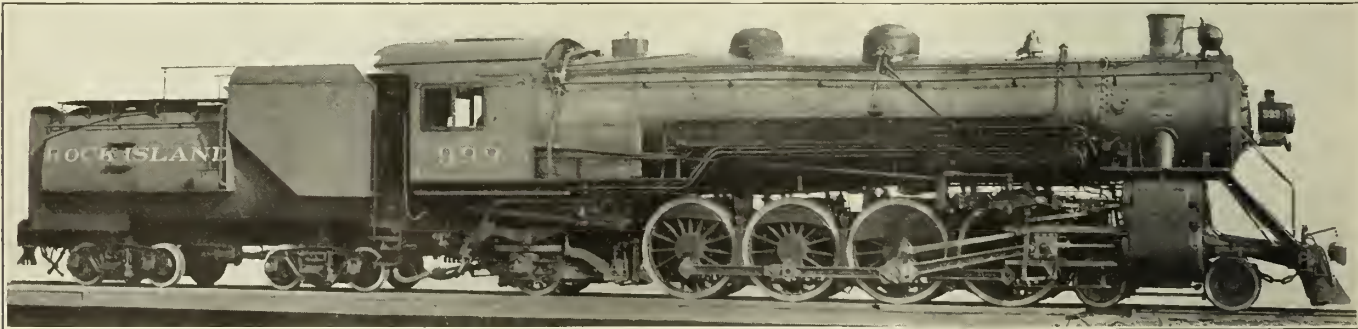
From Phillipsburg, Kan., to Limon, Col., is a constant up-hill pull 247 miles long. The ruling grades are 53 feet to the mile. Several test trains were run to determine the capacity of these Pacific type locomotives. The accompanying tables show the results as compared with the carded time of several regular trains.

No difficulty was experienced in maintaining full boiler pressure at all times. The locomotives steamed very freely and very little black smoke was emitted at the stack. The maximum cut-

off was 16 inches, and the locomotives were worked there only for short distances, nearing the apex of severe grades. Except for hard pulls, the locomotives were generally worked at 6 to 8

Iowa Division; Westbound and Eastbound. Between Davenport and Valley Junction, Ia. Distance 178.9 miles, maximum grade 58 ft. per mile.									
Carded time.					Actual tests.				
	Train 5 Westbound	Train 7 Westbound	Train 8 Eastbound	Test 1 Westbound	Test 2 Westbound	Test 3 Westbound			
Running time, hrs.—min....	5:16	4:34	4:47	4:47	5:07	4:49			
Number of stops.....	10	4	4	4	12	8			
Schedule speed m. p. h....	31.7	37.3	35.4	32.1	29.2	31.7			
Running speed m. p. h....	34.2	39.3	37.8	37.6	35.2	37.3			
Number of cars.....	11	8	8	12	13	13			
Avg. wt. per car, tons.....	62.0	65.6	63.5	75.0	58.0	63.3			
Train tonnage, exclusive of lading	682	525	508	900	755	827			

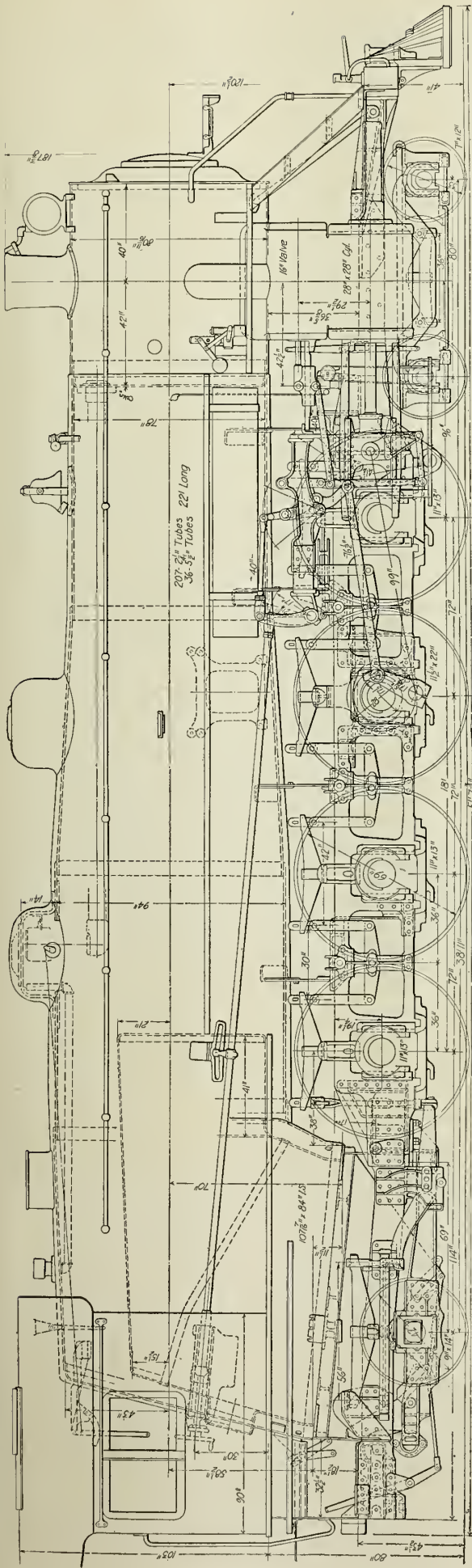
Between Valley Junction, Ia., and Council Bluffs, Ia. Distance 136.6 miles, maximum grade 69 ft. per mile.									
Carded time.					Actual tests.				
	Train 5 Westbound	Train 7 Westbound	Train 8 Eastbound	Test 4 Westbound	Test 5 Westbound	Test 6 Eastbound			
Running time, hrs.—min....	3:47	3:27	3:33	3:24	3:43	3:37			
Number of stops.....	3	1	1	3	5	3			
Schedule speed m. p. h....	34.0	38.7	37.6	37.4	34.1	33.6			
Running speed m. p. h....	36.0	39.6	38.4	40.2	36.7	37.8			
Number of cars.....	11	8	8	12	15	13			
Avg. wt. per car, tons.....	62.0	65.6	63.5	75.0	57.5	63.3			
Train tonnage, exclusive of lading	682	525	508	900	865	824			



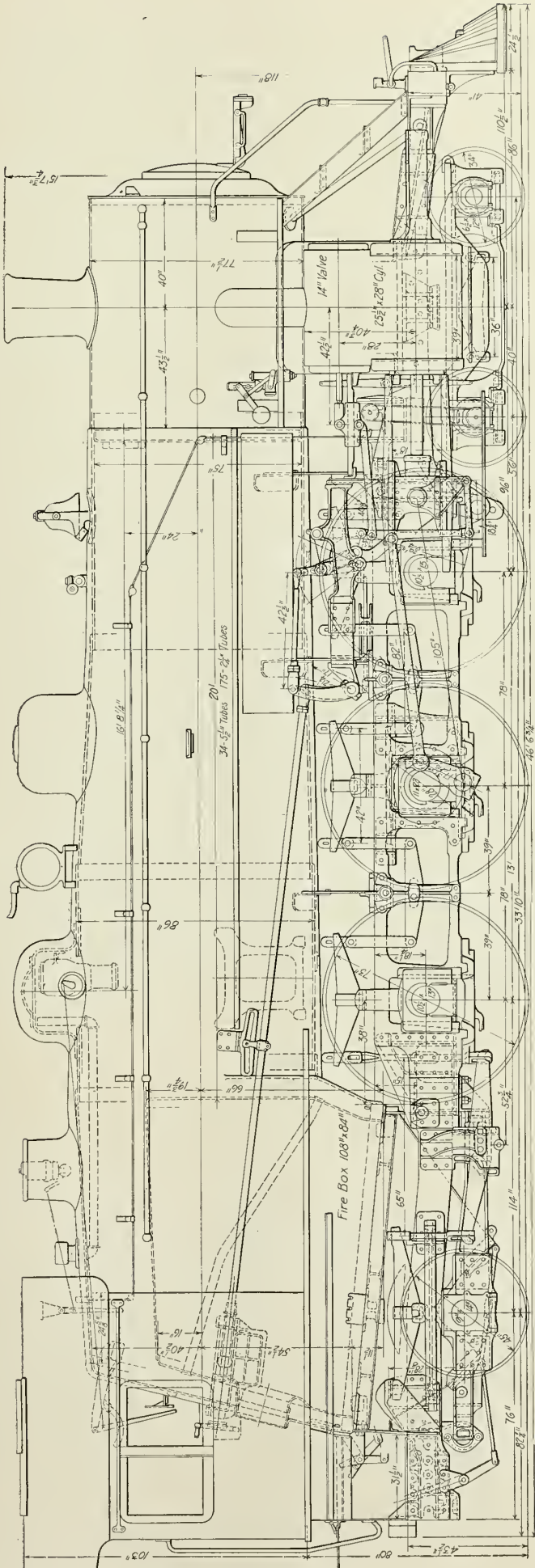
Mountain Type Locomotive, Chicago, Rock Island & Pacific Ry.



Pacific Type Locomotive, Chicago, Rock Island & Pacific Ry.



Elevation, Mountain Type Locomotive, Chicago, Rock Island & Pacific Ry.



Elevation, Pacific Type Locomotive, Chicago, Rock Island & Pacific Ry.

inch cut-off. The handling of air was satisfactory, no discomfort being experienced by passengers in rear cars of these long trains from this cause.

While no extensive tests have been conducted to determine economy on fuel and water of the new Pacifics, it was the opinion of the engine crews on these heavy trains that there was no increase over the older Pacific types. Had it not been for the introduction of these new locomotives on this line at this time, it would have been necessary to either double-head or operate in two sections. By the use of the Mountain type locomotives, the Rock Island has been enabled to consolidate the Chicago and St. Louis sections of one of the Colorado trains between Phillipsburg and Limon. This has effected a saving of 180,310 passenger train miles per annum.

At present, these combined trains consist of 10 to 13 cars, which can be satisfactorily handled by the new Pacifics, except in extreme weather. Therefore, there has been no opportunity as yet to test the Mountain type to its full capacity. However, it is anticipated that they will handle trains of 1000 tons weight in 16 cars on the schedule time of these combined trains without difficulty. Their consist, under normal conditions, will be 15 and 16 cars, largely steel equipment, which the Mountain type locomotives will ably handle over the 247 mile one-per-cent grade constant up-hill pull westbound from Phillipsburg to Limon. Westbound this combined train has 9 scheduled stops and 20 flag stops between these two points, which make the Mountain type more efficient than the new Pacific type on account of their greater starting effort.

In general construction the designs embody the latest approved practice and follow the standards of the builders. Each design is equipped with a superheater, brick arch, screw reverse gear, extended piston rods, long main driving boxes, Woodard engine truck, speed recorder, Baker valve gear, Chambers throttle, the Mudge-Slater smokebox arrangement and vanadium cast steel frames. The Mountain type is also equipped with the Foulmer main rod, and engine and tender were arranged so that the Street stoker can be applied later if desired.

These designs are the product of the long experience of the American Locomotive Co. in the development of powerful locomotives. The application of this experience to the railroad's specific requirements was directed by the officials of the motive power department, to whose valuable co-operation in the preparation of the designs the success of the locomotives is largely due. They furnish another striking example of reduced operating costs which have been obtained by combining fuel saving

Colorado Division, Westbound.

Between Phillipsburg, Kan., and Goodland, Kan.
Distance 139.9 miles, maximum grade 53 ft. per mile.

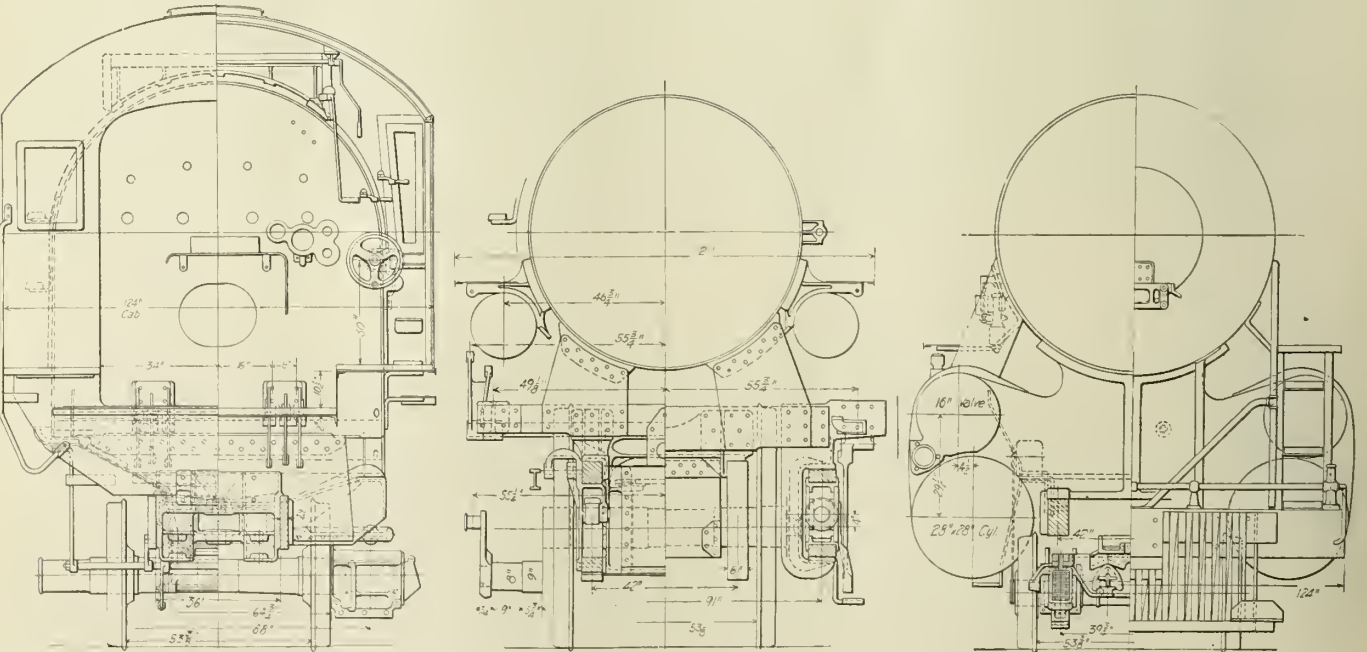
	Carded time.			Actual tests.		
	Train 5	Train 7	Test 8	Test 9	Test 10	Test 11
Running time, hrs.—min....	4:04	3:09	3:40	3:42	3:54	3:52
Number of stops.....	2	1	2	4	7	4
Schedule speed m. p. h....	32.9	43.0	35.9	28.6	33.3	33.7
Running speed m. p. h....	34.3	44.4	38.0	37.8	35.8	36.2
Number of cars.....	10	8	12	14	15	15
Avg. wt. per car, tons....	62.0	65.6	75.0	53.6	56.3	58.0
Train tonnage, exclusive of lading	620	525	900	750	844	870

Between Goodland, Kan., and Limon, Col.
Distance 107.1 miles, maximum grade 53 ft. per mile.

	Carded time.			Actual tests.		
	Train 5	Train 7	Test 12	Test 13	Test 14	Test 15
Running time, hrs.—min....	3:25	2:40	3:10	2:41	3:12	2:56
Number of stops.....	1	1	1	1	5	5
Schedule speed m. p. h....	30.5	38.9	32.4	34.8	31.0	25.5
Running speed m. p. h....	31.4	40.1	33.8	39.9	33.4	36.5
Number of cars.....	10	8	12	14	15	15
Avg. wt. per car, tons....	62.0	65.6	75.0	53.6	56.3	58.0
Train tonnage, exclusive of lading	620	525	900	750	844	870

Missouri Division, Westbound.

	Davenport to Eldon—Distance 111.6 miles		Eldon to Trenton Distance 121.5 miles	
	Carded time	Actual test	Carded time	Actual test
	Train 1	Test 16	Train 1	Test 17
Running time, hrs.—min....	2:40	2:40	3:08	3:19
Number of stops.....	4	6	3	3
Schedule speed m. p. h....	38.2	38.5	36.5	34.2
Running speed	41.8	41.8	38.8	36.4
Number of cars.....	6	14	6	14
Avg. wt., per car, tons....	65.0	66.6	65.0	66.6
Train tonnage, exclusive of lading	390	933	390	933



Cross Sections, Mountain Type Locomotive, Chicago, Rock Island & Pacific Ry.

devices and improved designing in a larger and more powerful operating unit.

The leading features of these locomotives are indicated in the following table:

Type	4-6-2	4-8-2
Service	Passenger	Passenger
Cylinders	25½ by 28 ins.	28 by 28 ins.
Valves	Piston	Piston
Valve gear	Baker	Baker
Tractive power	40,260 lbs.	50,000 lbs.
Boiler, type	Ext. wagon top	Wagon top
Min. diameter	76¾ ins.	78 ins.
Working pressure	190 lbs.	185 lbs.
Fire-box, size	84 by 108 ins.	84 by 108 ins.
Grate area	63 sq. ft.	63 sq. ft.
Kind of fuel	Soft coal	Soft coal
Tubes, no. and diameter...	195—2¼ ins.	207—2¼ ins.
Flues, no. and diameter..	34—5½ ins.	36—5½ ins.
Length	20 ft. 0 ins.	22 ft. 0 ins.
Heating surface, fire-box..	213 sq. ft.	287 sq. ft.
Tubes and flues.....	3259 sq. ft.	3805 sq. ft.
Arch tubes	25 sq. ft.	25 sq. ft.
Total	3497 sq. ft.	4117 sq. ft.
Superheating surface ...	805 sq. ft.	944 sq. ft.
Driving wheels, diameter..	73 ins.	69 ins.
Journals, main	11 by 22 ins.	11½ by 22 ins.
Journals, others	10½ by 13 ins.	11 by 13 ins.
Truck wheels, front, diam..	34 ins.	33 ins.
Journals	6½ by 12 ins.	7 by 12 ins.
Back, diameter	45 ins.	42 ins.
Journals	9 by 14 ins.	9 by 14 ins.
Wt., on driving wheels.	174,500 lbs.	224,000 lbs.
Total engine	281,500 lbs.	333,000 lbs.
Total engine and tender..	440,300 lbs.	490,500 lbs.
Wheel base, driving.....	13 ft. 0 ins.	18 ft. 0 ins.
Total engine	33 ft. 10 ins.	38 ft. 11 ins.
Total engine and tender..	65 ft. 1¼ ins.	70 ft. 2¼ ins.
Tender, wheels, diameter..	34 ins.	33 ins.
Journals	6 by 11 ins.	6 by 11 ins.
Capacity, water	8500 gallons	8500 gallons
Capacity, coal	14 tons	14 tons

Hearings On Industrial Relations.

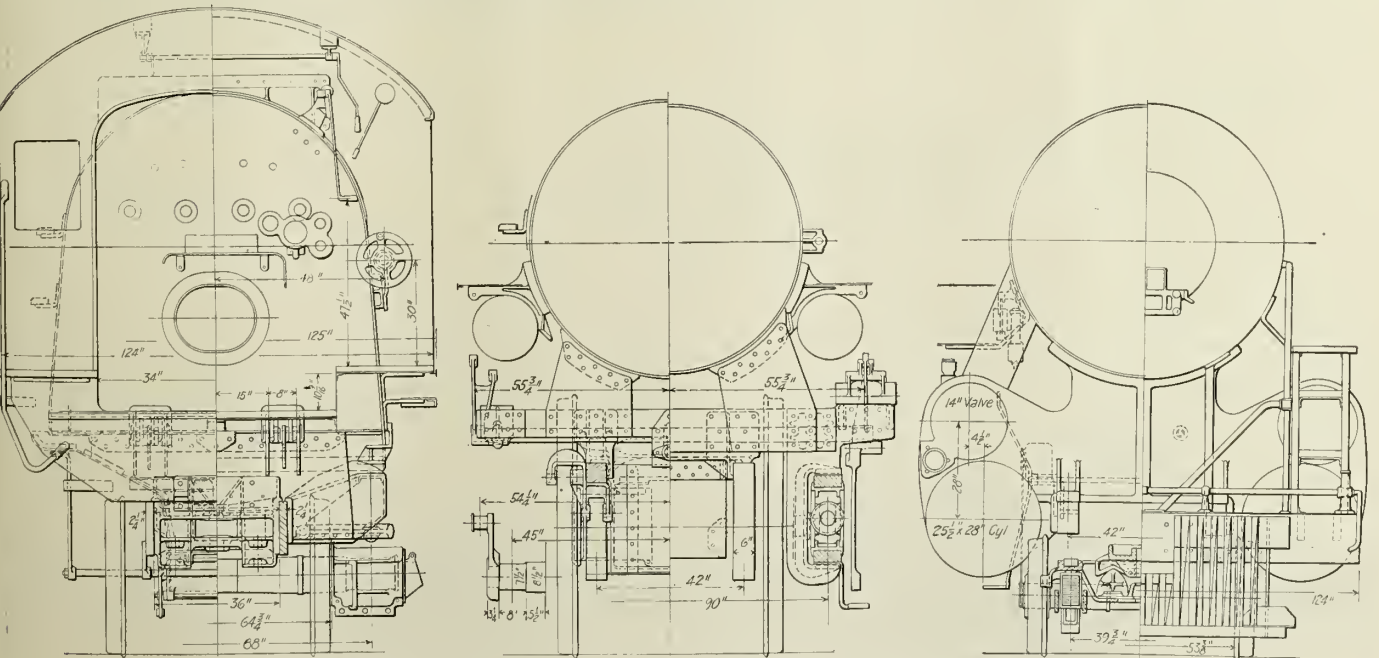
Announcement has been made by Frank P. Walsh, chairman of the United States commission on industrial relations, that a series of public hearings will be conducted in important industrial centers from New York to San Francisco, during the spring and early summer, by the commission. The hearings will embrace in their scope all the main divisions of the inquiry directed by congress. Among

the cities that probably will be visited are New York, Philadelphia, Boston, Paterson, Scranton, Pittsburgh, Buffalo, Wheeling, Charlotte, Greenville, Atlanta, Birmingham, Nashville, Louisville, New Orleans, Detroit, Indianapolis, Cleveland, Chicago, Houghton, Milwaukee, Madison, St. Louis, Kansas City, St. Paul, Denver, Trinidad, Dallas, Houston or Galveston, Los Angeles, San Francisco, Seattle, Butte and Lead. Through examination of witnesses competent to speak for employers, trades unions, other labor organizations, unorganized employes and the general public, the commission hopes to obtain information concerning the industrial situation that will lead to constructive recommendations.

Some of the subjects to be inquired into in each city are irregularity of employment; possibilities of ending irregularity and increasing production through scientific management; the activities of trades unions and employers' associations; and the extent and operation of governmental machinery for regulating the conditions of industry, including the relations between employers and employes. Successful methods of maintaining harmonious relations beneficial to both employers and employes will be inquired into particularly, with a view to their adoption in other centers where no such methods have been tried.

Eminent authorities on subjects to be included within the scope of the inquiry have joined the staff of the commission and are now aiding in planning the hearings. Witnesses desired by the commission will be summoned under the authority granted it by Congress, and volunteer testimony will be welcomed. Announcing the plan for hearings, Chairman Walsh said:

"The commission will carefully avoid acting as a board of mediation and conciliation, and will not allow itself to be drawn into local controversies or recognize such controversies unless in doing so it can obtain information that has more than local and temporary significance. Every interest will be given a hearing. The commission will strive to put aside all bias and prejudice. It will urge others to do the same, in the hope that the industrial problem may be studied in the light of reason. The open mind will be our watchword, and we shall endeavor to provide a forum where men representing all factions can meet in the common purpose of finding a way out from bitterness and strife. To accomplish this we shall need the co-operation and help of all concerned. We shall ask those who meet with us at



Cross Sections, Pacific Type Locomotive, Chicago, Rock Island & Pacific Ry.

the hearings to come not as employers or employees, but as men belonging to the same human family.

"The hearings are to be undertaken as one means of carrying out the instructions of congress to inquire into the industrial situation and to report our conclusions and recommendations. The commission wishes in particular to in-

vite the help of every person who has a constructive suggestion. Such suggestions will be especially welcome when they are supplemented by testimony as to the successful carrying out of the ideas they embody."

According to present plans the hearings will begin the latter part of March.

Shop Improvements of the C. & E. I. R. R., Yard Center, Ill.

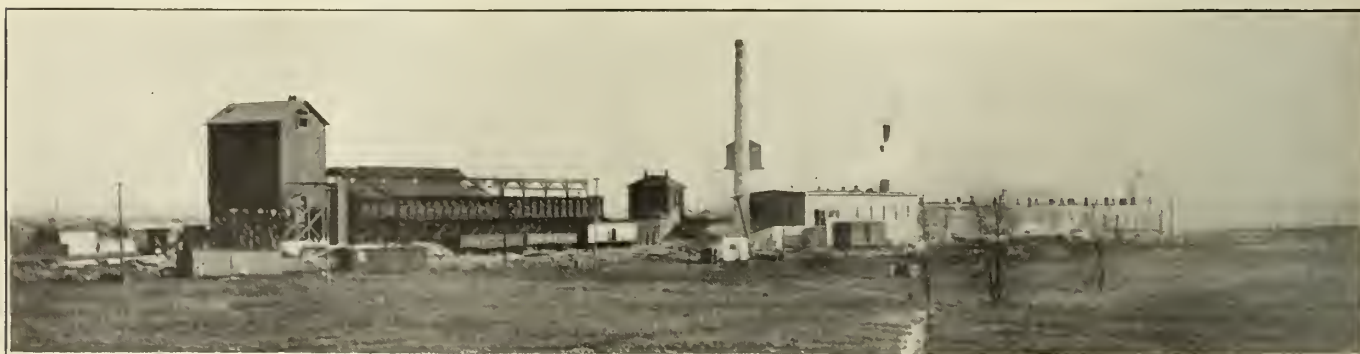
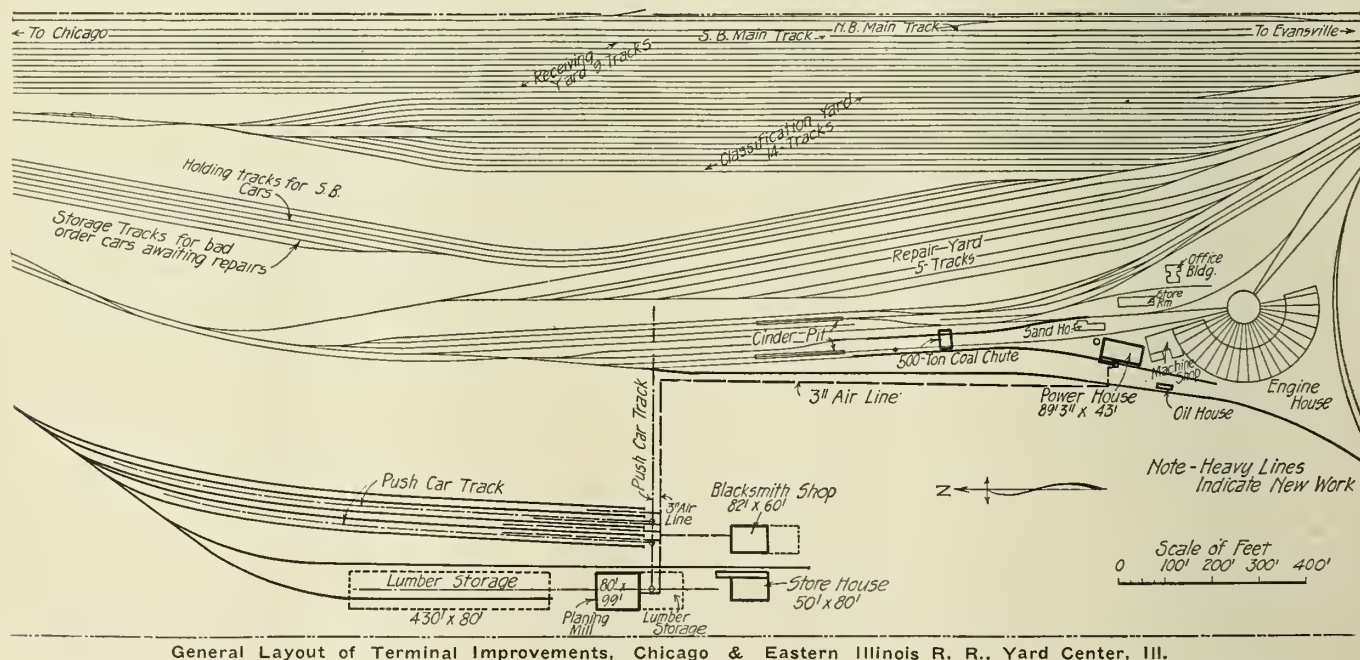
SYNOPSIS.—The following account is descriptive of one of a series of improvements contemplated by the Chicago & Eastern Illinois R. R. in extending the capacity of its repair facilities. The improvements under consideration, though not extensive, show careful study and involved a number of very interesting features.

The Chicago & Eastern Illinois R. R. is making a number of improvements in the various locomotive and car repair shops on the system. The first of the constructive improvements which have been completed is a new repair plant at Yard Center, Ill., about 18 miles south of Chicago, same having been put into operation the first of this year. This work was in the nature of an addition and extension to the existing plant, it having become necessary to separate the locomotive handling and repair work at this terminus from the freight car repair work.

In carrying out this project, the heavy car repair department was moved to the west side of the site, as shown in the general plan, and the area adjacent to the classification yard and

running tracks made vacant by this change was used to rearrange the light car repair yard and the engine handling plant, thereby eliminating a number of engine moves. The new work in the heavy freight car repair department comprised a new lead and six repair tracks, planing mill, blacksmith shop, and store house, together with complete equipment for handling repairs on all classes of freight cars. The new work in the light repair and engine handling department consisted of general rearrangement of tracks, a new power house, and a 500-ton coal handling plant.

Power House: The power house is a combination structure 43 by 89 feet in outside dimensions. This building is equally divided by a 13-inch fire wall into a boiler and engine room. As the entire site is filled land, soil tests were made on the site of each building at various elevations to determine the economical footing design, and it was found that spread footings resting on a stratum of wet clay underlying the surface loam, which gave a safe resistance of 3500 pounds per square foot, furnished the cheapest design. The concrete footings extend



General View of Engine Terminal, Chicago & Eastern Illinois R. R., Yard Center, Ill.



Blacksmith Shop, Chicago & Eastern Illinois R. R., Yard Center, Ill.



Storehouse, Chicago & Eastern Illinois R. R., Yard Center, Ill.

up to the water table, which coincides with the floor line on all sides except the west, where a reinforced concrete, cantilevered retaining wall on the engine room side, and the coal bunker walls on the boiler room side, extend 11 feet above floor line. At present two bunkers of 35-ton capacity each are built to serve the boilers and provisions was made to permit the construction of an additional bunker when the future boiler unit is installed. A track runs from the coal handling plant up a 2-per cent grade to these bunkers so that drop bottom coal cars can be shoved up this ramp by a cable car mover and emptied by the coaling station attendant.

The floors in the engine room and boiler room are of concrete, six inches in thickness. The walls are of plain brick with soldier courses over the windows and a belt course four feet below the roof line. The roof trusses, 24 feet in the clear from the floor line, are of the shallow "Pratt" type with the top chord pitched one inch to the foot. The roof sheathing and purlins consist of wood, and plain wood sash and frames were used throughout. Windows are placed with reference to equipment so that no dark corners or shadows exist. Approximately 25 per cent of the wall area of the power house is glass. The roof sheathing is covered with a 4-ply composition roofing, underlaid with one ply of dry felt. Four 12-inch "Swartout" ventilators were placed at the ridge of the roof.

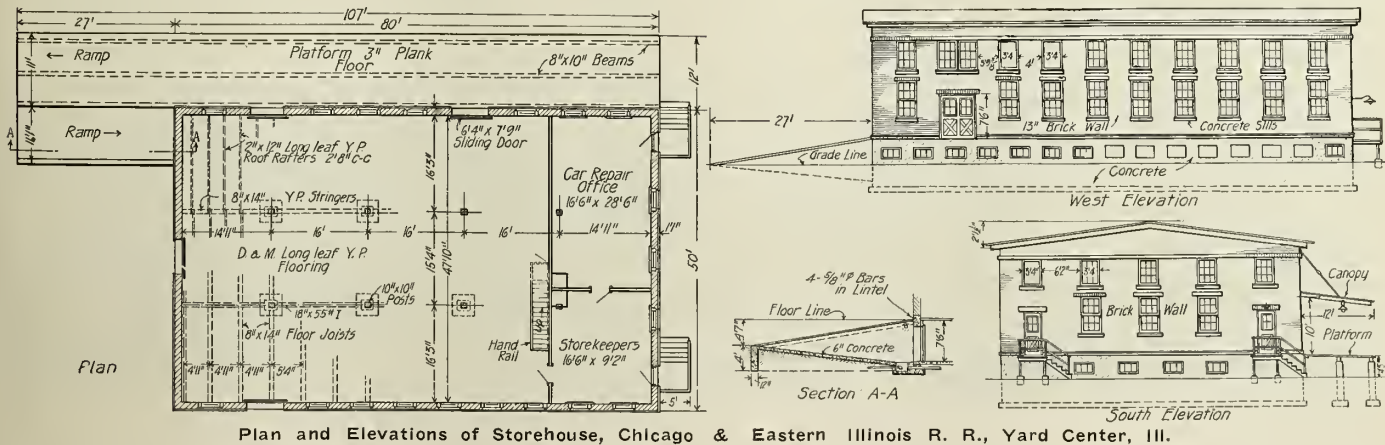
Store House: The store house is a concrete, brick and wood structure, 50 by 80 feet in size, located adjacent to the main lead and south of the planing mill and lumber storage yard. This building serves as a store house for all car material used on the new rip tracks, and offices for car foremen, storekeeper, inspectors and record clerks. It was the original intention to build a one-story structure, but inasmuch as a 4-foot fill was necessary in order to secure adequate drainage on this site, it was decided that a basement could be included without any additional expense. The foundations and basement floor are of concrete. Two rows of concrete columns run down the center of the building and support wooden columns on the first floor. The entire floor system was designed for a load 175 pounds per square foot. On the east side of this building is a 12-foot platform, sheltered by means of a canopy, the platform being at car floor level extending the full length of the building, with a ramp at the north end. Alongside of this ramp to the platform is a ramp down into the basement.

The south end of the structure is converted into offices by means of plaster board partitions and a double story arrangement. The interior walls and ceilings of the offices are lined with "Best-Wall" board. Two tiers of window sash light the area between the shelving. The bottom sash are the standard lift sash while the top sash pivoted and arranged for operation by means of a gang operator. The roofing is 4-ply, tarred felt, placed on a single ply of dry felt laid over on 1-inch dressed and matched sheathing. Galvanized iron gravel guards are placed on all edges of roof and canopy.

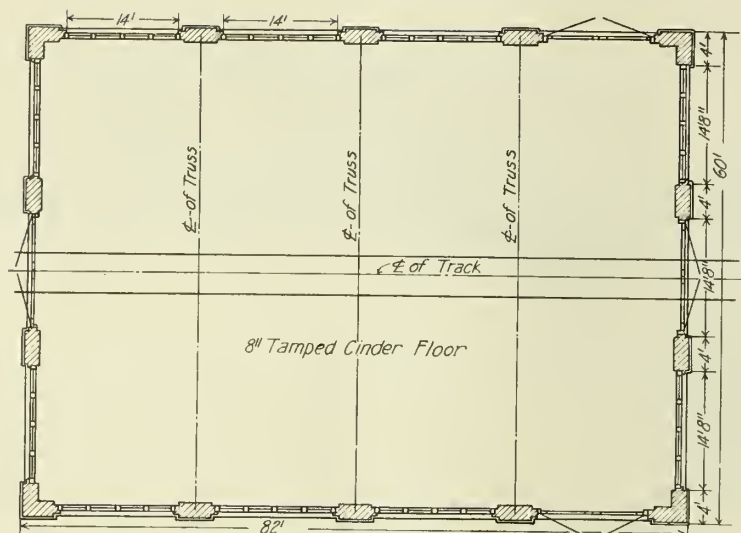
Blacksmith Shop: This is a thoroughly modern shop building 60 feet wide and 80 feet long, located just south of the tracks devoted to freight car repairs. The building is located east of the main lead track and store house, with sufficient area between to take care of the unloading of new wheels and axles and the re-shipment of discarded parts. Running north and south through the shop is an industrial track, which makes connection with the system of industrial tracks throughout the repair yard and also with one of the rip tracks. This track is used mainly in rolling wheels and axles from the wheel press to the yard. The foundations are of concrete, the side walls of brick, and "Fink" roof trusses support steel purlins, which, in turn, support a reinforced concrete slab roof. The two center bays have a monitor eight feet high with sliding sash extending the full height of the monitor sides and the full length. The ends of the monitor are plastered on "Hy-rib" metal reinforcement, with two coats of Portland cement plaster on each side.

The tool equipment of the blacksmith shop comprises one 1½-inch double bolt cutter, one 24-inch drill press, one 36-inch car wheel boring machine, one 36-inch wheel press, one 42-inch Buffalo blower, one No. 2 axle lathe, and three forges. These tools are run from a 2½-inch main line countershaft belted to hangers on 8-foot centers. The shaft hangers are supported by frames built up of 8-inch channels, 24 inches back to back. The line-shaft is run at 200 r. p. m. The floor adjacent to the machines is 3-inch plank while around the forges a cinder floor is used.

Planing Mill: The planing mill is the only non-fire-resisting building in the new plant. Before this type of building was decided upon, several preliminary studies were made as to the kind of mill to construct. Inasmuch as the combustion of the



Plan and Elevations of Storehouse, Chicago & Eastern Illinois R. R., Yard Center, Ill.



Plan and Section of Blacksmith Shop, Chicago & Eastern Illinois R. R., Yard Center, Ill.

material which was continually passing through the mill would produce a hot enough fire to wreck any steel work and render it practically useless, the steel and brick construction was eliminated. The first cost of a concrete mill of sufficient floor area eliminated it from consideration. Furthermore, for the money available, the type of construction selected would afford the floor area required to handle the work of the yard. The mill is 80 by 100 feet in size and is divided into five bays longitudinally and two bays transversely. The transverse division allows two one-in-four pitch wood roof trusses and effects a considerable saving in the material required for the roof system. The mill is located just west of the main lead track and has an industrial track runway through the west bay so that the material will pass through in a straight line from the raw material storage to the finished material storage, which is located with reference to the industrial track serving the dead ends of the rip tracks.

The tool equipment of the planing mill includes one rip saw, one cut-off saw, one Berlin automatic planer and sizer, one combination vertical and radial boring machine, one standard heavy horizontal hollow chisel car mortiser, one heavy horizontal gainer, and one 60-inch grindstone. The planer is driven by a 50 h. p. induction motor, and the remainder of the tools are belt driven from a 27/16-inch line shaft running the full length of the building. All the foundations for shop tools were made hollow, where possible, and the voids filled with rock.

Drainage System: The drainage in the new repair yard is taken care of by means of a 12-inch sewer, which intercepts the 24-inch sewer previously constructed on the west side of the classification yard. This sewer has three branches: a 6-inch line serving the basement of the store house and the area in proximity to the store house and blacksmith shop, a 6-inch line serving the planing mill and material yards, and a 12-inch

line which runs east of the new repair yard with branches to catch basins between repair tracks. These branches are run out from the 12-inch main every 150 feet. The drainage system in the power house runs out the north end into a manhole, where a turn is made, taking the drain water past the east side of the power house into a manhole belonging to an old sewer layout. The 4-inch blow-off from the boilers runs into a blow-off sump which is vented by an 8-inch wrought iron pipe running 20 feet up alongside the concrete stack. The sump is drained by a 6-inch soil pipe to the drainage manhole. Bell traps are provided in boiler room and engine room and placed so as to take off all drips from pumps and compressor. As none of the new buildings have parapet walls, all roof drainage runs to the ground where it is taken to the sewers through the catch basins and the perforated manhole covers.

Water System: Water for fire protection and industrial use in the new yard is taken from a 6-inch line which taps an old line running from the elevated tank on the north side of the yard to the round house. Hydrants are spaced 300 feet apart in the lumber and repair yards. There are 2 1/2-inch hose valves with hose and racks in each building. Two inch drinking water lines with hydrants every 200 feet, run along the west side of the repair tracks. The water used in the power house for boiler feed and the air compressor jacket is taken out of an old 6-inch line which runs along the east side of the power house.

Heating System: The heating system of the buildings in the new repair yard is not as yet completed. The store house, blacksmith shop and planing mill will be heated by direct radiation. A low pressure system will be used and the condensation returned by a vacuum pump to the feed water heater. The run from the power house to center of heating load in new yard is 1300 feet in length and it is the intention to run the supply and return pipes in ducts, covered with a waterproof, non-con-



Powerhouse, Chicago & Eastern Illinois R. R., Yard Center, Ill.



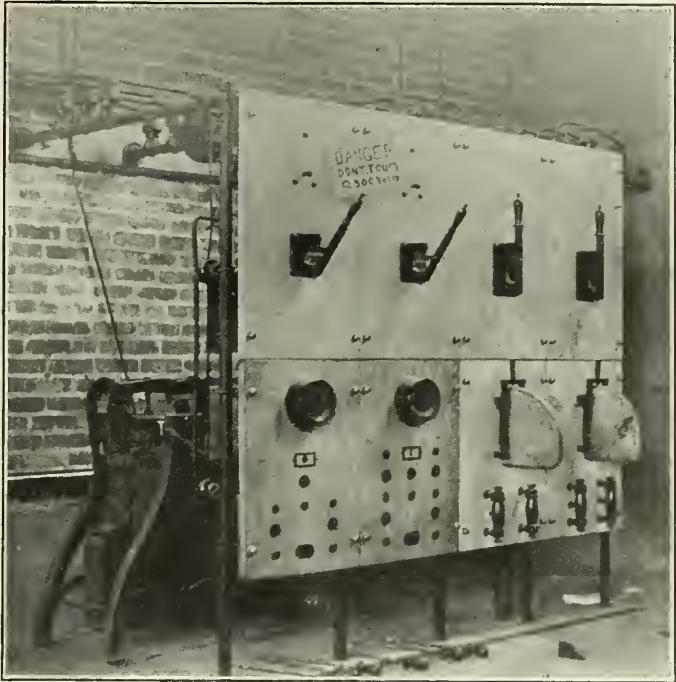
Planing Mill, Chicago & Eastern Illinois R. R., Yard Center, Ill.

ducting covering. The round house, office building, store room and sand house are heated by direct radiation, a 3-inch line from the boiler room supplying this heating.

Electric Light and Power System: At the time work was started it was planned to install a high speed automatic engine direct connected to a 2300-volt a. c. generator and use the exhaust steam for heating, but The Public Service Company of Northern Illinois offered the road such an advantageous rate that it was concluded that the power could be bought more cheaply than it could be manufactured in the quantity that was needed. One 300 h. p. boiler was therefore left out and the space to be occupied was reserved for a future unit, which will be installed when additional air capacity is added. The Public Service company brought its lines to the power house and from this point it is distributed by the road. The railroad company already has a large installation of arc lights and conductors in its two classification yards, has incandescent lights in all structures along the right of way from the village of Dolton to Harvey and it was decided to distribute all current



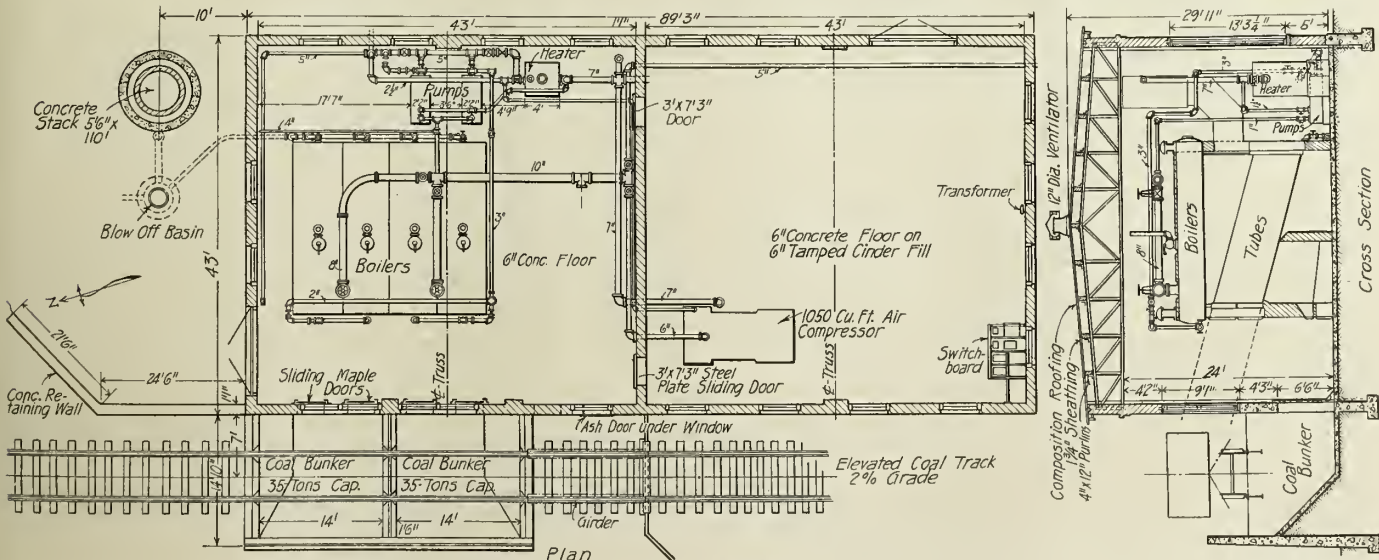
Coaling Station, Chicago & Eastern Illinois R. R., Yard Center, Ill.



Main Switchboard in Powerhouse, Chicago & Eastern Illinois R. R., Yard Center, Ill.

for these circuits also from a main board to be located in the power house.

The Public Service company delivers current at 2300-4500 volts, on a 4-wire, 3-phase, grounded neutral system, and this is taken into the power house to the main oil switch which controls the entire power and lighting layout. Between the wall bushing through which the line enters the building, and the main oil switch, are placed the necessary lightning arresters, choke coils, fuse boxes, potential and current transformers, these latter forming a part of the metering apparatus of the Public Service company. Under the old lighting system two 2300-volt circuits for incandescent lights and inter-locking apparatus, and two Wood series arc systems, were fed by the old power plant. These four circuits were brought into the new power house and fed through taps from phases and neutral, being controlled by automatic oil switches and protected by lightning arresters. Each of these circuits were given a panel on the board. The arc circuits were connected up to the old constant current transformers and the entire change was made so that



Plan and Section of Powerhouse, Chicago & Eastern Illinois R. R., Yard Center, Ill.

the lighting service and the interlocking devices were not interrupted.

The lighting circuits in the power house are controlled from a panel in the engine room, which is fed from a 2 k. w., 2300 to 110-220 volt transformer. One hundred watt Tungsten lamps furnish the general illumination in the engine room and boiler room on a basis of 0.4 watt per square foot. The coal handling plant is lighted throughout by 16 c. p. carbon and 60-watt tungsten lamps, the carbon lamps being used in locations near moving parts. On the opposite corners of the coal chute are placed type "W" multiple flaming arc lamps. All lights in the coal plant are controlled from a panel box located near the ground. The blacksmith shop is lighted by means of flaming arc lamps, suspended from the center of every alternate roof truss on the basis of 0.3 watt per square foot. Individual carbon lamps are used over the machines and on the outside of each door. One hundred watt tungstens only are used in the planing mill with individual lights over the various machines. The intensity of light in the planing mill is 0.5 watt per square foot. The store house and office building is lighted by means of 60-watt tungsten lamps suitably placed. Flaming arc lamps were located along the west track of the repair yard to permit of work being done at night. These arcs also illuminate the material yard.

Power System: All motors used in the new work of the 440-volt, induction type. Each individual motor is protected and controlled by cutouts, knife switches and automatic oil switches, with low voltage and overload releases. In the coal handling plant a 20 h. p. motor placed in the house above the bunkers, runs the lifting chain mechanism. A $7\frac{1}{2}$ h. p. motor runs the windlass that snakes the coal cars. A 35 h. p. motor is used to run the line shaft in the blacksmith shop and the same size motor runs the shafting in the planing mill. The Berlin planer in the planing mill is direct connected to a 50 h. p. motor. All power wiring inside of buildings, as in the case of the light wiring, is run in conduit.

Power Plant Equipment: In the boiler plant there is installed for present purposes, two 300 h. p. Babcock & Wilcox boilers with Martin rocking grates. Coal runs from the bunker doors directly in front of the boiler and at a convenient distance for firing. The stack is of reinforced concrete, 5 ft. 6 in. inside diameter at the top and 110 ft. high. Feed water is heated by exhaust steam in an open type, 750 h. p. Blake & Knowles feed water heater. Water is fed to the boilers by two Blake & Knowles, horizontal, duplex, 6 by 4 by 6 in. plunger pumps, one of which is to be used for emergency. The boilers can also be fed direct by pressure from the water main. The suction of the feed pumps is likewise connected both to the heater and to the city main. Compressed air for the entire terminal plant is furnished by a duplex, steam driven compressor, having a capacity of 1050 cubic feet of free air per minute. Air is piped to the round house and from there to the tools in the engine repair department and the 80-foot turntable. Air lines are also run along each repair track with outlets at 50-foot intervals to serve the portable pneumatic tools used in car repair operations.

All work at Yard Center was executed under the supervision of J. E. Epler, assistant to general manager, and L. C. Hartley, chief engineer of the road. The track work was done by the railroad company's forces; the coal chute was built by Fairbanks, Morse & Co., and all buildings, together with complete electrical and mechanical plant, were designed and constructed by The Arnold Company, Engineers, 105 South La Salle street, Chicago, Ill.

Flange lubrication is accomplished on certain lines operating in and about Liverpool, England, by means of an automatic arrangement which consists of a grease box by the side of the track, adjacent to curves, with a deflector bar attached to the rail. Every wheel that passes over the bar depresses it in such manner as to actuate a ratchet and pawl, whereby a spurt

of grease is placed on the flange of each wheel, before it reaches the curve.

Air Brake Performance on Modern Passenger Trains.

By S. W. DUDLEY.*

SYNOPSIS.—The following article is adapted mainly from the conclusions embodied in an extended discussion of the results of the Pennsylvania R. R. air brake tests, 1913, read before the American Society of Mechanical Engineers on Feb. 10, 1914. The tests demonstrated that a twelve-car train running at 60 miles per hour, can be stopped by an emergency application in 1000 feet, or within the length of the train. They also showed that trains can be controlled by service applications without shocks at any speeds and with greater accuracy and promptness and still require less expert knowledge and skill on the part of the manipulator. The improvement in emergency stopping power has resulted from applying the air brakes more quickly and to a higher pressure, holding this higher pressure without diminution toward the end of the stop, using a more efficient design and better installation of foundation brake rigging and providing a better method of applying the brake shoe to the wheel and in providing more brake shoe metal to absorb the heat developed during the process of stopping.

The Pennsylvania Railroad, in conjunction with the Westinghouse Air Brake Co., instituted in the spring of 1913 the most scientific and comprehensive investigation of the different factors affecting the operation of brakes on steam railroad passenger trains that has been undertaken since the Galton-Westinghouse trials of 1878 and 1879. The tests indicated the degree to which existing apparatus is suited to present conditions, the direction in which improvement is necessary and can be made, and the amount of improvement actually accomplished. The latter can be broadly summarized as follows: Desired results are insured with greater certainty; undesired results are guarded against more effectively; and an adequate capacity for present and future requirements is provided.

The scope of the test was such as to develop the characteristic action of the standard high-speed brake (schedule PM) having the graduated release feature, and which is now generally used in heavy fast passenger service. The performance of this type of brake was contrasted with that of the newly developed UC brake apparatus, the prominent features of which are that it permits emergency application if desired, promptly after service application has been made, and also that it is adapted to operate electrically, whereby simultaneous action can be had on all cars of a train of whatever length, greatly facilitating the handling of trains, both as to length of stops and with respect to the smoothness of action. The tests also involved an extensive investigation into the subject of brake shoes, and likewise offered an opportunity to demonstrate the value of the clasp-type of foundation brake rigging for which the severity of operating conditions of late years has brought forth an imperative demand.

ADVANTAGES OF THE IMPROVED EQUIPMENT.

In service applications with the improved (UC) equipment a greater flexibility of operation is provided. That is, the braking power per pound of brake pipe reduction is lower, thus giving the engineer a greater time in which to use judgment when manipulating the brakes. At the same time, however, the maximum braking power obtainable in a full service application is higher. A more sensitive and prompt release of the brakes is insured, tending to improve the releasing action of all brakes in the same train of mixed old and new equipments. The action of the old and the new equipments mixed in the same train is harmonious and free from rough slack action or shocks both in service and emergency operation.

*Assistant chief engineer, Westinghouse Air Brake Co.

With the new equipment operating electrically or pneumatically, there is always available a quick acting and fully effective emergency brake. This is not the case with the old equipment, in which the relation of the service and emergency functions is such that a quick action application could not be obtained after a service application of any consequence. The following average results indicate the degree to which this difference has an effect on the length of stop. Considering the ordinary full service stop from 60 miles per hour with both brakes (say 2000 or 2200 feet) as 100 per cent, the attempt to make an emergency application with the old equipment does not produce any shorter stop than if only a full service application were made. With the improved apparatus operating pneumatically, an emergency application following a partial service application will shorten the stop about 14 per cent and after a full service application about 10 per cent. With the electro-pneumatic brake these figures are respectively 23 per cent and 15 per cent.

The time to obtain full emergency braking power with the PM equipment on the entire train was 8 seconds; with the UC equipment operating pneumatically 3.5 seconds or 56 per cent less; with the electro-pneumatic equipment 2.25 seconds or 72 per cent less. The gain in emergency stopping power of the electric pneumatic equipment over the PM equipment results from: The shorter time occupied in applying the brakes; a higher brake cylinder pressure obtained; and the holding of the pressure as obtained, without blow-down, as with the high-speed reducing valve of the PM equipment. The time of equivalent instantaneous application of retarding force for emergency applications with the PM equipment 12 car train was from 2 to 2.5 seconds; for the UC pneumatic from 2 to 2.5 seconds; and for the electro-pneumatic from 0.7 to .85 seconds.

The observed average braking power with the PM equipment (for a nominal 113 per cent braking power on the cars) ranges from 95 per cent to 100 per cent. With the UC pneumatic equipment and electro-pneumatic equipment, nominal emergency braking powers of 90, 125, 150 and 180 per cent were used, which, due to locomotive effect, become for the complete train 90, 117, 137 and 160 per cent respectively. With the electro-pneumatic brake a uniform increase in percentage of braking power results in a substantially uniform decrease in length of train stop. An increase of 5 per cent in braking power reduces the length of stop about 2 per cent within the range of braking powers tested.

ADHESION.

The available rail adhesion varies through wide limits, e. g., from 15 per cent in the case of a frosty rail early in the morning to 30 per cent for a clean, dry rail at mid-day. The amount of wheel sliding was found to depend more on the rail and weather conditions than on the percentage of braking power. Some sliding was experienced with braking powers as low as 90 and 113 per cent where rail conditions were unfavorable, but 180 per cent braking power did not cause wheel sliding with good rail conditions. The effect of excessive wheel sliding was to make the length of the stop about 12 per cent greater than similar stops without wheel sliding. A braking power low enough to eliminate the possibility of wheel sliding on a bad rail results in longer stops than could be considered satisfactory for general service. Since good rail conditions prevail a large part of the time, the preferable emergency braking power is that which, considering the installation conditions, will stop trains at all times in as short a distance as can be accomplished without trouble from wheel sliding in such cases as are to be anticipated when emergency stops have to be made under unfavorable rail conditions. Advantage might be taken of this fact to use a higher braking power in summer than could be used in the winter with the same degree of freedom from objectionable wheel sliding.

The amount of wheel flattening when sliding occurs depends upon the weight upon the wheels, the materials in the wheels

and rails, and the condition of the rail surface. The rail surface may be such that relatively long slides will produce but small flat spots, or, conversely short slides may produce flat spots of a size requiring prompt attention. When the UC equipment is used on the cars, an arrangement giving a high emergency braking power on the locomotive, with a blow-down feature, has advantages as follows: Shocks between locomotive and cars practically eliminated; shorter stops are made possible; and no more wheel sliding results than is to be expected with the present installation of ET equipment.

CLASP TYPE OF BRAKE RIGGING.

The use of the clasp type of brake rigging eliminates unbalanced braking forces on the wheels and so avoids the undesirable and troublesome journal and truck reactions that come from the use of heavy braking pressures on but one side of the wheel. This has an important effect not only on freedom from journal troubles but also in enabling the wheel to follow freely vertical inequalities of the track. The clasp brake also improves the brake shoe condition materially, both as to wear and variability of performance. Although the clasp brake rigging will produce better stops than a single shoe brake rigging equally well designed (other conditions being equal), its advantage in this direction is of less importance than in the improved truck, journal and shoe conditions mentioned above. The tests indicated that at least 85 per cent transmission efficiency could be obtained with either single shoe or clasp brake rigging.

The following features were observed to be of importance if maximum overall brake rigging efficiency is to be secured: (a) Protection against accidents that may result from parts of rigging dropping on the track. (b) Maximum efficiency of brake rigging at all times to insure the desired stopping with a minimum percentage of braking power. (c) Uniform distribution of brake force, in relation to weight braked, on all wheels. (d) With a given nominal percentage braking power, the actual braking power to remain constant throughout the life of the brake shoes and wheels. (e) Piston travel to be as near constant as practicable under all conditions of cylinder pressure. (f) Minimum expense of maintenance and running repairs of brake rigging between the stopping of cars.

BRAKE SHOES.

The brake shoe bearing was the most difficult factor to control and at the same time the most potent in producing variations in brake performance. The tests established the possibility of a variation of 15 to 20 per cent in length of stops from 60 m. p. h. with all factors except brake shoe condition remaining substantially constant. Continued stopping with moderate braking pressures produced a constantly improving brake shoe condition and shorter stops. This is taken as evidence that with reasonable attention to brake shoe maintenance the condition of the shoes on cars in ordinary road service is likely to be more favorable to making short emergency stops than during a series of tests in which the brake shoes are worked severely.

The difference in the efficiency of the clasp and single shoe rigging may offset the gain which might be expected from difference in coefficient of friction and vice versa. Consequently as neither of these factors could be observed uninfluenced by the other, a satisfactory comparison of the mean coefficient of friction under different rigging conditions or of different types of rigging or air brake apparatus under variable shoe conditions in road tests, is impossible. High braking powers from high initial speeds result in a great heating of the working surface of the shoe and a rapid abrasion. This effect is most marked under severe braking conditions such as obtained when heavy cars equipped with one brake shoe per wheel are stopped.

Shoes of the same type and hardness had a high rate of wear per unit of energy absorbed when a low coefficient of

friction was developed and, conversely, a lower rate of wear when a higher coefficient of friction was developed. Both the road and the laboratory tests confirmed previous tests and conclusions from analysis that the temperature of the working metal is the determining influence in coefficient of brake shoe friction. The other factors that may be involved become effective chiefly as they effect the change of temperature of the working metal.

The general performance of the shoes as observed during the road tests formed the basis of the program established for laboratory tests, which resulted in the following deductions: (a) The generation of the retarding forces and consequent absorption of the energy of the moving train is dependent upon but a very small quantity of brake shoe metal. (b) The actual bearing area rather than the total face area of the shoe is the important factor in brake shoe performance. (c) The magnitude of the bearing area changes throughout the stop and is greatest near the end of the stop. (d) The bearing area shifts continuously from one portion of the surface to another during the stop. (e) The principal factor in producing high friction for any given braking condition is the frequent shifting of the bearing area from the heated to the cooler spots over the face of the shoe. (f) Slotted shoes or shoes that are cracked are more flexible than solid shoes and the bearing area shifts more readily than in the case of solid shoes. (g) With shoes of the same type and approximately the same hardness, the wear per unit of work done is less with the slotted shoe than with the solid shoe. The stops with slotted shoes were always shorter and the mean coefficient of friction higher than with solid shoes. (h) The shifting of the bearing area will tend to be more rapid if the size provides more available area for shoe bearing. (i) The greater the pressure per square inch of bearing area, the lower will be the mean coefficient of friction. (j) Flanged shoes provide more available area for bearing than unflanged shoes. (k) The use of two shoes instead of one per wheel will result in a higher coefficient of friction and less wear per unit of work done.

A comparison of the values of the mean coefficient of friction for standard and for clasp brake conditions indicated a decided advantage for the clasp brake throughout the entire range of braking powers. The gain in favor of the clasp brake with slotted shoes amounted to about 40 per cent, at a braking power of 180 per cent, and 100 per cent, at a braking power of 40 per cent, an average gain for the whole range of braking powers of about 70 per cent. From a brake shoe standpoint the advantage of using two shoes instead of one shoe per wheel may be summed up as follows: First. The clasp brake shoe is associated with but one-half the wheel load and consequently has but one-half as much energy to absorb. Second. The clasp brake shoe is working at only one-half the shoe pressure at which the standard shoe must work under the same braking power. Third. The available work area for the same amount of energy to be absorbed is double.

A possible source of disadvantage when using two shoes per wheel is that a warped or poorly bearing shoe is subjected to less pressure tending to force it into a good contact with the wheel. For this reason though the available shoe area is doubled when using clasp brakes the actual amount of working metal throughout the stop may be less than with a single shoe, which is less capable of resisting the tendency of the heavier pressure to cause a better fit of shoe to wheel. This, and an especially good shoe condition due to previous moderate pressure tests in each case, is an explanation why three of the 60 m. p. h. 150 per cent braking power electric-pneumatic stops with the single shoe train were shorter by 50 feet than the best stops of either of the first or second clasp brake trains. On the other hand the disadvantage and greater variability of the single shoe brake is evidenced in the fact that under the same conditions as cited above two stops with this

train were longer than the longest stops without material wheel sliding made with either of the two clasp brake trains.

With plain solid shoes the durability will be increased 41.1 per cent under clasp brake conditions as compared with that under single shoe conditions. With plain slotted shoes the durability will be increased 33.5 per cent under clasp brake conditions as compared with that under single shoe conditions. The superior durability of the plain slotted shoe as compared with the plain solid amounts of 11.7 per cent under single shoe brake conditions and 5.9 per cent under clasp brake conditions. The wear of the flanged solid shoes per unit of work done is 19 per cent less than for plain solid shoes, and for flanged slotted 26 per cent less than for plain slotted shoes, or 30 per cent less than plain solid shoes. The wear of plain slotted shoes per unit of work done is 5.4 per cent less than the wear of plain solid shoes, and the wear of the flanged slotted is 13.2 per cent less than the wear of flanged solid shoes.

For the same amount of work done flanged solid shoes cost 16 per cent less than plain solid shoes, and flanged slotted shoes cost 23 per cent less than plain slotted shoes, or 27 per cent less than plain solid shoes. Approximately 135 per cent more stops will be required to wear out the flanged solid than will be required to wear out the plain solid shoe; 158 per cent more stops to wear out the flanged slotted than the plain slotted shoe, and 171 per cent more stops to wear out the flanged slotted than the plain solid shoe.

For any given braking condition with cast-iron brake shoes the indications are that the best relation will exist between shoe wear and mean coefficient of friction when the Brinell hardness of the cast iron is about 190. Machine and road tests show a difference in stopping distance for the same type of shoe under the same braking conditions. The effect of the difference in wheel surface conditions is one of the leading factors which go to make up the difference between machine and road tests. The difference in braking performance can be established and the factor expressing this difference be applied to laboratory results to predict the performance of a car or train.

Program of the Railway Engineering Convention.

The fifteenth annual convention of the American Railway Engineering Association will be held in the Congress Hotel, in Chicago, March 17-20. The meetings will be held in the Florentine room of the hotel, beginning at 9:30 a. m. and 2 p. m. each day. Following is the program of the sessions:

TUESDAY, MARCH 17.

Address of the president.

Report of the secretary.

Report of the treasurer.

Reports of standing and special committees, in the order below. In the right-hand column appears the number of the bulletin in which each of the committee reports is presented.

Rules and Organization.....	Bulletin 162
Signals and Interlocking.....	" 162
Yards and Terminals.....	" 162
Roadway.....	" 162
Wooden Bridges and Trestles.....	" 162
Iron and Steel Structures.....	" 163

WEDNESDAY, MARCH 18.

Masonry	Bulletin 163
Track.....	" 163
Electricity.....	" 163
Wood Preservation	" 163
Grading of Timber.....	" 163
Water Service	" 163
Buildings.....	" 163
Rail.....	" 164

Annual Dinner at 7 p. m.

THURSDAY, MARCH 19.

Ties	Bulletin 164
Signs, Fences and Crossings.....	" 164
Conservation of Natural Resources.....	" 164
Economies of Railroad Location.....	" 164
Uniform General Contract Forms.....	" 164
Records and Accounts.....	" 164
Ballast.....	" 164

Election and Installation of Officers.

Adjournment.

FRIDAY, MARCH 20.

Visit to exhibit of the National Railway Appliances Association in the Coliseum and Armory.

Mr. E. H. Fritch, Karpen building, Chicago, is secretary of the association.

Presentation of Medal to Col. Goethals.

The National Geographic Society presented a gold medal to Col. Geo. W. Goethals, at a dinner given at the New Willard hotel, Washington, D. C., Tuesday evening of this week. The gold medal is inscribed: "This special medal of the National Geographic Society is awarded to George Washington Goethals, to whose ability and patriotism the world owes the construction of the Panama canal, March 3, 1914." President Woodrow Wilson made the presentation. Secretary of State Bryan was toastmaster. Other speakers of the evening were the German ambassador, Count von Bernstorff; the French ambassador, J. J. Jusserand, dean of the diplomatic corps, and representative James R. Mann of Illinois. More than half of the members of congress and the larger part of the diplomatic corps and high officers of the army and navy were in attendance. The occasion marked incidentally the completion of the first year of President Wilson's administration.

In presenting the medal the chief executive said:

"I am here to do what I suppose is an unusual thing for a society of this sort. It generally confers its honors upon those who have disclosed geography rather than upon those who have altered it. It is a sort of advertiser and custodian of the globe, but it is now about to honor a gentleman who has had the audacity to change the globe.

"The engineering profession is one of the few creative professions. Those of us who have attempted to be literary men conceive that we have created conceptions of the mind, but we never can produce them in court. They are never visibly upon exhibition. But the magic of the engineer is that he can change the face of nature and show the work of his hands and that it is in some deep sense creative in character.

"We have therefore to honor to-night the greatest living representative of this extraordinary profession. It seems to me to be natural, if I may say so, with apologies to some of our friends, that the greatest engineer should come from the United States. The government of the United States lent him to the world and he has done this thing for the world. For it is our proud boast that we have cut this highway for all the seagoing ships of the world.

"I take it for granted that we do not to-night forget that distinguished group of men who have been associated with Col. Goethals—that gallant and devoted soldier who gave his very life to see that the great work was done at Culebra cut; that man who made so much of this work possible, Surgeon-General Gorgas, by knowing how to hold disease off at arm's length while these men were given leave to work; Col. Seibert, who built the walls of Gatun dam and created Gatun lake, making it look to the eyes of the beholders as if nature had done the work over which he himself presided, and Col. Hodges, who made the locks and the machinery by which these great things are administered."

Col. Goethals, so the press reporters give their impression, looked as if he would like to run away. He said, after some hesitation:

"This medal represents the satisfaction of the National Geographic Society at the practical completion of the canal and its approval of the services rendered. Those services are not only individual services but national services. The French were the pioneers in the undertaking. But for the work they did on the isthmus we could not to-day regard the canal as practically completed. But for the English we probably would not have known the means of eradicating malaria. The death rate would have been great. Among individuals we have national representatives of the Spanish and the English in our laboring force.

"The canal has been the work of many, and it has been the pride of the Americans who have visited the canal to find the spirit which animated the forces. Every man was doing the particular part of the work that was necessary to make it a success. No chief of any enterprise ever commanded an army that was so loyal, so faithful, that gave its strength and its blood to the successful completion of it than this canal force. And so, in accepting the medal, I thank the National Geographic Society for its appreciation in the name of the canal army."

Convention of the Air Brake Association.

The twenty-first annual convention of the Air Brake Association will be called to order in the convention hall of the Hotel Pontchartrain, Detroit, Mich., Tuesday, May 5, 1914, and will continue its sessions through four days, ending Friday, May 8. The hours of the several sessions will be announced at the first day's meeting.

The subjects announced for discussion at this convention and the committee chairmen in charge of same are as follows:

- (1) Electro-Pneumatic Signal System for Passenger Trains, L. N. Armstrong.
- (2) Air Hose, T. W. Dow.
- (3) Clasp Type of Foundation Brake Gear for Heavy Passenger Equipment Cars, T. L. Burton.
- (4) Air Gage and Conductor's Valve in Caboose Cars, Mark Purcell.
- (5) Analysis of the Factors Involved in Controlling and Stopping Passenger Trains, Walter V. Turner.
- (6) One Hundred Per Cent Efficiency of Freight Train Brakes, Fred Von Bergen.
- (7) Recommended Practice, S. G. Down.
- (8) Topical Subject, "Mountain Grade Work," H. H. Forney.
- (9) Topical Subject, "Modern Train Building," George W. Nolan.

One of the entertainment features of the convention will be the "manufacturers' exploitation meeting," which is intended to be instructive and entertaining to the members and likewise profitable commercially to the manufacturers. One afternoon, to be selected later, will be set aside for the members to assemble in the convention hall, where each exhibitor will be given from fifteen minutes to thirty minutes' time in which to exploit, by discourse, charts or lantern slides, etc., or in any manner he chooses, the product or device he desires to place before the assemblage. The executive committee has inaugurated this convention novelty, believing that it will assist both the exhibitors, and also give the members an orderly account of what the manufacturers are contributing to the air brake art. Details of this innovation will be worked out and announced at the opening of the convention.

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CORRESPONDENCE.—Information concerning any matter of railway or engineering news is invited. We desire to receive particulars of changes in the personnel or organization of railways; of work projected or of the improvement of existing roads; bids asked or contracts let; new structures or new equipment; experiments with new devices or methods; adoption of new rules or practice; methods of maintenance; changes in the supply and equipment trade and advice of important sales or orders. Railway or engineering literature, including trade catalogues and circulars describing new devices and appliances, will receive attention if sent to this office. Our columns are available for criticism or comment on articles published, and for expression of opinion on any subject of railway business or management, if of an impersonal nature and of general application. All matters for editorial purposes should be addressed to the Chicago office.

ADVERTISING.—Rates of advertising made known on application. Copy for changes in standing advertisements should be in this office ten days before date of first publication if proof is to be submitted by mail for approval before publication; or on or before the Wednesday preceding the date intended for publication, if proof is not required.

SATURDAY, MARCH 7, 1914.

We have no desire to detract from the proper glory of Col. Goethals as constructor of the Panama Canal, but the present wave of adulation is unreasonable. The public sees only the man who has been in charge of such a work during its successful completion. Col. Goethals' work has been administrative; it is more like the work of a contractor than that of an engineer. The important work of planning and preparation was done by his predecessors. He had only to take hold and dig and build, with everything ready. He had the remarkable advantage of controlling his work absolutely, under military rule—an advantage that no contractor or civil engineer could have. Viscount Bryce late British Ambassador to the United States, in his recent work on South America has pointed out that the canal is the result of modern sanitation, and an absolutism in construction. The advantage of military control in executive work is manifest.

In the North American Review for February, Mr. Theo. P. Shonts has treated of the part of railway men in the construction of the canal. It will refresh the memory to read this, and will also show the obstacles which Col. Goethals' predecessors had to contend with under Commissions; and the prime import-

ance of the work which had been done by them. It is hardly conceivable that if President Woodrow Wilson had read this, he would have slopped over, as he did, in presenting to Col. Goethals the gold medal of the National Geographic Society, at Washington, Tuesday night. His remarks and the response are given in another column. President Wilson paid a great tribute to the engineering profession and denominated Col. Goethals "the greatest living representative of this extraordinary profession."

That Col. Goethals is a genuine man is shown by the reporter's statement that he "looked as if he would like to run away." He acknowledged the debt to the French engineers and said "the canal has been the work of many."

Hero worship is within limits an excellent thing, as the disciples of Thomas Carlyle know. But the failure to credit the real forces with the result of their work and influence is a part of the "ingratitude of republics" which should be condemned. Somehow a military touch seems to influence people as a uniform is supposed to attract the ladies. We have no desire to detract from any reputation but we plead for fairness to men who were unfairly treated and meanly rewarded. It would have been the graceful thing for President Wilson to have posted himself on the history of the canal and to have given credit where credit was due, rather than to embarrass Col. Goethals by such extravagance of praise as toastmasters are wont to use in introducing after-dinner speakers and which usually are characterized as "joshing."

An impressive measure of the growth in the size and weight of our trains during the past decade is contained in a paper recently read by Mr. S. W. Dudley before the American Society of Mechanical Engineers. In that paper, the conclusions from which are summarized in an article appearing elsewhere in this issue, there was given a general discussion of the results of an exhaustive series of tests on an improved form of air-brake apparatus that marks another of the series of epoch-making achievements in the air brake art. The new brake equipment is adapted to simultaneous electric control on all cars of the train, which fact, in combination with the use of the clasp-type of foundation rigging, makes possible the stopping of a twelve-car all-steel train running at 60 miles per hour, within a distance of 1000 feet. The best that is to be expected of the "high-speed" brake, which for the past ten years has been the accepted standard in heavy passenger service, under the same conditions, is that the train can be brought to rest in a distance of something like 1600 feet. This margin of improvement is one that reflects great credit on the skill and enterprise that have brought it about—much greater in fact than is apt to be realized when one considers that the "high-speed" brake was capable of equally creditable performance with the trains of ten years ago.

The increase in the weight of trains then is such

that, until the development of the new brake, from 50 to 60 per cent greater distance was required in which to bring them to a stop from a speed of 60 miles per hour. We have come to require this greater distance through exerting tremendously greater effort in attaining this speed. Having attained the momentum resulting from this greater effort, it has become desirable to dissipate it with greater effectiveness in order not to sacrifice the margin of safety, from the momentum standpoint, that was enjoyed with the cars of lighter weight. This has now been made possible, to the everlasting credit of those who worked out the problem, but it may be observed that the cost of our progressiveness has not been inconsiderable. In it is included not only the greater cost of the heavier cars and locomotives, the necessarily advanced cost of the brake apparatus by which to safely handle these cars, but also the expense of the extra energy that is put forth and dissipated as often as a train of such cars is accelerated and subsequently brought to a stop. This line of thought suggests once more that a worthy engineering achievement would be to eliminate some of the extra weight with its resultant power costs, that has attended the acquiring of the advantages sought in our heavier equipment.

Railway Revenues and Expenses.

During the first six months of the current fiscal year, embracing the period between July 1 and December 31, 1913, railroads of the United States transacted a business ten million dollars greater, in gross, than in the corresponding period of the previous fiscal year. But the expenditures incident to transacting this business increased \$68,000,000. There was therefore a resulting loss in net operating revenues of the railways for the half year, of \$58,000,000. This astounding situation is disclosed by figures just compiled by the Bureau of Railway News and Statistics, covering the total mileage of the country, and based upon the partial figures recently published by the Interstate Commerce Commission, which fall 25,000 miles short of representing the actual aggregate.

From these returns the Bureau deduces an exceedingly unfavorable outlook for the entire fiscal year. The unfavorable showing in net for the first six months, \$510,000,000 this year as against \$568,000,000 last year, confronts the railways despite the fact that only two of the months showed large losses in business compared with the previous year. "July, August and September," says the Bureau's statement on this subject, "enjoyed large expansions in gross, though all lost in net. October showed the total mileage of railways practically at a standstill as to gross business, though losing \$12,000,000 in net. With November came a more decided slump in gross business with resulting larger loss in net; and the figures for December, now available to complete the half year, intensify the unfavorable showing. December brought

for the entire railway mileage, slightly over 250,000 miles, a drop in gross business of \$12,000,000, compared with December, 1912, against a comparative loss for November of \$9,000,000. December's expenses on the other hand climbed \$2,000,000 and there was a consequent loss in net for the month of \$14,000,000 under the same month of 1912. With this condition prevailing as the second half of the fiscal year is entered, and coming months bidding fair to continue the losses, business prospects for the twelve month period are anything but rosy."

Results even more unfavorable are apparent if the showing be extended to include certain items leading to net income. The 'six months' profit from outside operations, from July to December, 1912, amounted to about \$2,500,000. Compared with this there was an actual deficit of some \$130,000 in the corresponding period of the current fiscal year. And it is of further significance that taxes paid on the entire railway mileage rose from \$64,000,000 in the first six months of the last fiscal year, to \$70,000,000 in the first half of the present fiscal year. As a result of these and other conditions, there is a net income to December 31, 1913, of \$440,000,000, against \$506,500,000 the year before; a loss of almost \$67,000,000 in the face of \$10,000,000 more business done.

We present in another column the summary prepared by the Bureau of Railway Economics, from the Interstate Commerce Commission's statistics. Corresponding with its source, this latter summary covers less than 225,000 miles of railroad, including only companies with annual operating revenues in excess of \$1,000,000, and in that way it differs slightly from the statistics commented on above. Through the entire summary, as given by the Bureau of Railway Economics, however, the situation so impressively sketched by the Bureau of Railway News and Statistics is perfectly apparent. It can be noted moreover, from the greater detail therein given, how the situation runs back through the full calendar year, 1913, and how the more recent returns indicate that the poor showing is accumulating and not diminishing. In this connection the relative showing of the eastern, western and southern sections is of importance; and it will be noted that with the comparatively good results of the South eliminated, which seemingly is due to peculiarly favorable local conditions, the poor showing of the East and the West is materially magnified, with the East, the home of large industries, bearing the larger part of the burden of woe.

Report on Shipping Combines and Agreements.

HOUSE COMMITTEE RECOMMENDS CONTROL BY INTERSTATE COMMERCE COMMISSION, RATHER THAN TERMINATION OF AGREEMENTS.

The merchant marine committee of the national house of representatives has been conducting during two years past, an exhaustive investigation into the existence of a so-called "shipping trust," in this country. In its final

report, made public this week, the committee presents its ultimate conclusions and recommendations in the matter. The report deals with 800 foreign and domestic navigation companies and 200 railroad lines. The committee avers that shipping lines in practically every trade route from or to United States ports are operated by agreement or conference to restrain competition. The report declares that the advantages accruing to both shipper and ship line through these agreements are so great that the combinations should be allowed to continue, under the supervision of the Interstate Commerce Commission, as to rates, classification, rebates and discrimination. It would be futile, the committee states, to attempt to restore competition by ordering existing agreements terminated. In the statement summarizing the committee's findings and recommendations, Chairman Alexander said:

"Relative to the foreign trade, the report shows that it is the almost universal practice for steamship lines, both on the inbound and outbound voyage, to operate under agreements and conference arrangements which have for their purpose the control of competition between the conference lines or between them and non-conference lines. Eighty agreements and understandings, involving nearly all the regular lines operating on nearly every American foreign trade route, are in effect, dealing respectively with the traffic to and from Europe, Africa, Australia, Asia, South America, Mexico, Central America and the West Indies. In the few instances where several lines served the same trade and denied the existence of co-operative arrangements, it appears that one line was sufficiently powerful to dominate the other lines, and, without effecting any definite agreement, secure the desired conditions in rates.

"The numerous agreements referred to present fourteen distinct methods by which the lines seek to control competition, either through the fixing and regulation of rates, the apportionment of traffic, the pooling of earnings or the elimination of non-conference lines.

"With reference to the domestic trade, the facts show that competition in rates between steamship lines has been as effectively eliminated as in the foreign trade. In the trade, however, written or formal agreements are rare—apparently have been scrupulously avoided—and the elimination of competition in rates has been accomplished by other methods.

"Nearly three-fourths of the line tonnage operating in the American coast-wise and Great Lakes trade is owned or controlled by railroads and shipping consolidations. Even as regards bulk carriers, there is a strong tendency toward the establishing of a community of interest between the owners. This is especially indicated on the Great Lakes, where a community of interest, through common officers, directors or large stockholders, or charter relations, exists between 37 groups of bulk carriers, representing three-fourths of the American bulk tonnage on the Great Lakes.

"The committee concluded to recognize agreements and conferences among carriers in the foreign trade only if the same are brought under some form of effective government supervision. Open competition cannot be assured for any length of time by ordering existing agreements terminated. Such termination would either cause the lines to engage in rate wars, which would inevitably result in the survival of the fittest, or, to avoid a costly struggle, they would consolidate through common ownership.

"For this reason the committee felt that effective government supervision is the only means of eliminating existing abuses and assuring to shippers the benefits which may flow from co-operative arrangements among the lines. Such supervisory control, the committee felt, should be vested in the Interstate Commerce Commission because of the close

relations between rail and water transportation. If necessary, in view of the added duties involved, the membership of the commission should be enlarged."

As to foreign shipping the committee recommended that all agreements and understandings between navigation companies, or such companies and railroads or shippers, be filed with the Interstate Commerce Commission; that the commission be authorized to determine the reasonableness of rates and to order rates changed; that rebating be prohibited by law; that the commission be empowered to enforce fair treatment of all shippers, and that the use of cut-throat "fighting ships" and deferred rebates be prohibited.

As to the domestic trade the committee recommended that, in addition to the above, the jurisdiction of the Interstate Commerce Commission be extended to interstate port-to-port traffic, with full powers to regulate and fix rates; that water carriers, if cutting rates against a competitor, be denied the privilege of restraining rates; that all traffic associations pertaining to rail and water or all water transportation be brought under the commission; that railroads be prohibited from making discriminatory rates or unfair divisions of rates on rail and water routes; that railroads be compelled to make terminal facilities available to all water carriers, under the regulation of the commission, and that canal transportation in interstate traffic be placed under the supervision of the commission.

The committee's recommendations probably will be embraced in bills to be framed by the committee at a later date, though it is probable that no effort will be made to press such legislation at the present session of congress.

Damages Refused in Cattle Shipment.

A case with a rather peculiar turn to it arose out of an action brought by a shipper of Uvalde, Texas, against the Iron Mountain road, to recover damages for alleged breach of a contract in a shipment of cattle. The case was later appealed in the state court. It appears that the appellant, an initial carrier, entered into a contract with the appellees to transport the cattle of the latter from Uvalde, Tex., to the National Stock Yards, in Chicago, agreeing that it would transport the cattle, that they would be unloaded and fed once in transit, and with such dispatch that they would be delivered at the point of destination in time to be sold at a given date. It was alleged in the complaint that the appellees at the time of making the contract informed the agent of the carrier of their desire to ship the cattle on one feed only, for the reason that cattle shipped from Uvalde, Tex., to the National Stock Yards, Ill., and fed only once en route, would take a heavy fill and would weigh more than if fed and watered more than once upon the journey. The Texas Court of Civil Appeals said, in the case of *St. Louis, Iron Mountain & Southern Ry. Co. vs. West Brothers*, that the only complaint seemed to be that the cattle were not transported fast enough to avoid a second stop for feeding and watering, which second feeding and watering prevented the cattle from carrying to their destination a thirst that would cause them to inflate themselves with water so as to increase their weight and consequent values. The court said: "Whatever may have been the custom as to filling the cattle with water just before a sale, it is a fraud upon the rights of the buyers that cannot be tolerated as a basis for damages in a court of justice. The railroad company cannot be condemned to pay damages because it acted in such a way, whether designedly or not, as to prevent fraud upon the rights of others, and a failure to carry out a contract to perpetrate such fraud will not be allowed to make a basis for damages."

Locomotive Maintenance Costs

Records of 1902, 1912 and 1913 Compared

The data contained in the table herewith, in so far as they pertain to the costs for the years 1902 and 1912, were published in the Railway Review for August 2, 1912, with the explanation that the costs for the latter year in many cases, were thought conservative owing to the fact that certain roads followed the practice of postponing repairs during the period for which the returns to the Interstate Commerce Commission, and from which these figures are derived, were made. The prediction was made that higher costs per ton mile and per mile run would be shown for 1913 than were reported for 1912. There is some satisfaction in noting that

this prediction is so far from being generally true as to indicate that there is reason for predicting a reverse condition for 1914 and subsequent years. This arises from the fact that four roads have been able to decrease their locomotive repair costs on the mile-run basis as well as on the ton-mile basis while nine additional roads have effected reductions on the ton-mile basis in the face of increased cost of repairs per mile run. Encouragement is seen also in the consistent gains in net revenue tons per train load which averages 9.13 per cent for the 27 roads reported, over 1912 and has reached an advance of nearly 50 per cent over the figures for 1902.

Road	Year	Average Tractive Power Tons	Average No. Tons Rev. Freight Per Train Load	Cost Locomo. Maintenance Per Mile Run Cents	Percentage of Increased Cost Per Mile Run Over 1902	Cost Locomo. Maintenance Per Ton-Mile Mills	Percentage of Increased Cost Per Ton-Mile
Atchison, Topeka & Santa Fe	1902	10.92	243.45	11.165	.....	.784	.....
	1912	16.55	326.44	14.896	33.42	1.245	58.80
	1913	16.76	350.36	16.785	50.38	1.297	65.43
Atlantic Coast Line.....	1902	7.74	165.50	6.907	.....	.659	.....
	1912	10.66	210.44	8.416	21.84	1.011	53.41
	1913	10.90	224.13	8.619	24.78	.962	45.97
Baltimore & Ohio.....	1902	13.32	406.53	8.396	.....	.356	.....
	1912	17.44	554.67	11.127	32.52	.544	52.81
	1913	17.83	619.97	12.311	46.63	.553	55.33
Boston & Maine.....	1902	8.31	201.41	4.246	.....	.737	.....
	1912	11.49	264.87	8.761	106.31	1.093	48.30
	1913	12.22	291.56	10.151	139.07	1.171	58.88
Central Rd. of N. J.....	1902	9.58	439.50	10.442	.....	.568	.....
	1912	12.68	513.78	10.149	*2.88	.621	9.33
	1913	13.01	547.20	10.681	‡2.28	.610	7.39
Chesapeake & Ohio.....	1902	12.52	509.35	6.954	.....	.218	.....
	1912	17.50	756.46	11.493	65.27	.356	63.30
	1913	18.97	843.50	12.629	81.75	.380	74.31
Chicago & Alton.....	1902	11.71	315.96	8.175	.....	.527	.....
	1912	15.68	423.63	10.637	30.11	.611	15.94
	1913	16.53	483.20	15.658	91.53	.842	59.77
Chicago & Northwestern.....	1902	8.96	267.13	5.436	.....	.441	.....
	1912	12.57	298.94	8.156	50.03	.810	81.40
	1913	13.08	347.97	8.996	64.94	.746	69.11
Chicago, Burlington & Quincy	1902	8.89	220.52	7.946	.....	.639	.....
	1912	13.57	437.75	10.470	31.76	.656	2.66
	1913	14.63	483.83	11.094	39.61	.632	*1.11
Chicago, Milwaukee & St. Paul.....	1902	8.16	249.91	3.012	.....	.247	.....
	1912	11.61	288.16	9.301	208.79	.822	232.79
	1913	14.50	346.95	9.677	221.28	.720	191.49
Chicago, Rock Island & Pacific	1902	9.88	184.06	4.931	.....	.498	.....
	1912	13.87	276.87	8.891	80.31	.840	68.67
	1913	14.33	294.98	10.347	109.83	.912	83.13
Delaware, Lackawanna & Western	1902	11.02	374.69	6.688	.....	.407	.....
	1912	14.33	574.05	11.915	78.15	.664	63.14
	1913	15.12	641.22	10.798	61.45	.542	33.17
Erie	1902	11.21	380.63	9.092	.....	.627	.....
	1912	12.58	533.39	11.221	23.41	.582	*7.18
	1913	16.55	595.55	11.881	30.67	.551	*13.79
Great Northern.....	1902	12.33	389.55	9.613	.....	.453	.....
	1912	16.96	601.11	11.655	21.24	.534	17.88
	1913	18.26	634.62	12.775	32.89	.538	18.32
Illinois Central	1902	10.63	274.74	5.288	.....	.419	.....
	1912	13.55	356.09	11.657	120.44	.757	80.67
	1913	14.31	407.04	12.794	141.94	.720	71.83
Lehigh Valley	1902	11.41	466.83	15.573	.....	.617	.....
	1912	14.24	558.55	10.989	*29.43	.496	*19.61
	1913	15.31	592.22	11.266	*27.65	.466	*24.47
Minneapolis & St. Louis.....	1902	8.83	255.77	5.380	.....	.472	.....
	1912	12.01	257.49	8.384	55.84	.779	65.04
	1913	12.53	304.99	8.664	61.60	.630	33.47

Road	Year	Average Tractive Power Tons	Average No. Tons Rev. Freight Per Train Load	Cost Locomo. Maintenance Per Mile Run Cents	Percentage of Increased Cost Per Mile Run Over 1902	Cost Loco. Mainten. Per Ton- Mile Mills	Percentage of Increased Cost Per Ton-Mile
New York Central & Hud- son River.....	1902	10.67	341.56	7.340	.....	.563	.....
	1912	16.20	438.70	10.415	41.89	.765	35.88
	1913	16.52	499.84	11.807	60.86	.760	34.99
New York, New Haven & Hartford	1902	8.79	217.58	6.219	.....	1.205	.....
	1912	11.44	291.75	8.401	35.08	1.118	*7.22
	1913	11.90	290.95	9.713	56.16	1.160	*3.98
Norfolk & Western.....	1902	12.84	475.73	5.548	.....	.234	.....
	1912	17.74	692.43	11.468	106.70	.362	54.70
	1913	18.79	763.84	11.358	104.72	.339	44.87
Northern Pacific.....	1902	10.87	346.37	7.018	.....	.403	.....
	1912	15.50	510.54	10.500	49.61	.605	50.12
	1913	16.72	541.62	10.600	51.04	.551	36.72
Pennsylvania	1902	11.98	501.54	9.590	.....	.363	.....
	1912	16.53	676.20	12.899	34.50	.605	66.66
	1913	16.90	700.80	14.231	48.39	.655	80.44
Philadelphia & Reading.....	1902	.....	282.15	5.756	.....	.518	.....
	1912	14.26	508.72	12.766	121.78	.680	31.27
	1913	14.65	535.38	11.393	97.93	.569	9.84
St. Louis & San Francisco...	1902	9.20	190.44	4.713	.....	.533	.....
	1912	13.87	262.28	9.287	97.05	.910	70.73
	1913	14.00	287.90	10.108	114.47	.860	61.35
Southern Pacific.....	1902	10.19	331.85	8.121	.....	.709	.....
	1912	15.36	430.11	12.691	56.27	1.222	72.35
	1913	16.11	431.12	15.121	86.19	1.401	97.60
Southern	1902	.....	188.37	7.180	.....	.714	.....
	1912	15.52	250.04	9.657	34.49	.998	39.77
	1913	15.89	259.52	10.090	40.53	1.004	40.61
Toledo, St. Louis & Western	1902	9.83	285.59	6.920	.....	.423	.....
	1912	13.54	412.30	9.834	42.11	.477	12.77
	1913	13.54	456.06	8.841	27.76	.362	*16.85
Union Pacific.....	1902	12.78	318.99	11.803	.....	.692	.....
	1912	15.67	410.51	13.722	16.26	.968	39.96
	1913	16.51	441.89	15.984	35.42	.883	27.60
Wabash	1902	8.97	284.66	5.621	.....	.550	.....
	1912	13.14	357.75	12.861	128.80	.864	57.09
	1913	13.29	395.33	11.813	110.16	.715	30.00
Averages	1902	†10.46	314.15	7.416	.....	.557	.....
	1912	†14.31	430.14	10.780	.....	.793	.....
	1913	†15.17	469.43	11.593	.....	.742	.....
Average Increase, Per Cent:							
1912 over 1902.....	.....	†36.81	36.92	.....	45.39	43.70	.....
1913 over 1912.....	.....	†6.01	9.13	.....	7.54	*6.43	.....
1913 over 1902.....	.....	†45.03	49.43	.....	56.32	33.21	.....

*Decrease. †27 roads—figures lacking for 1902, in two cases. ‡Increase.

Revenues and Expenses for December and the Calendar Year

Statistics compiled by the Bureau of Railway Economics disclose that returns for December, reduced to a per mile of line basis and compared with the returns for December, 1912, show a decrease in total operating revenues per mile of 5.2 per cent, and an increase in operating expenses per mile of 0.1 per cent. Net operating revenue per mile was less by \$61, or 16.9 per cent, than for December, 1912, while that for December, 1912, was 10.4 per cent greater than for December, 1911. For the calendar year 1913 total operating revenues per mile increased 3.7 per cent, and operating expenses per mile 7.3 per cent. Net operating revenue per mile decreased \$183, or 4.4 per cent, while that for the calendar year 1912 was greater than for the calendar year 1911 by 5.1 per cent. Operating income per mile decreased \$239, or 6.6 per cent.

The Bureau of Railway Economics has issued a bulletin giving its summary of revenues and expenses of steam railroads

in the United States for the month of December, 1913, and for the calendar year, 1913. The railways whose returns are included in this summary operate 224,990 miles of line, or about 90 per cent of the steam railway mileage in the United States.

The operating revenues for the month of December, 1913, amounted to \$247,398,764. This includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail operation. Compared with December, 1912, the total operating revenues show a decrease of \$11,576,925. The total operating revenues per mile of line averaged \$1100 in December, 1913, and \$1160 in December, 1912, a decrease of \$60, or 5.2 per cent. Freight revenue per mile decreased 7.3 per cent, while passenger revenue per mile decreased 0.8 per cent.

Operating expenses, which include all the costs of maintaining track and equipment, operating trains, securing traffic, and

of administration, amounted to \$180,086,863. This was \$1,522,-631 more than for December, 1912. These operating expenses per mile of line averaged \$800 in December, 1913, and \$799 in December, 1912, an increase of \$1 per mile, or 0.1 per cent.

Net operating revenue, that is, total operating revenues less operating expenses, amounted to \$67,311,901. This was \$13,-099,556 less than for December, 1912. Net operating revenue per mile of line averaged \$299 in December, 1913, and \$360 in December, 1912, a decrease of \$61 per mile, or 16.9 per cent.

Taxes for the month of December amounted to \$11,320,885, or \$50 per mile, an increase of 7.2 per cent over December, 1912.

Operating income, which is net revenue from rail and outside

Table I—Summary for the Month of December. Revenues and Expenses of Steam Railroads, Compiled from Monthly Returns of the Railways to the Interstate Commerce Commission and Covering the Roads Included in the Monthly Report of that Commission which are Those Having Annual Operating Revenues of \$1,000,000 or Over.

ACCOUNT	UNITED STATES			
	Amount December 1913	Per mile of line	Increase per mile over December 1912	
			Amt.	Pct.
Total Operating Revenues	\$247 398 764	\$1 100	d \$60	d 5.2
Freight	168 380 649	748	d 59	d 7.3
Passenger	57 773 120	257	d 2	d 0.8
Other transportation	18 364 236	82	*	0.1
Non-transportation	2 880 759	13	*	6.3
Total Operating Expenses	180 086 863	800	1	0.1
Maint. of way and struct.	29 782 492	132	d 5	d 3.5
Maint. of equipment	43 679 286	194	7	3.6
Traffic	5 238 509	23	*	1.6
Transportation	94 365 628	419	d 4	d 0.9
General	7 020 948	31	2	8.4
Net Operating revenue	67 311 901	299	d 61	d 16.9
Outside Oper. - Net Revenue	def 263 333	def 1	---	---
Taxes	11 320 885	50	3	7.2
Operating Income	55 727 683	248	d 66	d 21.1
Average mileage represented ¹⁹¹³ ₁₉₁₂		224 990 223 347		

* Less than one dollar.

d Decrease.

def Deficit.

Table II—Summary for the Calendar Year 1913. Compiled from Monthly Returns of the Railways to the Interstate Commerce Commission and Covering the Roads Included in the Monthly Report of that Commission which are Those Having Annual Operating Revenues of \$1,000,000 or Over.

ACCOUNT	UNITED STATES			
	Amount 1913	Per mile of line	Increase per mile over 1912	
			Amt.	Pct.
Total Operating Revenues	\$3 075 112 243	\$13 723	\$485	3.7
Freight	2 131 912 118	9 514	312	3.4
Passenger	691 834 308	3 087	125	4.2
Other transportation	216 826 041	968	35	3.7
Non-transportation	34 539 776	154	13	9.0
Total Operating Expenses	2 189 563 930	9 771	668	7.3
Maint. of way and struct.	418 866 000	1 869	174	10.2
Maint. of equipment	526 860 068	2 351	231	10.9
Traffic	63 622 998	284	14	5.1
Transportation	1 103 274 467	4 924	226	4.8
General	76 940 397	343	23	7.3
Net Operating Revenue	885 548 313	3 952	d 183	d 4.4
Outside Oper. - Net Revenue	def 1 247 002	def 6	---	---
Taxes	130 543 407	583	44	8.1
Operating Income	753 757 904	3 364	d 239	d 6.6
Average Mileage Represented ¹⁹¹³ ₁₉₁₂		224 081 222 059		

* Less than one dollar.

d Decrease.

def Deficit.

operations, less taxes, averaged \$248 per mile of line, and in December, 1912, \$314, thus decreasing \$66, or 21.1 per cent. Operating income from each mile of line for each day in December averaged \$7.99 and for December, 1912, \$10.12. Operating income is that proportion of their receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and for dividends.

The operating ratio for December, that is, the per cent of total operating revenues absorbed in operating expenses, was 72.8 per cent, which is comparable with 70.8 per cent in November, 1913, and 69 per cent in December, 1912.

The railways of the eastern district show a decrease in total operating revenues per mile of line as compared with December, 1912, of 4.9 per cent, the railways of the southern district an increase of 5.4 per cent, and the railways of the western district a decrease of 9.2 per cent. Operating expenses per mile increased 2.2 per cent on the eastern railways, increased

TABLE III

SELECTED PERCENTAGES AND AVERAGES

(Roads having annual operating revenues of \$1,000,000 or over)

ACCOUNT	December								Fiscal year ending June 30		Six months ending December 31		Calendar year ending December 31		
	United States		Eastern District		Southern District		Western District		1913	1912	1913	1912	1913	1912	1911
	1913	1912	1913	1912	1913	1912	1913	1912							
PER CENT OF TOTAL OPERATING REVENUES:															
Freight revenue	68.1	69.6	69.0	70.9	69.7	69.7	66.4	68.3	69.8	68.7	68.7	69.6	69.3	69.5	68.4
Passenger revenue	23.3	22.3	21.9	20.6	22.6	22.6	25.2	24.1	22.2	23.2	23.4	22.7	22.5	22.4	23.6
Other transportation	7.4	7.0	7.8	7.4	6.6	6.6	7.4	6.7	6.9	7.1	6.8	6.7	7.1	7.0	7.0
Non-transportation	1.2	1.1	1.3	1.1	1.1	1.1	1.0	0.9	1.1	1.0	1.1	1.0	1.1	1.1	1.0
Maintenance of way and structures	12.0	11.8	12.2	11.7	11.7	12.3	12.0	11.8	13.3	12.7	13.5	12.9	13.6	12.8	12.7
Maintenance of equipment	17.7	16.2	20.0	17.8	17.6	16.6	15.1	14.3	16.4	15.9	16.9	15.4	17.1	16.0	15.7
Traffic expenses	2.1	2.0	1.9	1.7	2.3	2.3	2.3	2.1	2.0	2.1	2.0	1.9	2.1	2.0	2.1
Transportation expenses	38.2	36.5	41.4	39.0	33.9	34.2	36.4	34.7	35.2	35.9	34.5	33.2	35.9	35.5	35.4
General expenses	2.8	2.5	2.7	2.5	2.7	2.6	3.0	2.4	2.4	2.5	2.4	2.2	2.5	2.4	2.5
Total operating expense (excluding outside operations and taxes)	72.8	69.0	78.2	72.7	68.8	68.0	68.8	65.3	69.3	69.1	69.3	65.6	71.2	68.7	68.4
AVERAGES PER MILE PER DAY:															
Operating revenues per mile per day	\$35.47	\$37.40	\$59.17	\$62.19	\$32.59	\$30.90	\$25.32	\$27.90	\$37.76	\$34.78	\$39.00	\$39.22	\$37.60	\$36.27	\$34.25
Operating expenses per mile per day	25.82	25.79	46.26	45.25	22.24	21.01	17.43	18.22	26.17	24.05	27.02	25.74	26.77	24.94	23.44
Net operating revenue per mile per day	9.65	11.61	12.91	16.94	10.35	9.89	7.89	9.68	11.59	10.73	11.98	13.48	10.83	11.33	10.81
Operating income per mile per day	7.99	10.12	10.24	14.51	9.09	8.82	6.56	8.49	10.08	9.28	10.34	12.06	9.22	9.87	9.44

5.8 per cent on the southern railways, and decreased 4.3 per cent on the western railways. For the eastern railways net operating revenue per mile decreased 23.8 per cent, for the southern railways it increased 4.6 per cent, while for the western railways it decreased 18.5 per cent. Taxes per mile in the eastern district show an increase of 4.5 per cent, in the southern district an increase of 16.2 per cent, and in the western district an increase of 7 per cent. Operating income per mile decreased 29.4 per cent in the East, increased 3.1 per cent in the South, and decreased 22.7 per cent in the West.

Comparison of the returns for the six months of the current fiscal year with those of the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 0.6 per cent, an increase in operating expenses per mile of 5 per cent, and a decrease in net operating revenue per mile of 11.2 per cent. This net operating revenue per mile of the eastern railways decreased 17.1 per cent as compared with the corresponding period of the previous year, that of the southern railways increased 2.5 per cent, while that of the western railways decreased 9.4 per cent.

Compilation of December returns makes possible a summary of earnings and expenses for railways having total operating revenues of \$1,000,000 and over for the calendar year, 1913. These lines operate about 90 per cent of the steam railway mileage of the United States.

Total operating revenues for 1913 amounted to \$3,075,112,243. This is equivalent to an increase over the previous year of \$485, or 3.7 per cent, per mile of line. Freight revenue per mile increased 3.4 per cent, and passenger revenue per mile 4.2 per cent. Operating expenses amounted to \$2,189,563,930, which was an increase of \$668 per mile, or 7.3 per cent, over the calendar year, 1912. Net operating revenue amounted to \$885,548,313, representing a decrease of \$183 per mile, or 4.4 per cent, as compared with 1912. Operating income per mile of line decreased \$239, or 6.6 per cent.

The railways of the eastern district show a decrease in net operating revenue per mile of 9.1 per cent, railways of the southern district an increase of 4.3 per cent, and the railways of the western district a decrease of 2.5 per cent. All three districts show increases in total operating revenues per mile and in operating expenses per mile but in the eastern and western districts, these increased operating expenses more than balanced the increases in revenues. Taxes per mile increased 7.7 per cent in the East, 7.8 per cent in the South, and 8.9 per cent in the West. Operating income per mile decreased 12.6 per cent in the eastern district, increased 4 per cent in the southern district, and decreased 4 per cent in the western district.

Shop Output.—An important item which bears directly on shop output is the selection of engines for the shop. Oftentimes, in shop management, the boiler department is found to be loaded down to its full capacity, with the smith, machine or erecting departments able to take care of more work, and under conditions of this kind, the boiler work is naturally retarding the entire work and decreasing efficiency and output. Under such conditions as this, if engines requiring heavy machinery repairs and light boiler repairs can be selected for shopping, it balances up the three departments and the shop superintendent is in position to work them to their maximum capacity. The proper selection of engines for shopping can easily be determined at weekly meetings of the shop supervising force at which the detailed condition of each department of the shop is exposed. In large shops having transverse pits, it is always possible to handle one, and sometimes two, of the class "3" repairs on the pit assigned to an engine requiring a new boiler or firebox complete by removing the boiler to the boiler shop for necessary work and utilizing the pit for class "3" on other engines while the boiler work is being done on the first engine. This method makes possible an output of many more engines per month than is represented

by the number of pits operated in shop.—H. C. May, proceedings of the Western Railway Club.

Model D, American Electric Headlight.

The American locomotive electric headlight has been manufactured by the Remy Electric Co., Anderson, Ind., for a number of years, and the apparatus has been in constant and satisfactory service on a great many railroads. About ten months ago the company found opportunity to completely re-design the headlight; and the result is the model D, which is practically a new machine in all its detail parts, but retaining all the general principles of design which have given the machine its enviable reputation for serviceability in the past. The re-designing was done in a series of conferences embracing the entire engineering staff of the company. The object was to introduce such modifications of the individual parts as would make for greater efficiency of the unit as a whole. Minor changes would have accomplished this, but on account of the inter-relation of the parts, and for the purpose of obtaining certain advantages from the production standpoint, it was considered desirable to make the re-designing more comprehensive, with the result, as stated above, of practically a new machine. More than 1500 of these model D equipments have already been placed in service.

A side view of the model D American electric headlight is shown in the accompanying illustration, Fig. 2. The illustration Fig. 1, is an exterior view from the turbine end, and Fig. 3 shows the appearance from the generator end. The length of the machine over all, is 27¼ ins.; the width is 27½ ins., the height is 17 ins. and the weight is 240 lbs.

The rotating element of the machine is integral, comprising at one end the turbine wheel, and the armature of the generator at the other end, with the governor intermediate. The turbine wheel is built up of wrought steel plates and buckets of extruded brass formed to a scientifically perfect shape. The buckets are rigidly fixed between the two wheel plates, forming a simple design of the greatest possible strength, and one which requires no attention or adjustment whatever. The steam nozzle is mounted on the face of the turbine case and can readily be removed for inspection.

The working speed of the turbine is 2800 revolutions per minute. The steam consumption is 175 lbs. per service hour. It will handle full load at 90 lbs. boiler pressure, and the maximum steam pressure is rated at 250 lbs. The valve box, steam port and nozzle have been so designed as to prevent undue gathering of water in pockets, and air chambers are provided to permit of expansion should any freezing occur. The bearing on the turbine end of the shaft is made of phosphor bronze and is contained within a large oil reservoir. Lubrication is maintained by means of an oil ring on the shaft. Steam or condensation in the oil reservoir is automatically disposed of by means of a specially constructed overflow into the turbine case.

The function of the governor is to maintain constant generator speed, regardless of whatever amount the steam pressure may exceed the 90 lbs. minimum. It is the fly-ball type, having two weights acting against one coil spring. The thrust is transmitted by means of a large ball bearing. The valve is the balanced piston type and distinctive on account of its extreme simplicity, accessibility and minimum number of parts. It is self adjusting and an occasional inspection is the only attention required.

The generator is the bi-polar type, and has a rated capacity of one kilowatt. However it will endure a considerable overload without severe heating. The field coils are compound wound, thereby permitting the use of carb lamps and classification lamps, either in connection with or independent of the arc headlight. The fields, as indeed all parts of the generator, are readily removable for inspection or repair.

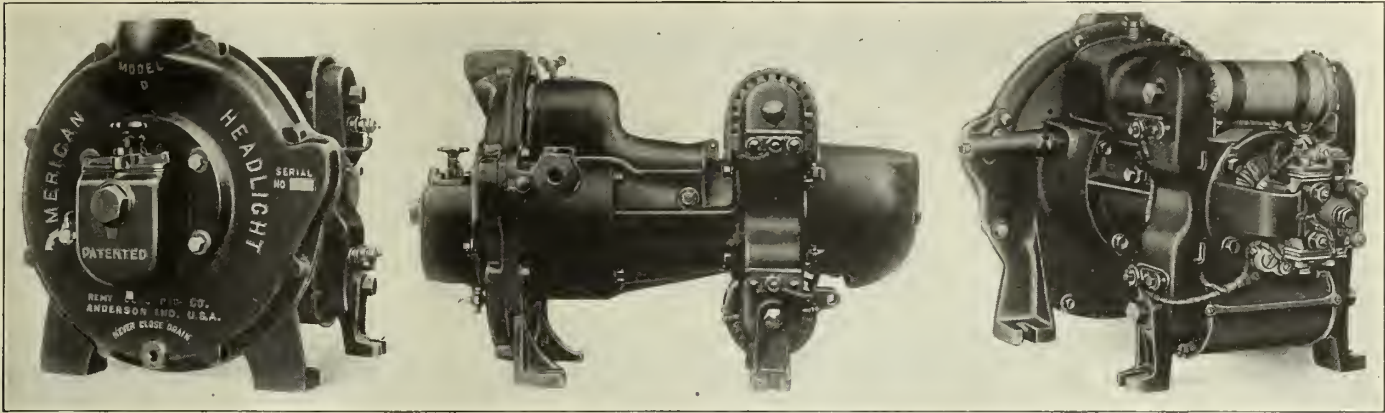


Fig. 1—American Electric Headlight, Model D, Turbine End.

Fig. 2—Side View, American Electric Headlight, Model D, Remy Electric Co., Anderson, Ind.

Fig. 3—American Electric Headlight, Model D, Generator End.

The armature is ring wound, on a laminated core, and is thoroughly impregnated with insulating varnish, to render it proof against heat, moisture and vibration. The coils do not overlap, and one burned out may easily be renewed. The spring tension on the brushes is readily adjusted and plenty of space is provided for cleaning the commutator. The commutator is built up on a substantial spider and may be renewed simply and readily in that form. The bearing at the armature end of the shaft is a non-adjustable high grade ball bearing of liberal size.

The general data of the arc lamp are as follows:

Height over all.....	26¼ ins.
Width	8½ ins.
Weight	18 lbs.
Voltage	28
Amperes	30
Maximum unreflected candle power.....	1700

The arc lamp, shown in the accompanying illustration, Fig. 5, is a feature of the equipment in which those responsible for it take much pride; for they have aimed to attain in it the utmost

with reflectors from 16 to 23 ins. in diameter. The upper half of the carbon guide bar is removable, thus enabling easy withdrawal of the reflector and lamp from the case. Standard copper coated carbons, 5⁄8x12 ins. in dimensions, are used, and one carbon will last about eight hours. The lower electrode is of copper, 9⁄16 ins. in diameter, and is retained in a holder so designed that the common troubles of heat warping and burning are overcome.

The Remy Electric Co.'s plant has recently been materially enlarged, and further additions will be made forthwith to care for the increasing business. The operations of the entire plant are adjusted on the latest basis of scientific efficiency, without the frills that impede rather than promote progress. The latest and most improved tools and machinery are installed throughout, and the greatest specialized attention is given to the production of the various parts. The lines of automobile equipment, which the Remy plant also produces, are such that their manufacture fits in well with the precise and painstaking methods appropriate to the manufacture of locomotive headlight equipment. Every machine is thoroughly tested out, and all adjustments made, before it leaves the shop.

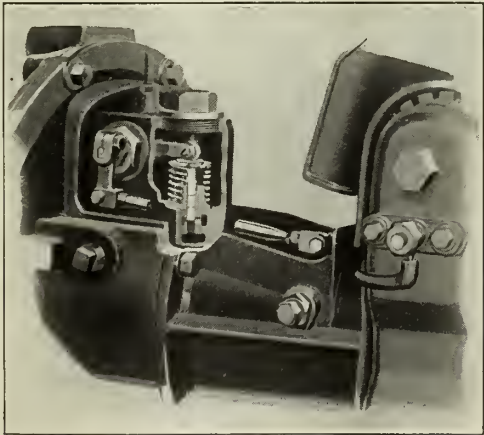


Fig. 4—American Electric Headlight, Model D, Sectional View to Show Valve.

simplicity, and consider it even more clever in design than the turbine generator. The arc lamp is either directly or indirectly responsible for most of the troubles that are experienced with electric headlights, and in this instance the rugged construction and minimum number of parts are intended to give the maximum reliability. The clutch mechanism insures correct manipulation of the carbon, and can be removed entire without the use of tools. In adjusting the feed of the carbon a considerable latitude of spring action is possible within which the lamp will operate satisfactorily. Adequate and easy means are provided whereby the arc can be adjusted to focus properly in any of the standard designs of cases

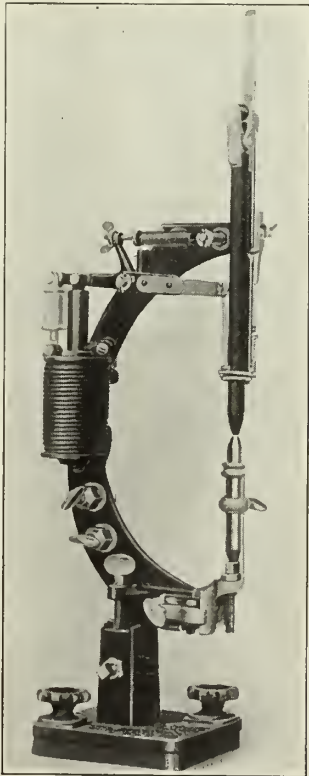


Fig. 5—Arc Lamp, Model D American Electric Headlight

The Railway Supply Man's Point of View

Waiting.

The word "waiting" very well describes the position in which the average railway supply manufacturer finds himself at this time. The thing about it is that he has been in this waiting position for several years now, and his condition is getting to be chronic, so chronic in fact that he is wondering if it is going to settle down to a permanent situation. While, of course, there is always a moderate amount of business being transacted between the railroads and the men who furnish them with material, supplies, and equipment, still the amount of business that is being done right now is not large enough to make the average railway supply man feel particularly enthusiastic regarding the line of business in which he is engaged.

"He truly serves who stands and waits" may be a very true saying, but service of this kind gets to be very monotonous after a few years. Right now, of course, the railway supply man is looking a little bit harder for business than he would if there were plenty of it in sight, and while he is waiting, he is also watching—and watching very carefully for every opportunity to help orders materialize. Whenever you see a group of railway supply men, or meet with them, and overhear what they are talking about, the subject of conversation is very sure to sooner or later come around to the point of discussing the question as to just when railroads are going to begin buying again.

Of course for many months the proposed five per cent rate increase has been constantly uppermost in the minds of railway supply men. They have been hoping that this will be granted, and that it will be granted in the near future. They have felt that with this concession to railroads the bars will be let down, and their plants will be flooded with orders from railroad companies, who have been practicing the severest economies for a number of years.

As long as they have been waiting, they have been living in hopes. Now the five per cent increase seems to be further off than ever, and the railway supply man is once more getting some further practice in the art or science of waiting.

True, in this waiting period there is an opportunity for the manufacturer of railway supplies to take stock with himself and see whether that which he is manufacturing and offering for sale is being turned out with the greatest possible economy. It is a good time to look into the overhead charges; a splendid opportunity for analyzing manufacturing costs, and what is of still more importance, it is a good time to look into the sales expense. The sales expense of a railway supply manufacturer is not small; in fact, it is large, and it seems to be necessarily so.

Apparently the selling of railway supplies should be conducted with economy, inasmuch as that which is sold is sold to comparatively few, and the gross amounts are large. However, the selling of equipment to one railroad does not mean the dealing with one man; it means the dealing with a great many men, and to place any appliance upon a railroad means that a great many departments and a great many individuals on that special railroad have to be satisfied that what is to be bought is to render the best service for the least amount of money.

During this period of waiting the opportunity presents itself to the average railway supply manufacturer for doing a large amount of educational work, making every man on a railroad who is interested in his special appliance more thoroughly familiar with it, and with what it can do. To do this means a very large sales expense. To do it by advertising means a great-

ly reduced expenditure. At the same time, railroad men generally keep themselves very well informed, and go very thoroughly into the merits of equipment which they are using.

Probably during this waiting period, the time is most opportune for conducting an advertising campaign of the right kind. The railroad man right now is not in the mood where he is thinking of buying. Probably for this reason, now is a better time for educating him from a railway supply man's viewpoint than if he were buying, and it is through advertising that this educational work can be done economically, and if the railway supply man handles the matter with intelligence, it can be done practically. Then, when the waiting period is over, the manufacturer who has been doing judicious advertising is going to be in a far stronger position than ever before, and he will have gained that position without any unwarranted expenditure of time or money.

Supply Trade Notes.

—Westinghouse, Church, Kerr & Co., 37 Wall street, New York City, have established a laboratory for the purpose of testing concrete aggregates, water-proofing materials, investigating paints and preservative coatings for steel and concrete.

—D. R. Niederlander has been elected president of Adreon Manufacturing Co., St. Louis, Mo. The announcement is made also that this company maintains a branch at Montreal, Que., with O. W. Meissner as representative.

—The annual report of the Pressed Steel Car Co. was reviewed in a previous issue. We quote here President N. Hoffstot's remarks with reference to the company's passenger car department: "The passenger car department has continued to contribute to the earnings during the past year, and, while your plant was the first to build steel passenger cars, at no time has the output been large. Since it is quite probable, however, that the future will bring an increased demand for this class of equipment, your board of directors has authorized doubling the capacity at an expenditure of about \$500,000. Plans are well under way for the erection of buildings, and these improvements will not only increase the capacity, but will at the same time reduce the cost of the entire output of this department."

—The Safety First Manufacturing Co. has been organized with offices in the Railway Exchange, Chicago. They will handle various high class railway specialties, besides taking over the business of the E. D. E. Co., of which the late Frank M. Gilmore was president.

—In its report for the year ending December 31, 1913, the Baldwin Locomotive Works shows gross sales amounting to \$37,630,969, an increase of \$8,706,634. Owing to an advance of \$8,373,829 in expense deductions, however, the manufacturing profit was reduced to \$3,886,475, a gain of only \$333,806. Other income, including dividends of the Standard Steel Works Co., increased the year's total net to \$4,673,638. From this was deducted \$665,838 for bond interest, deposit accounts, etc., leaving a balance of \$4,017,800, which, after the payment of 7 per cent, or \$1,400,000, on the preferred stock left a surplus of \$2,617,000, equivalent to 13.8 per cent on the \$20,000,000 outstanding common stock, compared with 11.4 per cent earned on the same stock in 1912. During the year the foundations have been constructed for the proposed shops at East Chicago. The total amount invested there in land and improvements is \$256,820. Alba B. Johnson, president of the company, in his remarks to stockholders, said, in part: "During the early part of 1913 orders were received sufficient to

provide a satisfactory volume of work throughout the first nine months, but there was a considerable recession of business during the last three months. While the value of orders carried over into 1914 is comparatively small, there appear to be prospects of early improvement."

—Net earnings of the Chicago Railway Equipment Co. for the fiscal year ended December 31, 1913, were \$374,916, or 15.8 per cent on the issued capital of \$2,486,000. The company paid dividends of 7 per cent, leaving a surplus for the year of \$174,020. The balance sheet follows:

Balance Sheet—Assets.

	Dec. 31, 1913.
Real estate, etc.	\$1,686,428
Good will and patents	774,895
Inventories	867,873
Investments at book value	19,485
Accounts and bills receivable and cash	594,147
Prepaid insurance	1,789

Total\$3,944,618

Liabilities.

Capital stock authorized	\$2,500,000
Issued	\$2,486,000
Bills payable	100,000
Trade liabilities	114,563
Miscellaneous reserves	328,955
General reserve	500,000
Undivided profits	415,100

Total\$3,944,618

President E. B. Leigh said:

"Your president's last annual report referred to 1912 as having been a remarkable year; the same may be said of the year just closed. Many of the conditions of 1913, however, were almost the converse of those of 1912.

"In 1912 we experienced a curtailment of business in the early part of the year—followed by a sharp upward trend, and closing with an almost unprecedented volume carried over into 1913. This was further augmented during the first three months of the year, after which our orders rapidly declined. The last half of the year recorded almost the lowest ebb ever known—the number of unfinished orders on hand at the end of 1913 being the smallest of any year, save one—1909.

"The general business, however, maintained a high level almost to the close of the year. Shipments (and consequently business done, continued heavy up to December, even December itself being a fair month. This condition was due to the large volume brought over into 1913, and the business initiated in the early part of the year, plus the accretions during its first half, which latter, although relatively small and steadily declining, were nevertheless a factor in continuing the volume of output. It was this continuing condition of present good business which, in many directions, appeared to obscure the impending and actual falling off of new business, and its inevitable results.

"It is confidently believed that had the Eastern railways been granted the advance in rates asked for June last, such action on the part of the Interstate Commerce Commission would have so restored confidence in railway credit, and encouraged continued railway purchases—at least, to the extent necessary to have so reinforced the volume of unfinished business, as to have not only very materially increased the business done, but doubtless would have averted the present unsatisfactory condition."

RAILWAY NEWS.

Atchison, Topeka & Santa Fe.—The Atchison, Topeka & Santa Fe Ry. has announced that through transcontinental freight service was inaugurated over the Lubbock-Texico cut-off, by way of Coleman, Tex., between Galveston and

the Pacific Coast, beginning March 1. The new service will be almost 24 hours shorter than the previous running schedule.

Atlanta & Carolina.—See New Roads and Projects under Georgia.

Atlantic Coast Line.—Directors of the Atlantic Coast Line R. R. have called a special meeting of stockholders at Richmond, Va., on April 1, to create a new mortgage of \$200,000,000, under which bonds can be issued at varying interest rates. Of the new bonds, about \$25,000,000 will be reserved for refunding, leaving \$175,000,000 to provide for other needs. The company, it is said, has decided to forego further bond issues under a \$200,000,000 united mortgage created in 1909, on which interest rate was fixed at 4 per cent and under which \$9,667,000 bonds have been issued. A prevailing market price of 93 has made it inadvisable to put out further securities under this mortgage owing to heavy bond discount, which would have to be written off.

Chesapeake & Ohio.—The Chesapeake & Ohio Ry. has sold \$33,000,000 five-year 5 per cent notes to bear interest from June 1, 1914, and mature June 1, 1919. They are from an authorized issue of \$40,000,000, the remaining \$7,000,000 of which will not be sold prior to July 1, 1915, without the consent of the bankers. An underwriting syndicate is being formed and a public offering of the issue will be made at 97 to yield 5.70 per cent. The road received 96 for the notes, less a commission to the bankers. The most important development resulting from the sale of the notes, it is said, promises to be the question of the ability of the road to continue dividends at the rate of 4 per cent through the life of the notes. Under the sale agreement the Chesapeake & Ohio must in the five years spend out of earnings a total of \$17,000,000 for improvements, including the payment of equipment trusts, before any dividend can be paid—\$2,000,000 in the year ended June 30, 1915; \$3,000,000 in 1916, and \$4,000,000 each year in 1917, 1918 and 1919.

Chicago, Rock Island & Pacific.—Rock Island preferred and common stockholders have formed a protective committee to care for their interests. The stockholders' committee is composed of William A. Read, Arthur Curtiss, James W. C. Osborn, Ogden Mills, Francis L. Hine, Andrew J. Miller and Benjamin Strong, Jr. The Bankers' Trust Co. has been appointed depository and Hornblower, Miller & Potter and Cadwallader, Wickersham & Taft have been retained as counsel. F. E. Mowle, 28 Nassau Street, has been appointed secretary, and B. W. Jones, 16 Wall Street, New York, assistant secretary.

The reason assigned for the formation of the protective committee by the holders of the collateral trust 4 per cent gold bonds of 2002 of the Chicago, Rock Island & Pacific R. R. Co. is that the surplus of the Chicago, Rock Island & Pacific Ry. Co. for the six months ended December 31, 1913, was less than \$5,000, and that the company does not expect to declare further dividends during the current fiscal year ending June 30, 1914, on the railway company's stock, and that therefore the company will have no resources for the payment on May 1 of the coupons then maturing upon the collateral trust bonds. The security for the collateral trust 4s of the railroad company is the stock of the railway company, which is equal to par amount to the principal of the outstanding bonds and the interest thereon has been paid out of the dividends received on the stock of the railway company. Members of the bondholders' protective committee which was formed February 26 are James N. Wallace, James Brown, Bernard Baruch, Henry Evans and Fred S. Strauss.

On March 5 T. M. Schumacher, chairman of the board of directors of the Chicago, Rock Island & Pacific R. R. Co., according to press dispatches, made known the result of his recent investigation of the Rock Island lines, including their present cash needs and future requirements. It is estimated that \$20,000,000 will be required by July 1 next to meet bonds and car trust certificates maturing, floating indebtedness, including \$1,500,000 due the railroad company, and interest payments, together with other pressing obligations. Cash on hand and net earnings will provide \$8,000,000 and short term notes, which it is proposed to issue, \$7,500,000, but there will then remain \$4,500,000, it is estimated, which must be provided before July 1, 1914. Mr. Schumacher is quoted as advising also against the payment of the dividend due May 1. The estimated total requirements for the next five years are given in the report as not less than \$50,000,000, including betterments and maturing car trust certificates of \$12,000,000. Against these requirements the company now has treasury bonds of \$15,000,000, and will receive in five years, at the rate of \$3,500,000 annually, \$17,500,000 of 4 per cent refunding mortgage bonds. The company's other needs are gone into

at length, including the obligations of the operating company (the Illinois corporation), which is responsible for \$266,000,000 of outstanding bonds. Mr. Schumacher is quoted as saying in conclusion: "Unless some plan can be devised which has a good prospect of accomplishing these results, and which is fair to all classes of security holders, including the 4 per cent bonds represented by your committee, the management that I represent will feel it inadvisable to continue in charge of the property."

Detroit, Toledo & Ironton.—The public utilities commission of Ohio on March 4 approved the plans for reorganization of the Detroit, Toledo & Ironton R. R., involving the issuance of securities aggregating \$22,500,000. The issue of securities includes \$2,000,000 bonds, the proceeds of which are to be used for equipment and betterments; \$8,000,000 bonds for redeeming indebtedness; \$6,000,000 preferred stock and \$6,500,000 common stock. Under the reorganization plans the capitalization will be reduced \$26,684,384 and the road will be unified between Ironton, Ohio, and Detroit, Mich. The committee which effected the reorganization for holders of first mortgage bonds of the old road consists of: William Church Osborn, of New York, chairman; Otto T. Bannard, Sidney C. Borg and Frederick H. Ecker. The Michigan railroad commission has also taken favorable action upon the plan for reorganization.

Florida, Alabama & Gulf.—Bondholders of the Florida, Alabama & Gulf R. R. filed a petition in Federal court at Pensacola, Fla., February 27, asking that a receiver for the company be appointed. The petition alleges that the company has defaulted in interest. W. N. Roberts, former assistant cashier of the First National bank of Pensacola, on March 1 was named receiver for the road.

Illinois Terminal.—The Illinois Terminal R. R., which recently increased its authorized capital stock from \$500,000 to \$5,000,000, made a mortgage to the First Trust & Savings Bank of Chicago, as trustee, to secure not exceeding \$5,000,000 first mortgage 5 per cent bonds dated December 1, 1913, and due December 1, 1938, present issue to be \$1,500,000. The shareholders voted on December 23, 1913, to sell the control to a St. Louis syndicate, and under the terms of sale all stock and other securities were deposited with trustee to be delivered to purchasers as soon as payments should be completed. The company owns a steam road extending from Alton to Hartford, Ill., 6½ miles, and from Cotters to Le-Claire, 3½ miles, and leases from the Wabash Railroad, Hartford to Edwardsville Junction, 6.80 miles, and from Edwardsville Junction to Edwardsville, 2 miles. The new bonds will be used to retire outstanding bonds and also to extend the line from Alton to East Carondelet, also to purchase certain branch lines between Alton and East Carondelet, which when connected up will form an outer belt line around East St. Louis.

Northern Pacific.—It is stated that the Northern Pacific Ry. will have the entire Portland-Puget Sound division in operation as a double track road by next September. The road will expend \$4,000,000 or \$5,000,000 this year for betterments, equipment, safety devices and construction work.

Pennsylvania Railroad.—The total revenues of the Pennsylvania Railroad from rail operations for 1913, according to the company's annual report for the year ended December 31, exceed those of any previous year in the history of the company, being 6.18 per cent greater than the revenues in 1912. While the revenues increased 6.18 per cent, the total expenses of rail operations show an increase of 8.96 per cent compared with the previous year. Expenditures for maintenance of way and structures in 1913 were \$24,116,756, an increase over 1912 of 14.28 per cent; \$38,853,179 for maintenance of equipment was an increase of 7.66 per cent; and transportation expenses, \$67,943,268 for 1913, increased 8.03 per cent. Year ended December 31, 1913:

		Increase.
Gross earnings	\$185,400,825	\$1,793,227
Operating expenses	137,987,401	11,349,456
Net earnings	47,413,424	*556,229
Outside operations, debentures.....	1,904,281	756,295
Total net	45,509,143	*1,312,524
Operating income	38,182,483	*1,510,650
Other income	19,520,415	223,140
Total income	57,712,898	*1,287,510
Interest, rents, etc.....	15,792,066	*1,054,379
Balance	41,920,832	*4,773,575
Sinking and other reserve funds.....	1,882,775	744,149
Balance	40,038,057	*977,280
Principal car trusts.....		*2,901,727
Balance	40,038,057	1,924,447

Dividends	28,394,247	1,195,329
Balance	11,643,810	729,118
Additions and betterments	11,103,206	1,849,620
Surplus	540,604	*1,120,502
Previous surplus adjustment.....	28,486,576	1,612,706
Total surplus	29,027,180	492,204

*Decrease.

Pere Marquette.—The receivers of the Pere Marquette R. R. are said to have prepared and sent forward to the trustees of the various bond issues of the road copies of a petition which will be filed shortly in the United States Court. The petition will ask the court to organize a new issue of receivers' refunding certificates in an amount sufficient to care for obligations amounting to \$12,614,894.24. The receivers hold that such an issue is necessary to keep the property together and that keeping the property together is the only way to safeguard the interests of the State of Michigan and the myriad of creditors, bondholders, stockholders and others financially interested in the successful maintenance of the company. The receivers will have 60 days in which to evolve a plan of financing the road.

D. E. Waters, one of the receivers of the Pere Marquette R. R., in speaking at Grand Rapids, Mich., of the filing of a petition in the United States District Court for permission to issue receivers' refunding certificates to care for obligations amounting to in excess of \$12,000,000, is quoted in part as saying: "What the Pere Marquette needs is an increase in its passenger and freight rates. Without that it cannot live and give the service people expect of it. Without this increase the road will be unable to buy the equipment it so much needs. The physical condition of the road is excellent and the automatic systems installed make it as safe as any in Michigan."

St. Louis & San Francisco.—Contract has been awarded to Burk & McNerny, Fort Smith, Ark., for grade and line improvements on the Ozark & Cherokee Central line of the St. Louis & San Francisco R. R. The work, it is said, will cost about \$100,000. Included in the improvements will be the elimination of nine trestles, which will be replaced with fills. Many grades will be reduced. Work will start at Lincoln, Ark., and proceed westward.

St. Louis Southwestern Ry.—The St. Louis Southwestern Ry. has applied to the Missouri public service commission for authority to issue \$1,234,000 bonds for improvements.

Western Maryland.—A press dispatch says that with the advent of Carl R. Gray as president, the Western Maryland Ry. is to increase its facilities, and it is understood that Mr. Gray will immediately begin the formation of plans to double-track the main line, and in this connection it may be necessary to relocate the road through the Blue Ridge mountains.

PERSONALS.

W. C. Loree has resigned as general manager of the Baltimore & Ohio Southwestern R. R. and the Cincinnati, Hamilton & Dayton Ry.

J. M. Fitzgerald, president of the Western Maryland Ry., has resigned.

Carl R. Gray, president of the Great Northern Ry., has been elected president of the Western Maryland Ry., to succeed J. M. Fitzgerald. He will also succeed Edward D. Adams as chairman. Mr. Gray will make his headquarters in Baltimore, Md.

D. S. Kamerer has been appointed assistant general manager of the Chicago Terminal division of the Erie Railroad, with headquarters at Chicago.

H. L. Reed, superintendent of the St. Louis division of the Chicago, Rock Island & Pacific Ry., at Eldon, Mo., has been appointed superintendent of the Nebraska division, with headquarters at Fairbury, Neb., vice A. W. Kelso, resigned.

H. E. Correll, train master of the Chicago, Rock Island & Pacific Ry. at Eldon, Mo., has been appointed superintendent of the St. Louis division, with headquarters at Eldon, succeeding H. L. Reed, transferred.

H. H. Germain has been appointed superintendent of special service of the Rock Island Lines, with headquarters at Chicago, effective March 1. The special service department has just been established. Mr. Germain has appointed the following district special agents: F. E. McGrath, First district, Des Moines, Iowa; M. A. Long, Second district, Topeka, Kan.; H. F. Clifton, Third district, El Reno, Okla.

F. A. Peil has resigned as assistant secretary of the Oregon Trunk Ry.

John W. Everman, general superintendent of the Texas & Pacific Ry. at Dallas, Tex., has been elected president of the Union Depot Company of El Paso, Tex.

Joseph W. Folk, solicitor of the State Department, has accepted the new post of chief counsel for the Interstate Commerce Commission. The commission announced February 27 that Dr. Charles W. Needham, former president of George Washington university, had been appointed assistant counsel. Both appointments were effective March 1.

H. Weitzel has been appointed assistant superintendent of the Phoenix and Hayden divisions of the Arizona Eastern R. R., with headquarters at Phoenix, Ariz., effective February 24, vice D. Reid, resigned.

F. A. Brainerd has been appointed superintendent of the Vancouver division of the Spokane, Portland & Seattle Ry. and of the Oregon Trunk Ry., with headquarters at Vancouver, Wash.

T. B. Copping, whose appointment as superintendent of transportation of the St. Louis & San Francisco R. R. has been noted in these columns, began his railroad career with the Louisville & Nashville R. R. as a station helper and operator in 1878. After a service of about two years as telegraph operator, he took service with the Cincinnati, New Orleans & Texas-Pacific Ry., and remained with them for eleven years, being located at Somerset, Ky., as operator, train dispatcher, chief dispatcher, train master, freight conductor and general yard master. Mr. Copping was afterwards in service of the former Louisville, New Orleans & Texas Ry. at Greenville, Miss., as assistant superintendent for two years; then with the Atchison, Topeka & Santa Fe Ry. at Marcelline, Mo., as chief dispatcher for a period of about a year. From there he went to the St. Louis, Iron Mountain & Southern Ry. at Van Buren, Ark., as chief dispatcher and train master for a period of six years; then to the Gulf, Colorado & Santa Fe Ry. at Temple, Tex., as train master and superintendent for a period of about five years, and thence to the Frisco Lines April 1, 1907, in the position of superintendent.

P. L. McManus, whose appointment as general superintendent of the Chicago, Indianapolis & Louisville Ry. was previously announced in these columns, was born at Chatham, Ill., June 22, 1865. He received a public school education and entered railroad work as water boy on the section with the Chicago & Alton R. R. at Chatham, Ill., in 1879, and was successively section laborer, clerk to road master, telegraph operator, agent, train dispatcher, brakeman and switchman with that company until 1895; with the Elgin, Joliet & Eastern Ry. as telegraph operator, cashier, agent, general agent and general yard master at Joliet, Ill., until 1902; with the Southern Railway from 1902 until 1910 as traveling yard master, inspector of transportation, chief clerk to the vice-president and general manager, assistant superintendent, division superintendent and assistant general manager. During the year of 1910 Mr. McManus engaged in the coal mining business as secretary and general manager of the Barney Coal Co., at Birmingham, Ala. In 1911 he accepted a position with the Chicago & Alton as yard master and he later served as train master and superintendent terminals of that road. From March, 1911, to April, 1912, he was inspector of transportation, Chicago, Indianapolis & Louisville, and in April, 1912, became superintendent of the same road at Lafayette, Ind. His appointment as general superintendent of that company was effective February 15.

J. M. Davis has been appointed general manager of the Baltimore & Ohio Southwestern R. R. and the Cincinnati, Hamilton & Dayton Ry., with headquarters at Cincinnati, Ohio, succeeding W. C. Loree, resigned. The appointment, which is announced by Vice-President A. W. Thompson, head of the operating department, is effective at once. Mr. Davis has been assistant general manager since January 1.

L. W. Hill, chairman of the board of directors of the Great Northern Ry., was elected president of the company at a special meeting of the board of directors March 3. He will retain the title of chairman of the board ex officio. The resignation of C. R. Gray, who has accepted the presidency of the Western Maryland Ry., was accepted by the board.

W. H. De France, superintendent of the Louisiana division of the Texas & Pacific Ry., has removed his headquarters from New Orleans to Alexandria, La., and, effective March 1, the limits of the Louisiana division are from the east limits at Marshall to the west yard limits at Addis.

T. S. Mahoney, superintendent of terminals of the Texas & Pacific Ry. at New Orleans, effective March 1, was ap-

pointed superintendent of the newly established New Orleans division. This division embraces the former New Orleans Terminal division and that part of the old Louisiana division from New Orleans to and including Addis yard and the Port Allen branch, including main line and branches.

W. E. Lefavere, effective March 1, was appointed purchasing agent of Denver & Rio Grande R. R., vice Thomas Tipton, resigned.

H. A. Butler has been elected president and general manager of the Maunch Chunk Switchback Ry., to fill the vacancy caused by the death of Asa P. Blakslee.

William R. Scott, whose election as vice-president of the Southern Pacific Co. was noted in a previous issue, was born November 8, 1860. He received a public school education and entered railway service in 1881, since which time he has been consecutively to July 12, 1884, locomotive fireman, Atchison, Topeka & Santa Fe Ry.; July 12, 1884, to July 1, 1891, locomotive engineer; July 1, 1891, to August 15, 1898, traveling engineer same road; August 15, 1898, to June 1, 1900, trainmaster Northern division, Gulf, Colorado & Santa Fe Ry.; June 1, 1900, to March 1, 1901, division superintendent same road at Cleburne, Tex.; March 1, 1901, to July, 1903, general superintendent, Fort Worth & Denver City Ry.; September to November, 1903, assistant superintendent, Sacramento division, Southern Pacific Co.; November, 1903, to June 1, 1905, superintendent Salt Lake division same company; June 1, 1905, to September 1, 1907, superintendent Western division same company; September 1, 1907, to November 1, 1907, general superintendent; November 1, 1907, to July 15, 1912, assistant general manager; July 15, 1912, to February 1, 1914, general manager. Mr. Scott on the latter date was elected vice-president and general manager of the South Pacific Co.

TRAFFIC.

F. R. Dalzell, division freight agent of Gulf, Colorado & Santa Fe Ry. at Dallas, Tex., has been appointed assistant general freight agent with office at Galveston, Tex., succeeding A. C. Fonda, who resigned to become head of the Texas Traffic Bureau. On account of his wish to locate in North Texas, A. Landry, hitherto assistant general freight agent at Galveston, will succeed to the position made vacant by the transfer of Mr. Dalzell.

H. R. Griswold, assistant general freight agent of the Pennsylvania Lines West of Pittsburgh, with office at St. Louis, Mo., has been appointed general freight agent of Grand Rapids & Indiana Ry., with office at Grand Rapids, Mich., succeeding the late E. C. Leavenworth.

George T. Solar, commercial agent of the Central of Georgia Ry. at Cincinnati, Ohio, has resigned to engage in other business.

Ira H. Hubbel has been appointed assistant freight traffic manager of the New York Central Lines, with office at New



W. R. Scott, Vice-President and General Manager of the Southern Pacific Co.

York, in place of Herbert D. Carter, deceased. William A. Newman has been appointed general freight agent at New York, vice Mr. Hubbel, promoted. These appointments were effective March 1.

Harlan MacMillan has been appointed general agent of the Rock Island Lines, with headquarters at Mason City, Iowa, effective March 1.

M. E. Newell, commercial agent of the Tennessee Central R. R. at Chicago, has been appointed general freight agent, with headquarters at Nashville, Tenn. A. E. Yardley succeeds Mr. Newell.

C. E. Naylor has been appointed district passenger agent of the Texas & Pacific Ry., with headquarters at New Orleans, La.

V. J. Kaiser has been appointed commercial freight agent of the Missouri Pacific, St. Louis, Iron Mountain & Southern, Denver & Rio Grande and Western Pacific railways, with office at Sedalia, Mo., succeeding W. B. Shirk, promoted.

ENGINEERING.

F. D. Griffin, division engineer of the Gulf, Colorado & Santa Fe Ry. at Temple, Tex., has been appointed assistant engineer, with office at Dallas, Tex., in charge of construction of the new passenger terminal in that city.

G. W. Hulsizer, signal engineer of the Chicago & Alton R. R., has been appointed superintendent of telegraph, with headquarters at Bloomington, Ill., vice T. M. Haston, resigned.

J. K. Conner, who has been appointed chief engineer of the Lake Erie & Western R. R. and the Northern Ohio Ry., was born at Wabash, Ind., April 12, 1871. He was educated at Rose Polytechnic Institute and then for four years was engaged in county and municipal work. He entered railway service in 1895 as assistant engineer and supervisor of track, Cleveland, Cincinnati, Chicago & St. Louis Ry. He was with that company for four years, then was assistant engineer of the Baltimore & Ohio Southwestern R. R. for a year, and from 1900 to 1901, assistant engineer of the New York Central & Hudson River R. R. Mr. Conner was then for two years bridge draughtsman and designer with the Lake Shore & Michigan Southern Ry., two years with the Lake Erie, Alliance & Wheeling R. R. as resident and division engineer and a year with the Lake Shore & Michigan Southern Ry. as assistant engineer. He was appointed first assistant engineer of the Lake Erie & Western R. R. in 1906. His appointment as chief engineer of that road was effective March 1.

J. R. McGraw, division engineer of the Buffalo division of the Pennsylvania Railroad, has been appointed division engineer of the Maryland division of the Philadelphia, Balti-

more & Washington R. R., at Wilmington, Del., succeeding J. C. Auten, promoted. E. B. Wiseman succeeds Mr. McGraw as division engineer at Buffalo, N. Y. J. B. Hutchinson, Jr., has been appointed division engineer of the Monongahela division of the Pennsylvania at Pittsburgh, succeeding Mr. Wiseman and W. B. Thomson, division engineer of the Williamsport and Susquehanna divisions, at Williamsport, Pa., succeeding Mr. Hutchinson; H. L. Thomas, supervisor on the South West Pennsylvania R. R., has been promoted to division engineer of the Elmira division of the Northern Central Ry., at Elmira, N. Y., in place of Mr. Thomson. Supervisors have been appointed as follows: C. W. Montgomery, Philadelphia division; W. E. Brown, Middle division; W. E. Dunbar, Renova division; J. E. Zullinger, assistant supervisor, Philadelphia division, and M. L. Smith, assistant supervisor, Pittsburgh division.

S. M. Bate, formerly division engineer of the New Orleans, Texas & Mexico R. R. and the Beaumont, Sour Lake & Western R. R., at De Quincy, La., has been appointed division engineer of the Missouri Pacific Ry., with office at St. Louis, Mo.

E. L. Crugar, assistant chief engineer of the Chicago & Alton R. R., at Chicago, has resigned and his former position, it is understood, has been abolished.

Maurice Donahue, supervisor of the Chicago & Alton R. R. at Bloomington, Ill., has been appointed roadmaster of the Southern division, with office at Bloomington; J. P. Corcoran, supervisor at Joliet, Ill., has been appointed roadmaster of the Northern division, with headquarters at Bloomington, and A. A. Cline has been appointed roadmaster of the Western division, with headquarters at Mexico, Mo.

F. H. Buchanan, whose appointment as signal engineer of the Pennsylvania Lines West of Pittsburgh was announced in our previous issue, was born in Warren county, Pa., March 3, 1869. His signal experience has covered a period of 26 years, 17 of which have been with the Pennsylvania Lines West of Pittsburgh, in various capacities, signal foreman, supervisor and inspector. Previous to his recent promotion which took place March 1, Mr. Buchanan was supervisor of signals, Vandalia Railroad, with headquarters at Terre Haute, Ind.

MECHANICAL.

J. H. Ruxton, effective March 1, was appointed superintendent of motive power of the San Antonio, Uvalde & Gulf R. R., with headquarters at Pleasanton, Tex.

George St. Pierre, master mechanic of the San Francisco-Oakland Terminal Rys., has been appointed superintendent of equipment, Oakland, Cal.

A. G. McClellan, master mechanic of the Chicago & Alton R. R. at Bloomington, Ill., has resigned and his duties will devolve on M. J. McGraw. Mr. McClellan has been appointed foreman of locomotive repairs at Bloomington, succeeding W. H. Wundrie, assigned to other duties.

W. A. Deems, general foreman of the Cincinnati, Hamilton & Dayton Ry., at Lima, Ohio, has been transferred to the Glenwood shops of the Baltimore & Ohio R. R. at Pittsburgh, Pa. W. H. Keller, general foreman of the Baltimore & Ohio Southwestern R. R. at Flora, Ill., succeeds Mr. Deems at Lima.

OBITUARY.

J. C. Stuart, former vice-president of the Erie Railroad, died at the Garden City hotel, Garden City, L. I., March 4, aged 53 years. Mr. Stuart was relieved of the duties of vice-president on account of ill health on January 1, and since then has been assistant to the president. He took up his life's work while hardly more than a boy. In January, 1888, he was made chief train dispatcher of the west division of the Chicago & North Western Ry., a position he held until June, 1890. Then he was made assistant superintendent of the Galena division in June, 1892. This position he held until February, 1898, when he accepted the position of general superintendent of the Chicago, St. Paul, Minneapolis & Omaha Ry. Two years later he went to the Baltimore & Ohio R. R. as general superintendent of the middle and northwestern divisions. In September, 1901, he was promoted to general superintendent of transportation of the Baltimore & Ohio system. Mr. Stuart took service with the Erie Railroad on January 1, 1903, when he was made general superintendent of the Ohio division and Chicago & Erie. After a year's work he was made general manager of the Erie, the position he held up to the time of his appointment as vice-president in November, 1909. In 1912 Mr. Stuart was chairman of the general managers' committee of eastern roads which successfully carried through the arbitration with the engineers.



Hunter McDonald, Chief Engineer of the N., C. & St. L. Ry., Who Was Recently Elected President of the American Society of Civil Engineers.

John Sebastian, former vice-president of the Chicago, Rock Island & Pacific Ry., died March 1, at his home in Evanston, Ill. He had resigned as vice-president on January 1, 1914, on account of ill health after devoting 36 years in the service of the company. President Mudge of the Rock Island Lines says with reference to his work that it was he who originated the system of railroads providing farm lands at little cost along their lines to worthy farmers. It was his mind that conceived the idea that railroads in the West should co-operate with honest men, help them to establish themselves and by the success of the men so helped build up valuable business for the roads. "He was the pioneer in experimental farming. Few men have been of more practical service to their country." Mr. Sebastian was born January 28, 1849, at Newport, Ky. He served as chief clerk and traveling agent in the passenger department of the Atchison, Topeka & Santa Fe Ry. from 1869 to 1880, and was general southwestern passenger agent of the Chicago, Rock Island & Pacific Ry. from 1880 until 1887. From 1887 to 1889 he was general ticket and passenger agent of the Chicago, Kansas and Nebraska division of that road. He was general passenger and ticket agent of the Chicago, Rock Island & Pacific from 1889 until July 1, 1902; passenger traffic manager from 1902 until 1903, and passenger and traffic manager of the Rock Island system from 1903 to 1906. He was elected vice-president in charge of passenger traffic December 1, 1909.

NEW ROADS AND PROJECTS.

Arkansas.—A branch line, 22 miles long, is being built from the St. Louis & San Francisco R. R. at Combs, Ark., to Mulberry, on the St. Louis, Iron Mountain & Southern Ry. Burk & McNerny, Fort Smith, Ark., are the contractors.

British Columbia.—S. D. A. Thomas, of Cardiff, Wales, is at the head of a syndicate which wants to build a railway in Canada to be called the Pacific, Peace River & Athabasca Ry., which is to start at the mouth of the Ness river, about 35 miles north of Prince Rupert, B. C., and extend eastward to the Ground Hog Hole deposit, the only deposit of smokeless coal suitable for the British navy on the Pacific Coast. The railway will then proceed eastward, through the Peace river country, and southward to Prince Albert, a distance of 1500 miles.

A report with reference to construction on the Pacific Great Eastern Ry. says that work has been begun on the first bridge, 20 miles from Squamish, B. C., and steel will be laid beyond that point and between the other bridges as the work progresses. Sufficient rails have already been delivered for the entire stretch between the present end of steel and Lillooet, about 120 miles north of Squamish. With the exception of a few sections, where cuttings have to be excavated, grading has been practically finished on the Squamish-Lillooet portion of the line.

California.—The Board of State Harbor Commissioners has awarded contract for the construction of the Belt Railroad extension and the Fort Mason tunnel, San Francisco, Cal., to Bates, Borland & Ayer, whose bid was \$219,233. The contract provides for the construction of 1100 feet of track and trestle and 1500 feet of tunneling under Fort Mason. The east portal of the tunnel will be at Van Ness avenue, while the west portal will be at the transport docks, foot of Laguna street.

The Southern Pacific Co., according to report, considers the construction of a line from Vallejo to Benecia, Cal., a distance of seven miles.

Florida.—The Tampa & Gulf Coast Ry., which is constructing an extension to St. Petersburg, Fla., has more than half of that work completed.

The Florida East Coast Ry. has let contract for ties and other material for the construction of 33 miles of railway to Lake Okechobee. The line has already been completed to a point 14 miles south of Whittier, Fla.

Georgia.—Application for the appointment of a receiver for the Atlanta & Carolina Ry. was made at Atlanta, Ga., March 2, by the Chicago Title & Trust Co., William C. Niblack, holder of \$1,000,000 worth of the company's bonds, and other creditors. Judge George L. Bell postponed his decision. The road already has laid some track between Atlanta and Augusta, Ga. It was planned to extend the road into South Carolina.

Kansas.—The Colorado, Kansas & Oklahoma R. R., which now extends from Scott City to Garden City, Kan., 52 miles, is reported to have let a contract for an extension from

Garden City to Forgan, Okla., 140 miles, which is to be completed within 20 months. At Forgan connection will be made with the Wichita Falls & Northwestern Ry. At Scott City connection is made with the Union Pacific R. R. The new line will also connect with the main line of the Atchison, Topeka & Santa Fe Ry. at Garden City.

Manitoba.—The Canadian Northern Ry is reported to have completed arrangements with the Manitoba government for building a line from Le Pas, Man., to Gypsumville, a distance of 162 miles. This new road, when completed, will give the company direct connections with the Hudson Bay Ry., a direct route to Hudson Bay from Winnipeg.

Missouri.—The Chicago & Alton R. R., says a report, is contemplating construction of a short line from Steinmetz, Mo., via Fayette, Columbia and Fulton to St. Louis, and the right of way of the former Louisiana & Missouri R. R. may be used.

Oklahoma.—See New Roads and Projects under Kansas.

The Kansas & Oklahoma Southern Ry. has been incorporated in Oklahoma, with \$1,000,000 capital stock. The new company is a reorganization of the Cherryvale, Oklahoma & Texas Ry., incorporated in 1902. The company proposes to build a main line from Kansas City, Mo., to El Paso, Tex., a distance of 900 miles, and a branch from Wichita, Kan., to Little Rock, Ark., a distance of 400 miles. Another branch is to run from Pawhuska, Okla., through the center of that state to McAlester, thence to Fort Smith and Texarkana, and then to Shreveport, La., a distance of 300 miles. Another branch, 153 miles in length, is to extend to Oklahoma City, via El Reno from Pawhuska. From El Reno an extension to Childress, Tex., 200 miles, is to be built. A fifth line contemplated will extend from St. Louis to Galveston, Tex., via Little Rock, Shreveport and Houston, Tex., a distance of 800 miles. S. M. Porter, of Caney, Kan., is the chief promoter and stockholder. Other incorporators are: R. E. Wade and George A. Masters, of Perry, Okla., where the headquarters of the company are to be; O. J. Brewster and F. D. Brewster, of Independence, Kan., and H. V. Bolinger, of Caney, Kan.

Pennsylvania.—The Pennsylvania Railroad, it is said, is again surveying for the proposed extension of the Tyrone and Clearfield branch to a connection with the Allegheny division near Du Bois, Pa.

Quebec.—The Farnham & Granby Ry. of Canada will apply for incorporation at this session of the Canadian parliament. The company proposes to build a line of railway to run from a point on the line of the Canadian Pacific Ry. near Farnham, Que., easterly through Brome or Rouville to Granby, northeasterly through Shefford county to Windsor Mills or Richmond.

South Carolina.—Track laying on the South Carolina Western Ry. between Florence and Poston, S. C., has been completed and freight service has been established.

W. R. Bonsal, Hamlet, N. C., president of the Charleston Northern Ry., is reported saying that grade has been finished from Andrews, S. C., south to the Santee river, 12 miles, and tracklaying is to begin at once. Grading is now in progress from the Santee south to the Cooper river, about 23 miles, and work on foundations of the bridge over the Santee river, which will be about a mile long, has been begun.

Texas.—Contract is reported let to G. H. Parker & Co., of Yorkville, Ill., to build the Childress, Mangum & Oklahoma City R. R. from Childress, Tex., to Mangum, Okla., 61½ miles. Work is to be begun within 60 days. M. A. Weslow, secretary of the Childress Commercial Club, may be able to give additional information.

Washington.—It is reported that the Canadian Pacific Ry. will build a line from its present terminus at Republic, Wash., down the San Poil river to the Columbia river, thence on the east bank of that river to Wenatchee, Wash.

The Northern Pacific Ry. is expected to authorize the expenditure of \$300,000 in extending the Cowiche line, built last year, and completing the branch from Toppenish, Wash., as far as Fort Simcoe.

Wisconsin.—The Baraboo, Devils Lake & Western R. R., with offices at Baraboo, Wis., has filed articles of incorporation. It is proposed to construct a railroad from Baraboo, Wis., to Portage and Kilbourn, a distance of about 100 miles. Capital, \$100,000. Among the incorporators are T. E. Mead, T. F. Risley and W. T. Marriot.

Electric Railways.

Articles of incorporation have been filed in Columbus for the Cleveland Pennsylvania Interurban Railway Co., capital-

ized at \$50,000. The company, according to its charter, proposes to build and operate an electric railroad between Cleveland, Ohio, and Sharon, Pa., and eventually, Pittsburgh. The incorporators are Harry P. Smith, Elijah Ashley, G. A. Mowers, Robert P. Thomas and Herbert A. Wadsworth, all of Pittsburgh.

An official of the Eastern Traction Co. has been quoted as saying that the Dallas-Greenville Interurban line, from Dallas to Greenville, Tex., probably would be opened for transportation about August 1. The work is now progressing rapidly. Practically all of the grading is now done. Short stretches here and there are yet to be graded, not more than a mile and a half in all. About 30 per cent of the bridge work has been completed all along the line. The steel has all been contracted for, and laying of steel will commence in April.

The charter of the Alamo Engineering & Construction Co. of San Antonio, Tex., which will construct the proposed interurban line between Waco and Austin, Tex., has been filed in the office of the secretary of state at Austin. The capital stock is \$20,000, all paid in, and the purpose of the corporation, as given in the charter, is the construction of railroads and bridges for railroad companies. The incorporators and directors are: W. J. Armstrong, C. Roos, F. A. Barber, W. F. McCaleb, M. H. Townsend.

Wm. H. Hamilton of Washington, D. C., and others propose the construction of the Washington, Frederick & Shenandoah Ry., an electric line to connect Washington with Frederick and also Staunton, Va. A survey was made, it is reported, some time ago.

L. S. Cook, Ft. Wayne, Ind., and Scott Bonham, Cincinnati, Ohio, plan the construction of an interurban electric line between Madison, Ind., and Cincinnati, Ohio. The route proposed is by way of Florence, Vevay, Markland, Patriot, North's Landing, Rising Sun, Aurora and Lawrenceburg, Ind., and Miamitown, Ohio. At the latter point it is proposed to form a junction with a line which has been projected from Rushville, Ind., to Cincinnati via Brookville, Ind., and Harrison, Ohio.

The Southern Traction Co., which is to operate between St. Louis and Duquoin, Ill., has completed its car sheds, machine shops and East St. Louis yards at a cost of \$250,000. The line now is completed between East St. Louis and Belleville, Ill., and it is probable that passenger service will be in operation between these points by April 1.

The Birmingham, Ensley & Bessemer R. R. it is reported, will resume construction on the extension from Fairfield to Bessemer, Ala., on which about eight miles of line remain to be built, financial arrangements having been made.

The Seabeach Railroad has been chartered for the purpose of constructing a railroad from Beaufort, N. C., to Cape Lookout, N. C., a distance of about 14 miles. Winston & Biggs, Citizens' National Bank building, Raleigh, N. C., are interested.

The Columbia-Camden R. R., capital \$250,000, is chartered and work reported begun upon its proposed electric railway from Columbia to Camden, S. C., about 30 miles. B. L. Abney, Senator Weston and others are interested.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Pere Marquette R. R. has ordered 5 Pacific type (4-6-2) locomotives from the Baldwin Locomotive Works.

—The Buffalo, Rochester & Pittsburgh Ry., reported in our previous issue as having ordered locomotives from the American Locomotive Co., has ordered from that company 2 Pacific type passenger locomotives and 5 Mallet freight locomotives, besides the 10 Mikado engines already mentioned.

—The Denver & Rio Grande R. R. is reported in the market for 10 locomotives.

—The Lehigh Valley Coal Co., New York, has ordered 1 six-wheel saddle-tank switching locomotive from the Davenport Locomotive Works.

—The Western Maryland Ry. is in the market for 20 consolidation (2-8-0) locomotives.

—The Central Railway of Brazil is in the market for 20 Pacific type and 30 Mallet type locomotives.

—The Pekin Kalgan Ry. has ordered 2 consolidation (2-8-0) locomotives from the American Locomotive Co.

—The Chicago & Eastern Illinois R. R. is reported in the market for 1 mikado (2-8-2) and 1 Pacific (4-6-2) locomotive.

—The Bulgarian government, according to the Bureau of Foreign and Domestic Commerce, is inquiring for 50 freight and passenger locomotives.

—The Pittsburgh & Lake Erie R. R., according to report, is inquiring for 2 Mallet locomotives.

—The Missouri, Kansas & Texas Ry. has ordered 25 Mikado type (2-8-2-S) locomotives from the American Locomotive Co.

—The Virginia & Southwestern Ry. has ordered 1 ten-wheel (4-6-0) locomotive from the Baldwin Locomotive Works.

—The Great Lakes Stone & Lime Co., Alpina, Mich., has ordered 5 four-wheel switching locomotives from the Baldwin Locomotive Works.

—The Southern Railway has ordered 27 locomotives from the American Locomotive Co. Ten of these engines are superheater Pacific type (4-6-2-S) passenger locomotives with 24x28 in. cylinders, driving wheels 72½ ins. in diameter and a total weight in working order of 235,000 lbs. Seventeen are superheater Mikado type (2-8-2-S) freight locomotives with 27x30 in. cylinders, driving wheels 63 ins. in diameter and a total weight in working order of 278,000 lbs.

—The Buffalo, Rochester & Pittsburgh Ry., in addition to the 10 Mikado type (2-8-2-S) locomotives mentioned last week in the Railway Review, has ordered 2 superheater Pacific type (4-6-2-S) passenger locomotives and 5 Mallet compound superheater locomotives (2-6-6-2-C-S) from the American Locomotive Co. The former will have 24½x26 in. cylinders, driving wheels 73 ins. in diameter and a total weight in working order of 262,000 lbs. The Mallet engines will have 23½ and 37x32 in. cylinders, driving wheels 57 ins. in diameter and a total weight in working order of 420,000 lbs.

Freight Cars.

—Virginia & Southwestern Ry., according to report, has ordered 935 freight cars from the Pressed Steel Car Co.

—The Ray Consolidated Copper Co. has ordered 40 cars for the Ray & Gila Valley R. R. from the Pressed Steel Car Co.

—The Butte, Anaconda & Pacific Ry. is reported as ordering 150 ore cars from the Pressed Steel Car Co.

—The St. Louis Southwestern Ry. is reported in the market for from 1000 to 2000 freight cars.

—The Missouri & North Arkansas R. R. has ordered 5 cabooses from the American Car & Foundry Co.

Passenger Cars.

—The Missouri & North Arkansas R. R. has ordered 2 combination mail and passenger cars from the American Car & Foundry Co.

—The Denver & Rio Grande R. R. has ordered 10 combination mail, baggage and express cars from the American Car & Foundry Co.

—The Missouri Pacific Ry. system has ordered 73 steel passenger cars from the American Car & Foundry Co. This order includes 3 mail cars, 4 paper cars, 18 baggage and express, 11 mail, baggage and express, 7 divided coaches, 11 coaches, 18 chair cars and 1 baggage and passenger car.

Signals and Interlocking.

—The Northern Pacific Ry., according to report, is preparing to equip over 300 miles of line with automatic block signals, of which 215 miles will be on the lines west of Paradise, Mont.

Iron and Steel.

—The Great Northern Ry., according to report, is considering the purchase of 15,000 tons of rails. The company has placed orders with the Pennsylvania steel Co. for 3000 tons of rails.

—The Atlantic Coast Line R. R. has ordered 12,000 tons of rails from the Maryland Steel Co.

—The Illinois Central R. R. has increased to 25,000 tons a recent order for rails placed with the Tennessee Coal, Iron & Railway Co.

Bridges.

—The Pennsylvania Railroad is taking bids on about 900 tons of steel to be used in connection with the electrification of the line to Paoli, Pa.

—The New York Central Lines are said to be inquiring for 1200 tons of steel for five bridges.

—The New York, New Haven & Hartford R. R. is re-

ported in the market for 250 tons of steel for a bridge at Woodlawn Junction, N. Y.

—The Pennsylvania Railroad has let contract to the Brown-King Construction Co., Philadelphia, Pa., to construct a bridge to carry Mount street, Philadelphia, over the tracks of the Philadelphia, Washington & Baltimore R. R.. The cost is estimated at \$50,000.

—The Chicago & North Western Ry. expects to begin construction about March 15 on a new 180-ft. two-span draw-bridge at Jefferson street, Milwaukee, Wis.

—The International & Great Northern Ry. is taking bids on a new bridge to be erected over the Sabine river.

—The Southern Pacific Co., it is said, has decided to construct a bridge over Coos Bay, at Marshfield, Ore.

—Plans have been prepared for a viaduct to be built at First avenue and Twenty-seventh street, Birmingham, Ala., the cost of which will be borne by the Southern Railway, Louisville & Nashville R. R. and the Alabama Great Southern R. R.

—The Oil Belt Ry. will erect a bridge over the Wabash river from Bridgeport to Vincennes, Ind.

Buildings, Terminals, Etc.

—Contract for the steel for the new office building of the Delaware & Hudson Co. at Albany, N. Y., has been awarded to John Eichleay, Jr., Company.

—The Missouri & North Arkansas R. R. it is reported, will erect shops and a four-stall engine house at Helena, Ark.

—The Chicago, Rock Island & Pacific Ry. is reported to have purchased site in McAlester, Okla., for proposed freight depot. A report says that \$75,000 will be expended.

—The Illinois Central R. R. has let contract to G. E. Scruggs and C. E. Ard, Birmingham, Ala., at about \$15,000, for a depot at Starkville, Miss.

—The Chicago city council on March 2 passed an ordinance which will enable the Belt Railway of Chicago to proceed with its plans for extension of its yards at Clearing, Ill. About \$10,000,000 will have been spent at Clearing by the time the work is completed. The yards are over three miles wide and are four and one-half miles long. During the past year the company has practically completed that portion of the yards outside the Chicago city limits. They will now proceed with the work in the city which includes viaducts at South Crawford and South Cicero avenues.

—According to a report from San Antonio, Tex., official announcement has been made that the Missouri, Kansas & Texas Ry. plans to begin work immediately on the construction in that city of the proposed \$1,000,000 depot.

—The railroad commission of Georgia has issued an order calling on the Central of Georgia Ry. to file with it on or before August 1 next full, complete and detailed plans and specifications for a union passenger station to be built at Macon, Ga.

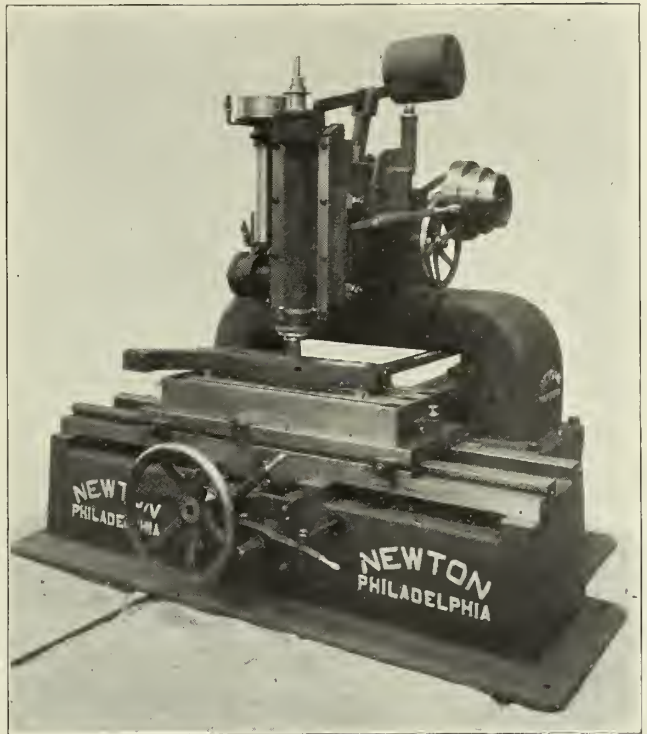
—The Missouri & North Arkansas R. R. will erect a passenger station at Eureka Springs, Ark.

—It is stated that the Atchison, Topeka & Santa Fe Ry. plans to spend \$1,000,000 for improvements at Richmond, Cal. The freight yards will be extended so as to fill all the space between the present limits and Ashland avenue. Additional shop buildings are to be erected and considerable extensions will be made to present piers and wharves.

The Newton Link Grinding Machine.

The link grinding machine shown herewith was devised by the Newton Machine Tool Works, of Philadelphia, at the solicitation of one of the large locomotive builders, who were unable to purchase in the open market, a substantial machine for finishing radius links, which now require hardening in order to meet service condition. On account of the remarkable success of the machine the builders have decided to add this design to their standard line of equipment.

In the actual operation of this machine, the links are located on a fixture mounted on the top table, by suitably located pins, the radius being gaged at all times from the center of the link to the center of a pivot mounted on a scale-measured extension at the rear of the machine. The



The Newton Link Grinding Machine.

maximum capacity is for links up to 100 ins. radius and having approximate length of 42 ins. With this machine, beyond clamping the work on the table and adjusting for depth of cut and for side to side movement of the link, all operations are automatic. Since watching operations of this machine, the builders have come to consider it so novel of sufficient importance to the railway field, as to practically decide to exhibit a duplicate at the Master Mechanics and Master Car-Builders Convention this year, at which time, of course, a complete demonstration of its operation will be afforded.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, FEB. 24, 1914.

Block-Signal System, 1,087,917—Elmer F. Bliss, Schenectady, N. Y., assignor to The Union Switch & Signal Co., Swissvale, Pa.

Railway-Tie, 1,087,923—Fremont Clifford, Connersville, Ind.

Tank-Car, 1,087,939—Myers A. Garrett, Chicago, Ill.

Electropneumatic Brake, 1,087,997—Walter V. Turner, Edgewood, Pa., assignor to The Westinghouse Air Brake Co., Pittsburgh Pa.

Grain-Door, 1,088,004—David Levi Williams, Blanchard, N. D.

Automatic Safety-Stop for Locomotives, 1,088,013—Charles Devos, St. Louis, Mo.

Retainer for Railroad-Spikes, 1,088,023—Edgar Beaumont Jarvis, Toronto, Ontario, Canada.

Lubricating Journal-Box, 1,088,044—Ivan Szot-Czetten, Warsaw, Russia.

Splice-Bar, 1,088,058—Stephen E. Brady, Granby, Mo.

Reinforced Tie, 1,088,062—William Galt Chipley, Atlanta, Ga.

Brake Governing Apparatus, 1,088,074—Frank James, Los Angeles, Cal.

Apparatus for Unloading Freight-Cars, 1,088,100—Benjamin P. Saunders, Iatan, and Oscar Williams, Weston, Mo.

Metallic Railway-Tie, 1,088,106—Edwin E. Slick, Westmont borough, Pa.

Switch-Stand-Crank Mechanism, 1,088,119—Frank C. Anderson, Cincinnati, Ohio, assignor to The American Valve & Meter Co., Cincinnati, Ohio.

Refrigerator-Car, 1,088,130—James Cuning, Indianapolis, Ind.

Railway-Switch, 1,088,134—Frank H. Ellis, Somerville, Mass.

Smoke-Preventer, 1,088,136—Benjamin F. B. Fairbrother,

Keene, N. H., assignor to Charles K. Darling, Concord, Mass.
 Rail-Joint, 1,088,150—George Holinka, Detroit, Mich.
 Portable Machine for Grooving Railway-Sleepers, 1,088,209—Albert Collet, Paris, France, assignor to Sté Maurice et Pierre Collet et Cie., Paris, France.
 Railway Signaling System, 1,088,246—Jacob B. Struble, Wilkinsburg, Pa., assignor to The Union Switch & Signal Co., Swissvale, Pa.
 Spring Locking Mechanism for Railway-Switches, 1,088,266—Frank H. Ellis, Somerville, Mass., assignor to Barbour-Stockwell Co., Cambridge, Mass.
 Rail, 1,088,288—Godfrey S. Mahn, Philadelphia, Pa.
 Fluid-Pressure Brake System, 1,088,299—William H. Sauvage, New York, N. Y.
 Device for Operating Switch-Points, 1,088,342—David V. Hochstetler, White Cloud, Mich.
 Methods of and Means for Bracing the Contents of Cars or the Like, 1,088,347—Elmer E. Koehler, Rochester, N. Y.
 Electric Railway Signal System, 1,088,363—Adolf Pillich, Lackawanna, N. Y.

Coal-Passer for Locomotive-Tenders, 1,088,418—Charles L. Heisler, Schenectady, N. Y.
 Mechanical Stoker, 1,088,445—David F. Nisbet, Crafton, Pa.
 Safety Device for Car Trucks, 1,088,528—Charles E. Burke, Argenta, Ark.
 Grease-Cup, 1,088,538—Chester H. Clark, Ash Fork, Ariz.
 Spike, 1,088,560—Charles A. Forrest, Harrisonville, Ohio.
 Rail-Joint, 1,088,562—Walter M. Gleeson, Fond du Lac, Wis.
 Blade for Railway-Switches, 1,088,567—Mario Grimaldi, Rome, Italy.
 Draft-Regulator, 1,088,572—John Hefferon, Cheyenne, Wyo.
 Rail-Joint, 1,088,581—John Isbell, Washington, Mo.
 Railway-Tie, 1,088,586—Nestor Kallioinen, Negaunee, Mich.
 Car-Coupling, 1,088,590—William Kelso, Pittsburgh, Pa., assignor to McConway & Torley Co., Pittsburgh, Pa.
 Embankment Marker, 1,088,591—Ulysses D. Kenworthy, Zim, Minn.
 Rail-Joint, 1,088,625—John Reimann, Jr., Tibbee Station, Miss.
 Smoke-Consuming Device for Locomotives, 1,088,639—David Townsend, Philadelphia, Pa., assignor to Cornell Economizer Co., Philadelphia, Pa.

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Twenty-five courses of instruction are available.

Officials have found in these a means of broadening their general railroad knowledge; employes have qualified for and obtained promotion; college men have combined these practical studies with their theoretical ones beneficially.

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Send check, and state what you want; or write for further information.

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RAILWAY REVIEW

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Speakers for the Banquet of the Railway Engineering Convention.

The following speakers have been announced for the banquet of the annual convention of the American Railway Engineering Association to be held on the night of March 18: Hon. Chas. A. Prouty, Interstate Commerce Commission, Dept. of Railway Valuation; Hon. Chas. Marcil, M. P., Ex-Speaker House of Commons of Canada; Col. John M. Schoonmaker, Vice-President, Pittsburgh & Lake Erie R. R.

Morgan Firm's Transactions with New Haven R. R.

The firm of J. P. Morgan & Co. has responded to a request of Chairman Howard Elliott of the New York, New Haven & Hartford R. R., by preparing a letter giving a complete statement of the financial relations between the banking house and the railroad and its allied companies during the twenty years from 1894 to 1914. The statement shows that during this period the Morgan house took part in the handling of New Haven and subsidiary companies' securities of the par value of \$333,082,803, from which the firm realized a total net profit of \$350,265, being at an average rate of \$17,000 per year. The statement showed that on some of the purchases of New Haven securities the Morgan firm sustained a net loss. The statement also gives the information that none of the Morgan firms nor any member of them ever had any interest in any properties "such as West Chester, the steam railways, the trolley lines or any of its subsidiary companies," with the exception of the fact that the late J. P. Morgan inherited 1,222 shares of the stock of the South Bay Wharf Terminal Co., and later exchanged this stock for 814 shares of New Haven stock.

Petitions to Retain Water Lines.

In addition to the several roads reported in our issues of February 24 and February 28 as having applied to the Interstate Commerce Commission for relief from the operation of that provision of the Panama Canal act which requires railroads to divest themselves of water-line holdings before July 1, unless the commission shall exempt them from the law, similar applications have been received also from the following roads: The Oregon-Washington R. R. & Navigation Co., the Southern Pacific Co. and the Central Pacific R. R., the Delaware, Lackawanna & Western R. R., the New York, Ontario & Western Ry., the Lehigh Valley R. R., the Long Island R. R., the Southern Pacific Company and Morgan's Louisiana and Texas R. R. & Steamship Co. which control the Direct Navigation Co. operating on Buffalo Bay between Houston and Galveston, Texas; the Central Vermont Ry., the Baltimore, Chesapeake & Atlantic Ry., and the Pere Marquette R. R.

Progress of Alaskan Railway Legislation.

The Alaska railway bill, reported as having passed the house of representatives in an issue of February 21, and providing for the construction of a thousand miles of government railroad at an expenditure of \$35,000,000, was made ready for the president's signature on March 10, when the

senate adopted the conference report already adopted by the house. President Wilson appended his signature to the bill on March 12. Reports are that tentative plans for construction have already been considered by the interior department which is said to be prepared to go ahead with the work now that the president has given authorization. The measure provides for the construction of not more than 1000 miles of a railroad to connect Alaska's coal fields with the coast, the route to be selected by the president, to whom are also left many other important details. He is to decide whether or not railroad lines already constructed in the territory shall be purchased as a part of the government system, and whether the road is to be operated by the government itself or leased after it has been built.

Petitions for Repeal of Obnoxious Railway Legislation.

In the Railway Review for March 7, mention was made of the fact that the several railroads operating in New Jersey had petitioned the legislature of that state for the repeal of the "full crew" law which has been for some time operative in that commonwealth. Similar action has been taken by twelve of the leading roads of the state of New York, who on March 10 presented petitions to the governor, the lieutenant governor and the speaker of the house. It was pointed out that since the law went into effect last September the additional cost to the railroads of the state, as a direct result, has been approximately \$600,000, while in the meantime, no additional safety has been given the general public by the employment of the extra men necessary to meet the requirements of the law. It is expected, that a bill intended to repeal the full crew law will be introduced in the legislature at an early date. Following the petition presented the New Jersey legislature, the same roads also entered a plea for the repeal of all laws of that state that in effect require or permit railroad companies to transport free of charge, state or other public officials, and for the enactment of a law prohibiting railroad companies from giving to any state or public official, and such official from soliciting, receiving, or using, free transportation. A tentative draft of an act for the above purpose was presented the legislature by the roads with a request that it be introduced for passage by that body.

Careers of Officers of the Pennsylvania System.

Records just compiled of careers of the 170 ranking officers of the Pennsylvania Railroad system give striking evidence of the policy the company pursues in training men, and of the opportunities open to men in the service. Of the 170 officers, 163, among whom should be mentioned the president of the company, started at the bottom. This census of Pennsylvania officers now in active service shows that four of them have worked for the railroad more than fifty years. They are: J. B. Hutchinson, assistant to the vice-president in charge of real estate, purchases, and insurance, Pennsylvania Railroad; A. L. Langdon, traffic manager, Long Island Railroad; E. T. Postlewaite, assistant to the president, Pennsylvania Railroad; E. A. Dawson, manager, Star Union Line. Each of the five vice-presidents of the Pennsylvania Lines West of Pittsburgh, who have just been elected, has been in the service of the railroad more than forty years. Every one of them began at the bottom of the railroad ladder. J. J. Turner, first vice-president, began work for the Pennsylvania as a ticket sorter; E. B. Taylor, second vice-president, started as a clerk; D. T. McCabe, third vice-president, as clerk; G. L. Peck, fourth vice-president, and A. M. Schoyer, resident vice-president at Chicago, began as messengers. Twenty-two of the company's officers have been in the company's service between 40 and 50 years; 57 between 30

and 40 years; and 59 between 20 and 30 years. Thirty of these 170 officers are between 60 and 70 years old, 61 between 50 and 60 years, 62 between 40 and 50, and 17 between 30 and 40 years of age.

New Coal Pier for the Norfolk & Western Ry., at Norfolk, Va.

An illustrated article under the above heading was published in the *Railway Review* of February 21, 1914. Mr. J. E. Crawford, chief engineer of the Norfolk & Western Ry., now informs us that credit for building the substructure should have been given to Henry Steers, Inc., of New York City. The superstructure was furnished and erected by the Virginia Bridge & Iron Co., of Roanoke, Va., and not by the Pennsylvania Steel Co., as stated in the article.

Help for Shippers of Perishable Fruit.

In an effort to aid fruit and vegetable growers and shippers to put their perishable shipments on the market in first class salable condition, the Southern Railway and Georgia Southern & Florida Ry. have issued an illustrated circular on "Rules Governing the Proper Marking and Loading of Perishable Freight." The circular contains information which was prepared after exhaustive investigation and is illustrated with twenty-eight photographs showing proper and improper methods of packing and loading perishable fruit and truck. The circular is being distributed among all important fruit and vegetable growers on the lines of the Southern and G. S. & F. railways and to all agents, and it is felt that considerable improvement and better returns to the grower and shipper will result from the idea. One striking photograph is shown in the circular of a car loaded from end to end and piled high with beans and onions. The containers used were poor and weak. Of this slipshod, costly method of shipping, the following comment is made: "Does it surprise you to learn they were in such a broken and crushed condition on arrival at destination they barely brought freight charges? On the other hand, what do you think of the grower who spends big money on fertilizer and labor to grow his crops, and then deliberately buys a poor, weak container in which to pack them, and crowns his shortsighted policy by loading them in the above manner? It is such as he who finally goes under and wonders why."

Employees Receive Recognition of Safety Work.

To William Schwab, conductor on the Sacramento division of the Southern Pacific Company, has been awarded the replica in bronze of the Harriman memorial safety medal given by the American Museum of Safety to the employee of the winning road who was most conspicuous in the promotion of safety by suggestions and otherwise. Conductor Schwab has received a letter from Julius Kruttschnitt, chairman of the executive committee of the Southern Pacific Company, commending him for his safety promotion efforts. Mr. Schwab made a remarkable showing in the matter of practicable suggestions and of general interest manifested in the "safety first" campaign of the company. Many of his suggestions were adopted and proved of exceptional value in the furtherance of safety. All were considered meritorious. He proved an active member when on the safety committee of his division, and after retirement from the committee displayed the same untiring zeal and interest in safety promotion. Other good records made by employees who displayed great interest and effort in connection with "safety first" were those of J. H. Dumphrey, engineman, Portland division; M. H. Warren, master car repairer, San Joaquin division; W. H. Brennan, conductor, Coast division; W. E. Smith, engineman, Coast division, and A. Livingston, en-

gineman, Shasta division. They, too, will receive letters of commendation and appreciation from the company.

Bell Telephone Company Educates Employees Concerning Government Ownership.

The government ownership idea has taken such hold upon the employees of the Bell telephone company in the Pittsburgh district that the company officers are taking steps to counteract this influence. The first of a series of lectures on the subject was given at Carnegie Hall, Pittsburgh, Pa., March 2, at which J. H. Crossman, general commercial superintendent, pointed out the evils of government ownership. He said government ownership had killed the ambition of telephone employees in England and declared politics would make employment in the telephone companies undesirable because of the uncertainty of tenure. Many of the arguments in favor of government ownership were taken up and their weak points explained.

Decision on Potato Shipments.

The Interstate Commerce Commission has rendered a decision settling certain disputed matters regarding conditions and regulations under which potatoes may be shipped during the winter months. The crux of the question in this instance was the cost of such reasonable precautions as to prevent loss through freezing of the potatoes in transit. The parties represented in the case were the Minneapolis Potato Growers' & Shippers' Association, Albert Miller & Co., the Northern Pacific Ry., the Great Northern Ry., and the Chicago & Northwestern Ry. The commission held that tariff regulations published by the railroads are "fair and reasonable," which allow "the shipper a choice between shipping his traffic at a lower rate under a special contract by which he becomes his own insurer against weather loss and damage or of making his shipments under terms imposing the full responsibility upon the carrier" at a higher rate.

George Westinghouse.

George Westinghouse who, for more than a generation, enjoyed world-wide fame as a benefactor of mankind through his many inventions by which industry has been revolutionized, died in New York city on Thursday, March 12, 1914, at the age of 68 years. His decline in health dated from some months previous, at which time he suffered from a nervous break-down, thought to have been induced by the financial difficulties in which the great manufacturing corporation which bears his name, found itself as a result of the panic of 1907. In view of his remarkable skill as an inventor and his unusual talent as an organizer, Mr. Westinghouse occupied the very front rank of the industrial geniuses of his time. In recognition of this fact, he had many honors conferred upon him, among others being his election to the presidency of the American Society of Mechanical Engineers in December, 1909. Following his election to this position, the greatest honor which the engineering talent of his native country could bestow upon him, the official journal of that organization published in its proceedings the following sketch of his career:

"George Westinghouse, a son of George and Emeline Vedder Westinghouse, was born at Central Bridge, N. Y., October 6, 1846. His father was a manufacturer of agricultural machinery, and established works at Schenectady, which are still in operation. The younger Westinghouse was educated in the public schools and at Union College, Schenectady, and received his early mechanical training in his father's manufactory. His tastes were strongly in the direction of machinery and the solution of mechanical problems.

"The patriotic ardor which filled the youth of the country during the civil war drew young Westinghouse into the vol-



Geo. Westinghouse

unteer army in June, 1863. He was under seventeen, but on account of his size and strength, being six feet tall and weighing 180 lb., the recruiting officers admitted him without asking his age. He enlisted with the Twelfth New York National Guard. Subsequently, he joined the Sixteenth New York Cavalry, and in December, 1864, became an assistant engineer in the United States Navy, serving in that capacity until August, 1865.

"Returning to civil life he invented in the same year a device for replacing derailed cars, and while placing this invention with the railroads his attention was attracted by the prevalence of minor and serious accidents due to the lack of efficient means for controlling trains in motion. After a careful study of the subject, and such experiments as were possible with the limited means then obtainable, he invented the air brake and patented it in 1868.

"The first train to which this brake was applied ran on a line west from Pittsburgh and on what is now a portion of the Pennsylvania system of railroads. During the trial trip a collision with a loaded team, which had become stalled on a grade-crossing, was prevented. This practical illustration of the utility of the invention led to the adoption of the brake. Mr. Westinghouse, retaining the control of his invention, undertook to manufacture it and organized the Westinghouse Air Brake Co., establishing at Pittsburgh the business which subsequently became the nucleus of the many industries associated with his name.

"From the invention of the air brake dates the beginning of modern railroading. * * * Before he was twenty-five his name had become familiar throughout the world, and his contribution to the material progress of civilization was everywhere recognized. He continued in the study and practice of engineering, and equipped a machine shop for his personal experimental use, where he worked out many inventions, at first relating almost entirely to devices for railroad operations. He applied compressed air to switching and signalling and later utilized electricity in this connection. From this beginning grew the Union Switch & Signal Co.

"His introduction of electricity into switch and signal work led him far into the field of electrical experiment and he devoted his energies to a cause in which few then believed—the adoption of the alternating current for lighting and power. In this he had to meet and overcome almost fanatical opposition which in many states, sought legislation against the use of the alternating current as dangerous to the public welfare. In 1885 he acquired the patents of Gaulard & Gibbs, and having undertaken a comprehensive study of the distribution and utilization of electrical currents in a large way, he personally devised apparatus and methods for the work, and gathered around him a group of men who were to become experts in the new electrical art. He also organized the electrical company which bears his name and undertook the development and manufacture of the induction motor which made practical the utilization of the alternating current for power purposes.

"Following the discovery of natural gas in the Pittsburgh region, Mr. Westinghouse devised a system for controlling the flow and for conveying the gas over long distances through pipe lines, thus supplying fuel to the homes and factories of Pittsburgh. He took up the study of the gas engine, and for ten years conducted a series of exhaustive experiments in this line, at the end of that time putting into commercial use a gas engine of large power for electric generating.

"Mr. Westinghouse also introduced the Parsons steam-turbine into this country, adding to it improvements and developments of his own, and others carried out under his supervision. More recently, he developed a steam turbine for ship-propulsion designed to overcome the well-known objections to the use of turbines in that field, and also

coöperated with Rear-Admiral Melville and John M. Macalpine in their study of problems associated with driving of propellers at low speed by turbines of high speed. * * * As a result of this work and enterprise, there have grown thirty corporations employing 50,000 men, \$120,000,000 of capital, with works at Wilmerding, East Pittsburgh, Swissvale and Trafford City, Pa.; at Hamilton, Canada; London and Manchester, England; Havre, France; Vardo, Italy; and at Vienna and St. Petersburg.

"Mr. Westinghouse made many visits to Europe in connection with his inventions and industries. There as in his own country he won the friendship of the foremost men of his time and the high esteem of the engineering profession. He was decorated by the French Republic and by the sovereigns of Italy and Belgium; and he was the second recipient of the John Fritz Medal—Lord Kelvin, his friend of many years, having been the first. The Königliche Technische Hochschule of Berlin bestowed upon him the degree of Doctor of Engineering; and his own college, Union, gave him the degree of Ph.D. In 1905 Mr. Westinghouse was selected as one of the three trustees in whose hands the voting power of the controlling stock interest in the Equitable Life Insurance Society was placed. The other trustees were Ex-President Grover Cleveland, and Justice Morgan J. O'Brien.

Besides his honorary membership in The American Society of Mechanical Engineers, Mr. Westinghouse was one of the two honorary members of the American Association for the Advancement of Science and was an honorary member of the National Electric Light Association. In 1904 he was given the Edison gold medal for "meritorious achievements," based on his demonstration of the practicability of his theory with respect to the generation and utilization of alternating current, and, as recently as last December, he received from the Verein Deutscher Ingenieure the celebrated Grashof gold medal, the highest honor which that body can bestow, being awarded to those who have rendered conspicuous service in the field of engineering. Mr. Westinghouse was the third engineer outside of Germany, and the first American to receive this distinction.

Mr. Westinghouse was married in 1867 to Miss Marguerite Erskine Walker, who, with one son, George Westinghouse, Jr., survives him.

New Freight Terminal of the Southern Ry., at Chattanooga, Tenn.

To meet the demands of increasing business at Chattanooga, Tenn., the Southern Ry. has recently spent, roundly, \$125,000 in extending and otherwise improving its freight terminal at that point. Nearly all of this work was done on a plat of some 14 acres, seen in the accompanying illustration. The increased facilities accommodate something like 60 jobbing houses and nearly 300 manufacturers in the industrial and commercial portions of the city. Tracks serving the in-bound and out-bound freight houses afford sufficient space for the loading and unloading of 100 merchandise cars daily, while the public team tracks afford space for placing 50 cars for loading and unloading.

Taking the features of the freight terminal under the improved conditions, from left to right, in the illustration, they are: Pillar crane on platform alongside of the track for handling machinery and other bulky freight; automobile unloading platform; driveways for drays unloading freight to outbound station; outbound station; tracks for outbound freight; tracks for inbound freight; inbound freight station; driveway and main line of freight tracks.

The outbound freight house is a new building, while the inbound freight house is the old structure, remodeled and repaired adequately. In the instance of both an unoccupied space has been left at the eastern extremity so that as soon as future growth of business warrants they can be extended.

For the paving of driveways and that part of King street occupied by the tracks, a 6-in. concrete base was laid, surmounted by a 2-in. sand bed, and topped with a 4-in. brick course. The new station, 34 by 250 ft., has a foundation of 24-in. concrete walls and 6-in. concrete granolithic flooring. The framework is of steel. The 2-in. concrete roof is covered with a composition roofing. There are no side walls, the only enclosures being rooms for check clerks and a small over-freight locker room. The platform is equipped with three dial scales and one beam scale. All buildings are provided with standard fire hydrants, of which there are two in each depot and three on each platform.

Two frame platforms have been constructed, each 14 ft. wide, one being 528 ft. long, the other 517 ft.. They are built on concrete piers, and have composition roofing. The framework is wood, this material being chosen because the ground in the vicinity is surfaced with cinders which produce fumes very destructive of steel. The timbers are of longleaf yellow pine.

A brick pavement, averaging 35 ft. in width, by 115 ft. long, is the approach to the platform which supports the 15-ton hand-power pillar crane, this being laid on massive reinforced con-

crete foundation. Next adjoining a tar macadam pavement, averaging 32 ft. in width, and 200 ft. long, approaches an automobile platform 80 by 16 ft., onto which automobiles can be unloaded from cars and run to the ground on an inclined plane, with easy access therefrom to the city streets.

All tracks are laid with 80-lb rails and provided with latest improved switches. At the end of each track is a steel bumping post, anchored to the rails and set 5 ft. in the ground, and supported on concrete foundation. Each of the paved driveways has its own sewer and drains. Surface water is carried off immediately. Wherever two adjacent tracks run parallel for any distance a line of 6-in. terra cotta pipe has been laid between the tracks, with open joints.

The work of construction was under direct charge of Mr. S. D. Moses, assistant to the district engineer of the Southern Ry. Most of it was done by company force and but little by contract.

The growing of white pine, says the United States department of agriculture in a bulletin recently issued on the

Decision Involving Weighing of Coal Shipments.

The Interstate Commerce Commission has rendered a decision in a complaint by S. C. Schenck, of Chicago, against the Norfolk & Western Ry., involving the carrier's tariff worded as follows: "Freight charges will be assessed on weights ascertained at Norfolk & Western regular weigh-



New Freight Terminal, Southern Ry., at Chattanooga, Tenn.

ing stations, and this rule will not be departed from by the Norfolk & Western Ry." The complainant attacked this rule as unreasonable and contended that destination weights ascertained on his private track scales should be observed. On two shipments in question, the gross weight of the first car as determined at Chicago was 2400 pounds less than at point of origin, while the tare weight was 600 pounds greater; of the second car the gross weight was 3100 pounds less at Chicago than at point of origin and the tare weight 200 pounds less. The complainant did not question the accuracy of the weights at point of origin, but insisted that the Chicago weights were also correct, and that the difference represented loss in transit. On behalf of defendants it was testified that the cars in which the shipments moved were in good condition, and that losses in transit were not probable. It was said that the yards through which the cars passed were adequately policed; that trainmen and switchmen who find it necessary to take coal from cars for carrier's use have

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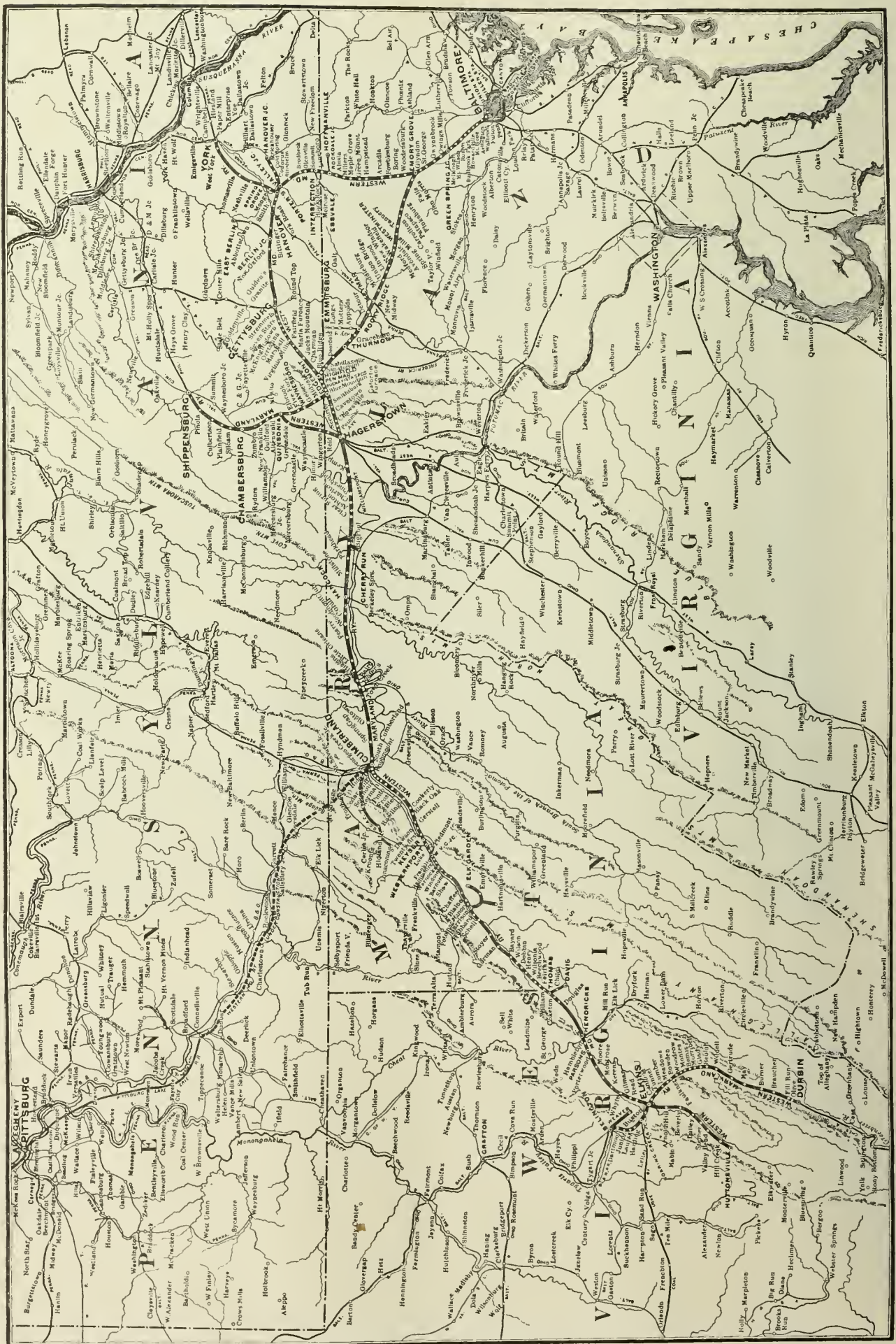


Fig. 1—Map of Western Maryland Ry., with Cumberland-Connellsville Extension Shown in Broken Line.

instructions to report the amount taken; and that the records of such reports do not show that any coal was taken from these cars.

The commission in its decision, said:

"In *Peters v. O. S. L. R. R. Co.*, 20 I. C. C., 598, the commission found unreasonable a tariff rule to the effect that shipments of coal should not be reweighed. We there said, as we had previously said in other cases, that the actual weight of shipments constitutes the true basis upon which to assess transportation charges, and that the question is one of fact to be determined in a manner just to both parties, as to which the ex parte action of either party can not conclude the other. Following the principle thus announced, and upon the facts of record in this case, we find that the rule of the *Norfolk & Western Ry. Co.* is unreasonable in that by its terms no correction of given weights, even though definitely ascertained to be wrong, is permitted.

"We are not convinced, however, that a general rule which would require carriers to accept weights ascertained by shippers or consignees on their private scales would

furnish the proper remedy or would be just and reasonable. In *Sunderland Bros. Co. v. C., B. & Q. R. R.*, 21 I. C. C., 632, consideration was given by this commission to the subject of natural shrinkage and other causes resulting in differences in weights of coal as between points of origin and points of destination, and we there held in substance that carriers should provide for the reweighing of coal upon request of shippers, and that if such reweighing should disclose a variation of more than 1 per cent, with a minimum of 500 pounds, from the original shipping weight, the original weight and charges should be corrected accordingly and the reweighing charges refunded. We think a similar rule should be adopted by the defendants in this case. The situation here brought to our attention furnishes a forcible illustration of the necessity of some satisfactory method whereby the delivered weights of shipments of coal may be definitely and satisfactorily ascertained, whenever reweighing is deemed necessary and is requested by the shipper or consignee."

Construction of the Western Maryland Ry. Extension from Cumberland to Connellsville

Heavy mountain work, to give the Western Maryland Ry. a connection with the New York Central system, and to tap the Connellsville district. By studious surveys and good engineering advantageous grades were found and distance was saved. The earthwork and concrete masonry quantities are large. About 25 per cent of the construction is double track, with provision for eventually extending the second track.

By the construction of 87 miles of new line, between Cumberland, Md. and Connellsville, Pa., the Western Maryland

Ry. makes connection with the Pittsburgh & Lake Erie R. R., of the New York Central system, at the latter point, thereby opening up a new trunk line route between the East and the West, over the Allegheny mountains. The Western Maryland Ry. system is shown on the accompanying map, Fig. 1. This old line, with headquarters and seaboard terminals in Baltimore, is so well known that description of its route and various branches in detail is not necessary here, but it may be said that in addition to a large volume of through traffic which it



Fig. 3—Tit Cut One-half Mile East of Brush Tunnel, Western Maryland Ry.

may be expected will be carried over this new outlet, the road will naturally receive a good share of the large tonnage of originating traffic at Connellsville, at the same time opening up a western outlet for the high-grade coal and the lumber production on the southwest branch of the road in West Virginia, the main stem of which runs from Cumberland to Elkins. In distance, also, there is the advantage of some saving, as the line from Baltimore to Pittsburg over this new route, 317 miles long, is 12 miles shorter than that over the Pennsylvania R. R. and 10 miles shorter than that of the Baltimore & Ohio R. R. between the same points. As will be seen by the map, the new road parallels the B. & O. R. R. most of the way.

Active work of construction on this extension was begun during 1910, and was brought well nigh to completion in the course of two years. By traffic arrangements with the New York Central lines a through route has been established and through passenger trains between Chicago and Baltimore over the Lake Shore & Michigan Southern Ry., the Pittsburgh & Lake Erie R. R., and Western Maryland Ry., via Cleveland, Youngstown, Pittsburgh, Connellsville and Cumberland, have been running since June 4, 1913. Freight from Pittsburgh and the West is turned over to the Western Maryland Ry at Connellsville; and connection with New York and Philadelphia is had with the Philadelphia & Reading Ry. at Shippensburg. Anthracite coal mined on the Reading road finds its way to the West by the reverse route.

The work of building this extension was very heavy and expensive, and the location, as well as the construction, involved many engineering problems. During the first year of construction several accounts of this work appeared in technical periodicals, but a large part of the work, covering extensive operations and interesting design, has not heretofore been described. It is the purpose of this article to cover the project somewhat comprehensively and to include a goodly number of photographic views that will show typical work.

For economy of operation it is essential that the grades of mountain lines be reduced to the lowest possible maximum. In this respect the grades worked out for the extension of the Western Maryland Ry. between Cumberland and Connellsville show up advantageously for this route, compared with those of several of its competitors, particularly those which cross the Allegheny mountains north of the Potomac. A profile of the grades is shown in Fig. 2. The maximum grade against east-bound traffic is 42 ft. to the mile, as against 79 ft. for the Pennsylvania R. R. and 53 to 62 ft. for the Baltimore & Ohio R. R. The Chesapeake & Ohio Ry. gets over the mountains on a maximum grade of 30 ft. to the mile, and the Norfolk & Western on a maximum of 53 ft. to the mile. This maximum rate for the Western Maryland Ry. (42 ft.) occurs at two points over a stretch of about 10 miles in each place. Owing to flanking grades of 30 ft. or more adjacent to these, however, the pusher service in each instance extends over a longer distance than 10 miles. In this connection it should be stated that the maximum grade referred to is compensated for curvature. The sharpest curves on the line are 8 deg. and all above 2 deg. are spiraled.

Against west-bound traffic the grades run from 61 to 92 ft. to the mile, over a distance of about 22½ miles. The descent on the eastern slope of the mountains is much shorter and steeper than it is on the western slope. The country traversed is quite rough on both slopes of the mountains, as might be surmised from the detours. For illustration, the air-line distance from Cumberland to the summit is 9 miles, while by the located route of the line it is 23½ miles. The summit elevation, 2340 ft. above sea level, is reached at the tunnel through Big Savage mountain.

The rough character of the country and the policy of adhering to a low-grade route being determining factors, the earth-work was necessarily very heavy, and a diversity of materials was encountered. The rock formations are largely of sandstone and shale, much distorted by terrestrial upheavals, and strata

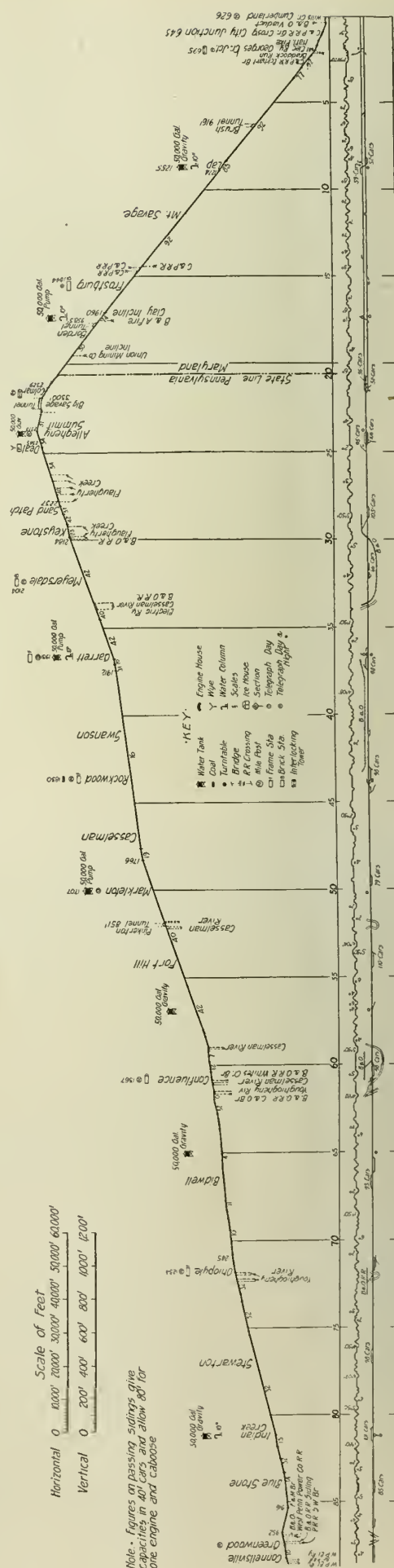


Fig. 2—Condensed Grade Profile of Western Maryland Ry. Extension from Cumberland to Connellsville.



Fig. 4—Seventy-Ton Bucyrus Steam Shovel in Rock Cut, $1\frac{3}{4}$ Miles West of Brush Tunnel.

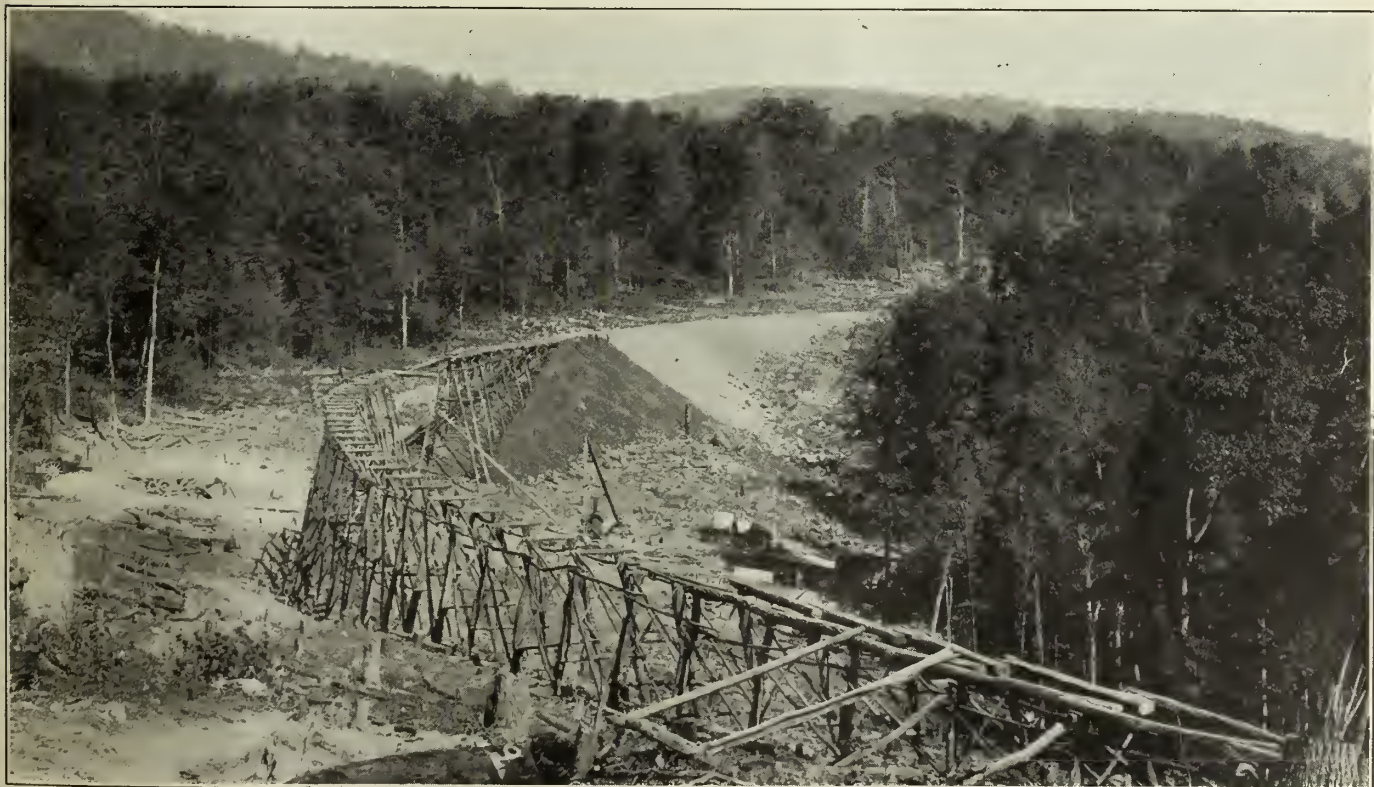


Fig. 5—Temporary Trestle for High Fill, $1\frac{1}{2}$ Miles West of Frostburg, Md.



Fig. 6—West End of Cut $\frac{1}{4}$ Mile West of Borden Tunnel, W. M. Ry. Extension.

are found lying at all angles from horizontal to vertical. The rocks are of varying degrees of hardness, disintegrated to considerable depth in places. Nevertheless, both red and gray sandstone were found of sufficient hardness to afford suitable material for concrete, which, in some cases, was broken in the vicinity of the work, thereby reducing expense of transportation.

There are a number of deep cuts and large fills, and, to

convey some idea of the magnitude of the earthwork in places a few of the largest works will be enumerated. Figure 3 shows operations at Tit cut, $5\frac{1}{2}$ miles west of Cumberland. The maximum depth of excavation in this cut was 97 ft. and the quantity of excavation was 215,000 cu. yds. Figure 4 shows a 70-ton steam shovel at work in a cut 48 ft. deep, at a point 8 miles west of Cumberland, where the excavation amounted to 45,000 cu. yds. The Limestone cut, near Corringanville, is 90



Fig. 8—Limestone Cut near Corriganville, W. M. Ry. Extension.

ft. deep and the excavation was 125,000 cu. yds. One mile west of Frostburg, Md., there is a cut 55 ft. deep, with excavation of 55,000 cu. yds. Just west of Tit cut, on the east slope, there is a fill 111 ft. high at the highest point and the quantity of material put into it was 145,000 cu. yds. At places on the line, all along, there were cuts ranging from 30,000 to 60,000 cubic yards in volume. In the 87 miles of line constructed there were 8,000,000 cu. yds. of excavation.

The usual method of handling this earth was with steam shovels of large capacity. In the deepest cuts the excavation was by stages, the material being shot after each through cut of the shovel, when the latter would be dropped down to a lower level and the process repeated until the sub-grade was finally reached. The arrangement for embankment filling was

and 15 ins. deep at intervals of 200 ft., on both sides of the tunnel and staggered. The Pinkerton tunnel is 825 ft. in length, the Borden tunnel 945 ft. long, the Brush tunnel 916.3 ft. long and the Big Savage tunnel, one mile west of the Maryland-Pennsylvania state line, is 3296 ft. long.

For the small roadbed openings cast iron pipe and concrete arch culverts were used. The pipes vary in diameter from 12 to 48 ins. Some examples of the concrete culvert construction appear in the illustrations.

Rail-top culverts are used in spans of 6 ft. and 8 ft. In these structures old 60-lb. rails are utilized, molded in with a layer of concrete 8 in. deep. The depth of ballast below the bottoms of the ties is 8 ins. Solid I-beam floors are used in places where headroom is restricted, in spans up to 25 ft. In



Fig. 7—High Fill on 8-Degree Curve, near Corriganville, W. M. Ry. Extension.

usually temporary trestle, the material being carried in dump cars hauled by light locomotives. In order to prosecute the work with desired rapidity it was necessary to transport many of these shovels across the open country. In the large fills allowance was made in the height for a settlement of 10 per cent.

The tunnel driving was by the usual method of taking out first a top heading the full width of the tunnel and then removing, in one bench, the material down to sub-grade, using small steam shovels for loading into cars. With the exception of the Big Savage tunnel all of them were built for double track, the clear width between vertical side walls being 30 ft., with an arch radius of 15 ft., the springing line coming at an elevation of 8 ft. 9 ins. above that of base of rail. These dimensions provide for tracks at 13 ft. centers. The standard dimensions for the single-track bore are 17 ft. clear width between vertical side walls; with an arch radius of 8½ ft., from springing lines 14 ft. above base of rail. The tunnels were timbered and lagged where the character of the rocks so required, and then all were lined with concrete. Weep holes were left in the concrete at intervals of 100 ft., and refuge niches 2½ ft. wide

one instance, 24-in. I-beams are used, spaced 18 3-8 ins. centers and resting on concrete abutments and piers. The concrete slab molded about them is just thick enough to cover and protect the metal, the top surface being crowned for drainage purposes. It is intended that the quantity of steel used is sufficient to carry the loads without bringing the concrete under strain.

In bridges the plate girder type of construction predominates, but there are a few truss structures. The longest bridge is the Salisbury viaduct (Fig. 44), the length of which is 1908 ft., and the maximum height above water 101.3 ft. This structure carries the road over the Casselman river, the Baltimore & Ohio R. R. and the Pennsylvania & Maryland Electric Ry. It consists of deck plate girders on towers of 30-ft. span with 60-ft. spans intermediate, except at the river crossing, where the span is 90 ft. and at the railroad crossing where it is 40 ft. The massive concrete abutment at the east end is shown in Fig. 30. A top view of the structure is seen in Fig. 45, with the plank walk and hand rail at the left. The standard bridge guard rail end, which is turned down into the ballast, hooking over a tie, is seen in this view.



Fig. 9—West End of Tit Cut, Looking East.

At a point $1\frac{1}{4}$ miles east of Connellsville the road crosses three tracks of the Southwest branch of the Pennsylvania R. R. at an angle of 24 degrees. In order to avoid a long-span truss bridge at this point because of the acute angle between the alignment of the two roads, two heavy plate cross girders about 75 ft. long span the P. R. R. tracks, and these are used as intermediate supports for the girders carrying the Western Maryland Ry. tracks, in two spans of 109 ft., with a 30-ft. intermediate span. The arrangement is seen in Fig. 42. The east abutment of this bridge is shown in Fig. 33 and the west abutment in Fig. 36.

At Ohiopyle there is a crossing of the Youghiogheny river

by a plate girder structure 561 ft. long, the bridge for its entire length being on a curve of 4 deg. In order to take advantage of duplication of work as far as possible, the bridge was designed with five spans of 80 ft., plate girders on both inside and outside of the curve being equal in length. In the spans adjacent to the abutments the plate girders are of varying lengths.

The bridges were designed to carry mallet locomotives with a weight of 440,000 lbs. on eight drivers, the load following, 5500 lbs. per lin. ft., being about 2 per cent heavier than is provided for in Cooper's "E 60" specifications.

A number of the views show fine specimens of concrete



Fig. 12—Grading Operations One Mile West of Big Savage Tunnel, Looking East.

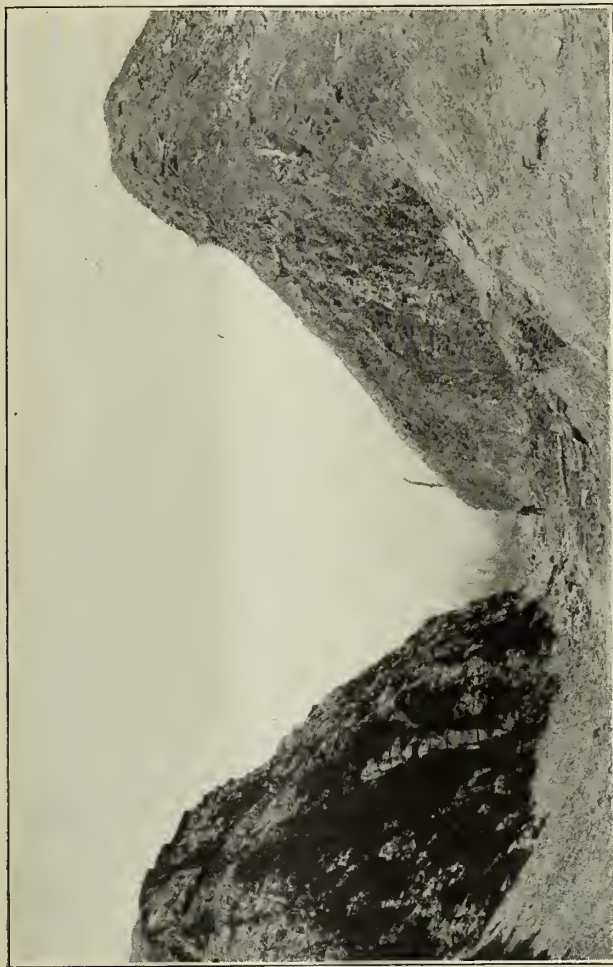


Fig. 11—Cut at Station 301, a Mile West of Frostburg.

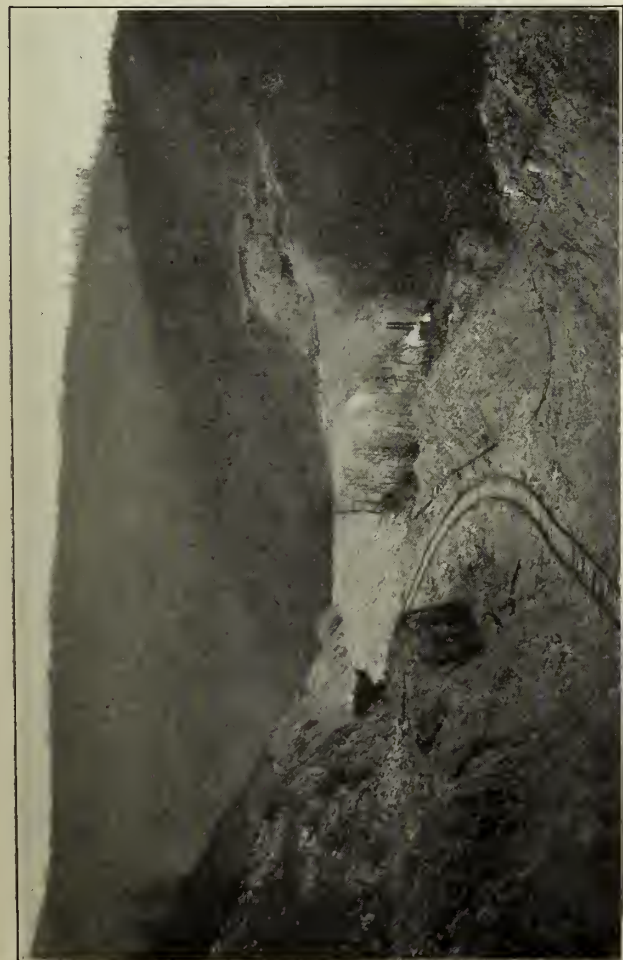


Fig. 10—Grading from Tit Cut to East Approach to Brush Tunnel.

construction. The foundations seen in Fig 28, piers and abutments, are for five 60-ft. deck plate girder spans, at the fourth crossing of the Casselman river, at Harnedsville, Pa. Fig. 29 shows Bridge No. 1 at George's Creek Junction. It is a double-track structure in two 150-ft. through truss spans, the first of which is erected, with the falsework in position for the erection of the second span. The completed bridge is seen in Fig. 38.

The high concrete piers for the six 90-ft. deck plate girder spans at the third crossing of the Casselman river, $\frac{1}{2}$ mile west of Pinkerton, Pa., are shown in Fig. 31, and in completed state in Fig. 37. At the fifth crossing of this stream (Figs. 32 and 40) there are five 95-ft. deck plate girder spans. The view shows the temporary trestle erected for transporting material for a fill to the right at Confluence, Pa. The bridge seen in Fig. 34 has six 110-ft. plate girder spans.

The view in Fig. 35 shows a number of works in progress simultaneously, as they appeared looking west. In the foreground is the masonry for the bridge at Station 800 crossing the B. & O. R. R. and the West Penn. Power Co.'s tracks, and masonry for the bridge at Station 820 crossing the B. & O. R. R. and the Penna. R. R. (South West Branch); also grading along the south side of Penna. R. R. tracks, in the right background. This bridge has one 151½-ft. through truss span (double track); four 80-ft. deck plate girder spans; two 73-ft. deck plate girder spans, and one 122-ft. deck plate girder span. The trestle at the right was erected temporarily for transporting filling material while the work on the high concrete piers was in progress.

There were two grades of concrete mixture, that for footings being in the proportion of 1:3:6 and that for all work above footings 1:2½:5.

Figure 46 shows the heavy 4-track viaduct construction of the Pittsburg & Lake Erie R. R. in Connellsville, Pa., looking west from Ashman avenue. The passenger station used jointly by this road and the Western Maryland Ry. appears at the right.

Of this extension 19½ miles of road, from George's Creek Junction to Colmar, Pa., and 1.1 miles from Greenwood to Connellsville is double track, the remainder of the 87 miles being single track. All of the bridge masonry, however, has been built wide enough to carry two tracks.

The contractor for building the entire line was the Carter Construction Co., of Chicago, various parts of the work being sublet to numerous parties. All of the work was planned and executed under the direction of Mr. H. R. Pratt, chief engineer of the Western Maryland Ry.

Railway Valuation and Rate Making.

BY ONWARD BATES.

From a discussion on the report of a special committee to formulate Principles and Methods for the Valuation of Railroad Property and Other Public Utilities, presented at the annual meeting of the American Society of Civil Engineers, Jan. 21, 1914. Published in the Proceedings of the Society for February, 1914, page 341. The committee assumes to report on the subject "Valuation for the Purpose of Rate Making." With his discussion Mr. Bates includes a contribution from Mr. Jared How on the question of depreciation in relation to valuation.

The government of the greatest nation in the world is committed to the policy of the regulation of big business, and, incidentally, of little business, and we have the example of men without business experience directing in detail how business shall be conducted, holding over the heads of citizens engaged in business the threat that the government itself will take business out of the hands of its owners and conduct it as a government monopoly. The notable present instance of this policy is the regulation of railway rates by the Interstate Commerce Commission, and it is in the minds of many people interested in railways that a continuation of this policy will ruin this line of business endeavor, in so



Fig. 13—Cut at Station 789, Two Miles East of Connellsville.

far as the interests of the men, women, and children who are railway stockholders are concerned.

The future of all public utilities is dependent on the rates which the public, through its governmental instrumentalities, may establish from time to time. "Justice" will be the watchword of those who name the values and of those whose property is valued. The committee, under the heading "General Principles Involved in Valuation for Rate-Making," writes:

"The primary requirement in the valuation of a public service property is that justice shall be done both to the owner of the property and to the public." * * * "The exercise of the power to regulate rates should be based on equity to both parties.

"It has been well settled by the highest courts that the owner of such property is entitled to a fair return upon a fair value of the property utilized in or reasonably necessary to service."



Fig. 14—Limestone Cut, Looking West, Western Maryland Ry. Extension.

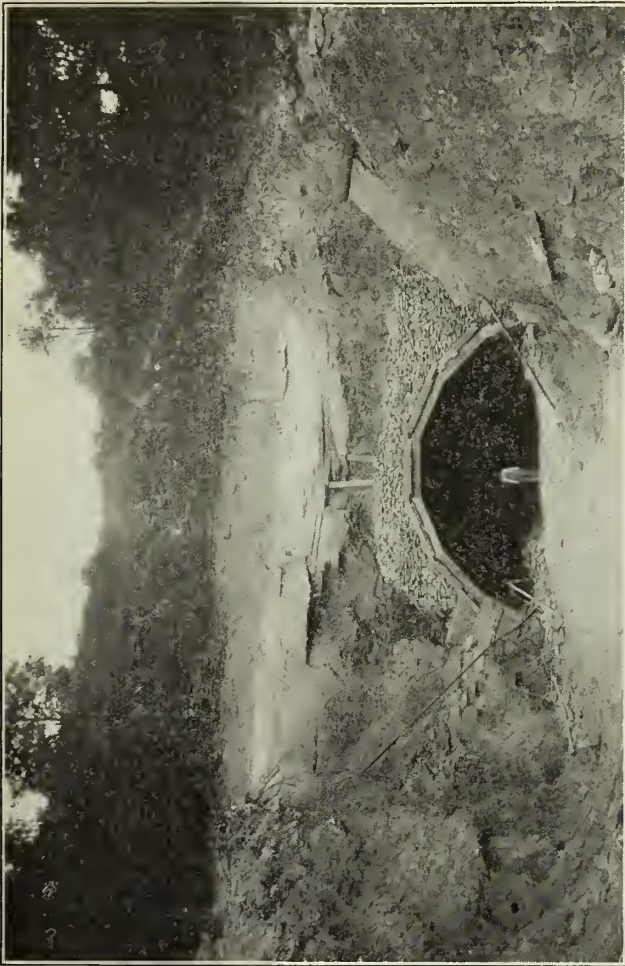


Fig. 16—West Heading of Pinkerton Tunnel, Western Maryland Ry. Extension.

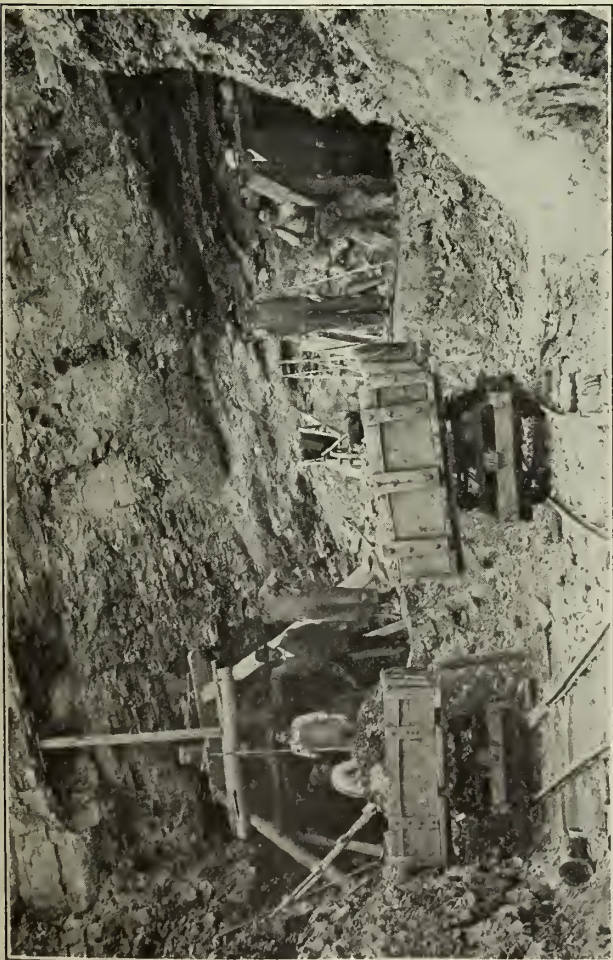


Fig. 15—West Heading of Borden Tunnel (Double Track), Western Maryland Ry. Extension.

Justice, however, is often obscured. It appears from the foregoing quotation that the highest courts depend for justice on the fairness of the valuation. It is to be expected and it is certain to happen, that controversies will arise between the owners of property and those who place values on such properties, and it is only natural and altogether probable that partisanship and bitterness will be engendered between the representatives of property interests and of the authority which undertakes to establish the value of property.

At this point we meet what the writer considers one of the worst features of government ownership—two parties disputing over values of which, one party, with the prestige of governmental authority behind him, is clothed with the power to do injustice, while the other party is practically helpless. Justice, as has been stated, depends on the fairness of the party to the controversy which holds the power of decision, and equity can only be secured by having the valuer fair and just and competent.

We are all prone to evil. Men are not perfect, and when engaged in a fight are inclined, during the heat of action, to forget the principles of equity and justice while endeavoring to secure an advantage over an opponent. There is an additional danger to vested interests to be expected from the appointment of incompetent valuers. This is the day of professional reformers and efficiency enthusiasts, most of whom are not under the conservative and sobering influence of personal investments which are at stake. At a time when the government is planning an organization for the purpose of valuing public utilities, which will require a great number of men, most of whom should be experts, and with the condition that such qualified experts are generally in the employment of the public utility corporations, it is to be expected that men with bright minds and plausible language will find in this organization a market for their talents. These talents may be very great, but, if not balanced by experience and a sense of responsibility toward the interests at stake, may be dangerous instruments in the hands of the government, leading to great injustice toward its citizens.

An illustration of what may happen in this line is to be found in the seventy-eight questions submitted by the Interstate Commerce Commission to the railways as a preliminary to the granting of an increase in rates. These questions are too long to be quoted here, but the necessity for an increase in rates seems to have been lost sight of by the Commission, which has started an investigation entirely aside from the business question to be determined, with the only possible result that it will create a delay in the administration of justice.

If it be assumed that, in the future, railway rates will be, or may be, based on the valuation of the physical property of railway corporations, we will find a large proportion of the membership of this society engaged in this work of valuation, and divided between a staff of engineers employed by the Interstate Commerce Commission for this purpose, on the one side, and the engineers employed by the railway corporations, on the other side. Engineers are already being lined up in these two classes, between which there will be great diversity of opinion on many points, notably on the questions of depreciation and land values. Under these circumstances it will be most unfortunate for the report of the committee to be considered as anything more than an expression of the opinions of its distinguished authors. The writer is willing to be corrected if he is wrong in making the statement that the committee was not appointed to make a report on valuation for the purpose of rate-making. Its function was "to formulate principles and methods for the valuation of railroad property and other public utilities." The committee may find justification in making a report on "valuation for the purpose of rate-making," in its statement that "Valuations of the property of

public service corporations may be made for a variety of purposes," and its report on this particular variety may be considered as only one section of a general report, the other sections of which are to be furnished later.

The committee goes on to say: "It is, of course, true that the principles and methods of valuation for rate-making are in most respects the same as those involved in the valuation for other purposes."

Granting this truth, if the committee had confined itself to a general report, it would have avoided the criticism of engineers specially interested in rate-making, who differ with the committee in some of its conclusions. The committee's report is on "Valuation of Railroad Property and Other Public Utilities for the Purpose of Rate-Making." The immediate and most important application of the principle of valuation for the purpose of rate-making is found in the case of the railways; but the report seems to be based largely on experience with water-works and public utilities other than railways. The report would have been more acceptable if its treatment were limited to local utilities which constitute monopolies in their own limited territory, such as water-works, gas plants, electric properties, etc. As a matter of fact, the report is based on the condition of, and legal decisions relating to, such utilities; but it also covers in a desultory way questions of valuation of railway property, and really lumps the whole proposition to include them. It attempts to apply the same principles to circumstances and conditions which are entirely unlike.

The rates to be charged for gas, water, telephone service, local transportation, etc., in Chicago, are not governed or influenced by the rates permitted in St. Louis or Milwaukee. The same principles may or should govern; but there are no competitive influences or conditions. For the regulation of those local utilities which are non-competitive, or competitive only in a very limited way, principles of valuation may be formulated which will be approximately fair and just; but the situation with railways is entirely different. Whatever advantages may come from railway valuation, the proper fixing of rates is not one of them.

The government valuation of railways is not declared to be for purposes of rate-making. Authority to make the valuation, after repeated requests by it, was granted to the Interstate Commerce Commission which wanted it for whatever value of any kind there might be in the information. The Commission has repeatedly declared that rates cannot be based on valuation, although it may be one of many elements to be considered under certain conditions. It would be just as fair to assume that the valuation is being made for the purpose of government purchase and ownership, as to assume that it is for the impracticable purpose of determining fair rates.

The impossibility of basing railway rates on the plan of fair interest return, or even profit, on the value of the property, is so patent that it ought not to require any re-statement. The whole railway system is competitive, and the government, just now, is bent on breaking it up into still smaller competitive units. Between certain terminal points there are half a dozen or more lines with different values, whatever principle of valuation is used in determining them. All must charge the same rate; and no road can, of itself, fix its own rates.

The existing rate structure is the product of commercial, competitive forces, and as a whole is found, even by regulating bodies, to be about right. It needs constant adjustment to meet changing conditions and to insure reasonable equality. Following a world-wide change in wages and all costs, the entire rate structure may need to be increased horizontally—as is the case at the present time—but no road or system, even if legally permitted, could raise a rate by itself, because its traffic would immediately desert it and go to other lines. This is not true of local public utilities,



Fig. 18—East Heading of Big Savage Tunnel, Western Maryland Ry. Extension.



Fig. 17—West Heading of Brush Tunnel, Western Maryland Ry. Extension.

because there is practically no other available supply of service for the public.

If all the railways were in one system and ownership, rates might possibly be predicated on value of investment, and changing costs be met by changing rates, so as to insure an average net earning. The strong lines would then support the weak, but, with diversified ownership and the demands of all parts of the country for adequate transportation facilities, nothing of the kind can be done, and speculation regarding it is useless and misleading.

gathered at one time from such material as is available, with the certainty that the railways will retain in their own service the experts who are fitted by experience for this work; the demand for results from this organization necessitating conclusions before this new occupation is capable of producing correct conclusions based on knowledge. In other words, results will be published before the business is learned, and conclusions will be to a greater or less extent untrustworthy.

There will be the interpolation of politics, directly and in-

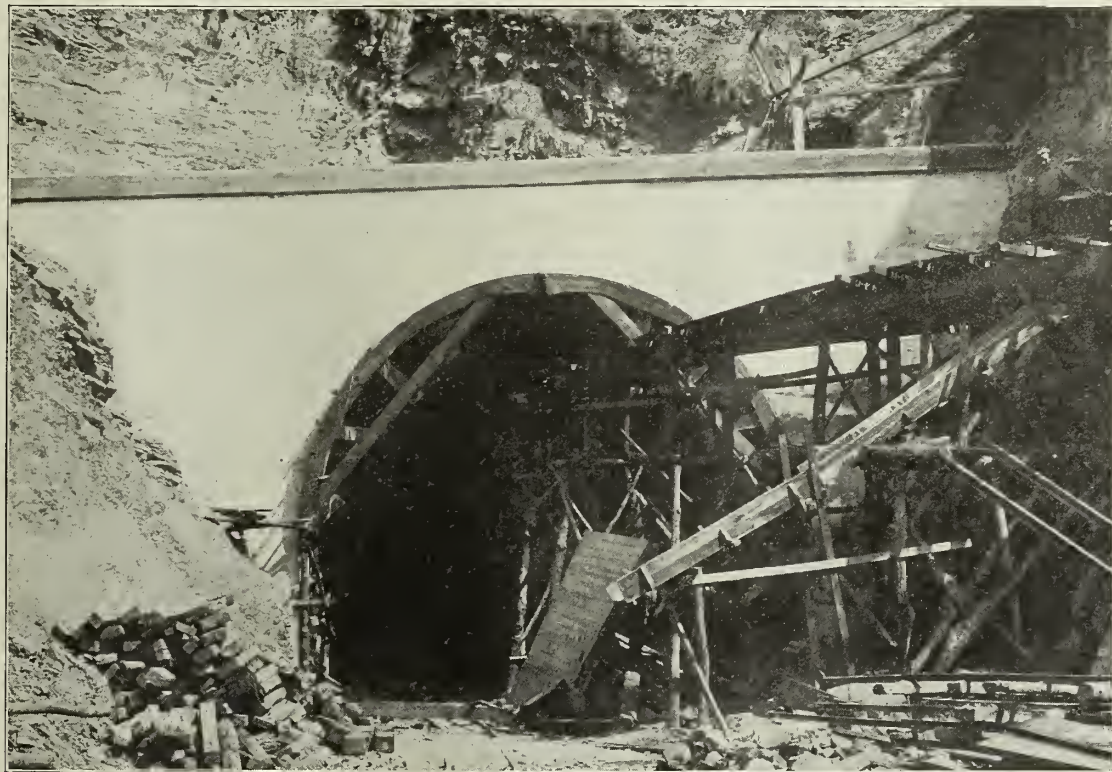


Fig. 19—East Portal of Brush Tunnel, Western Maryland Ry. Extension.

The committee should either have differentiated clearly and omitted railways from its discussion, or should have omitted entirely that part of its report relating to "purpose of rate-making."

The questions involved in the valuation of public utilities for the purpose of rate-making are of such importance and of such direct interest to the members of the society that the fullest discussion of them should be encouraged, and final conclusions should not be adopted until discussions are exhausted. With constant changes occurring, the time when discussions will be completed may never arrive, and final conclusions may be indefinitely postponed. Such a result ought not to be regretted. We must act according to our best present information, and continually move on to better conditions.

It should not be assumed that the questions to be solved in valuing public utilities for rate-making are wholly of an engineering nature. In fact, the engineer has only a limited function in their solution. The valuation of public utilities for the purpose of rate-making calls not only for engineering knowledge, but as well for the knowledge possessed by lawyers, by financiers, by real estate experts, by business men, and by accountants, all of whom should state the cases, from their points of view, before an attempt is made to formulate definite conclusions.

The work of valuing railway property, recently inaugurated by the Interstate Commerce Commission, will be done under certain disadvantages, some of which are:

A large organization, not trained to the work at hand, but

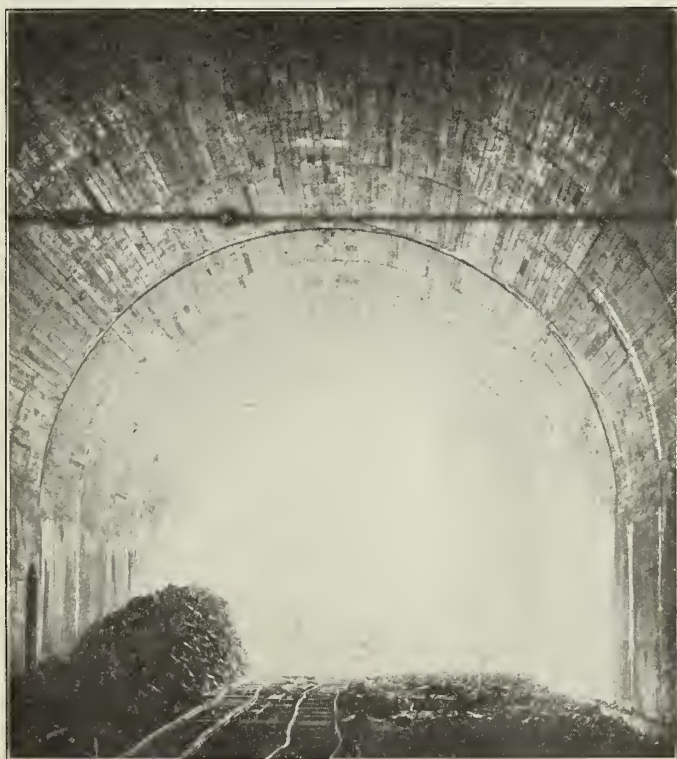


Fig. 20—Interior View of Brush Tunnel, Looking East, Showing Concrete Lining.

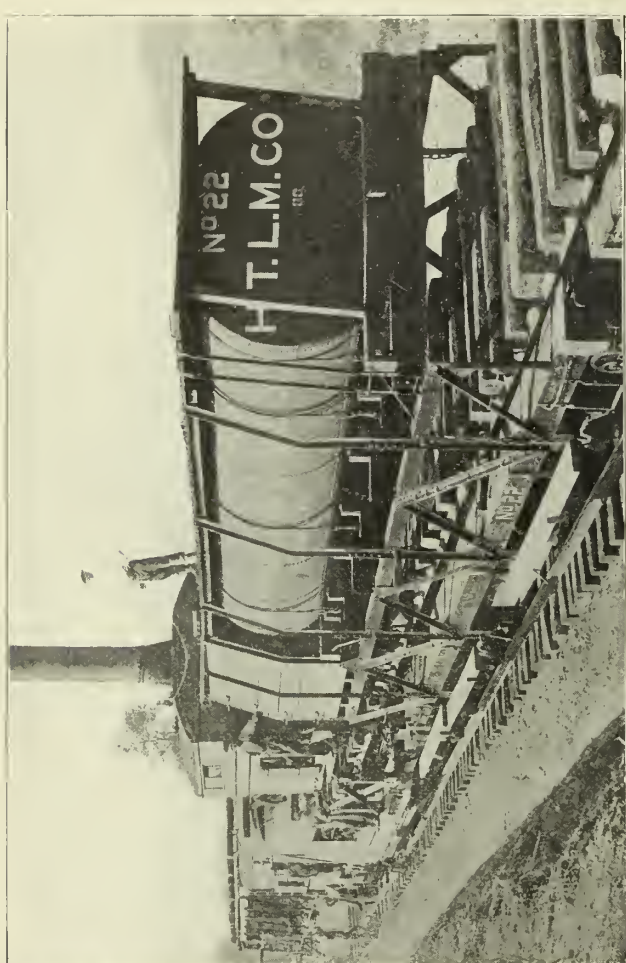


Fig. 25—Hurley Tracklaying Machine, Rear View, Western Maryland Extension.

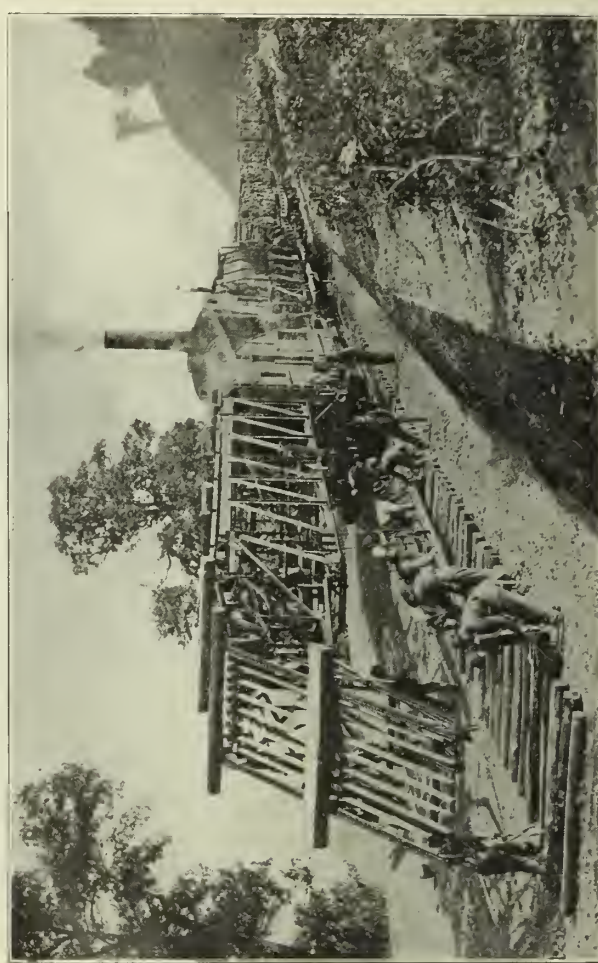


Fig. 24—Hurley Tracklaying Machine In Operation, Western Maryland Extension.

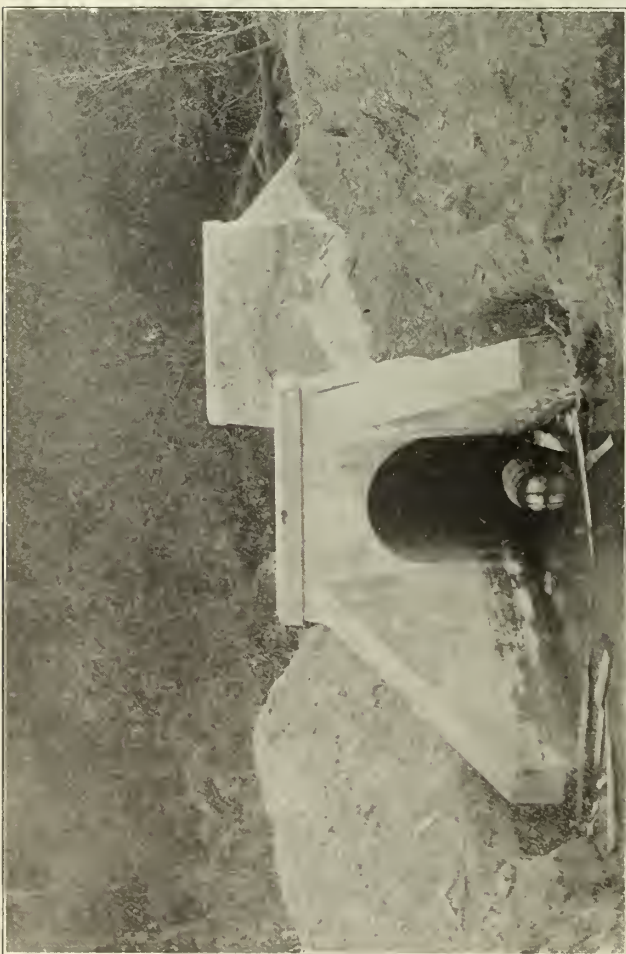


Fig. 21—Concrete Arch Culvert, 6-Foot Span, Western Maryland Ry. Extension.

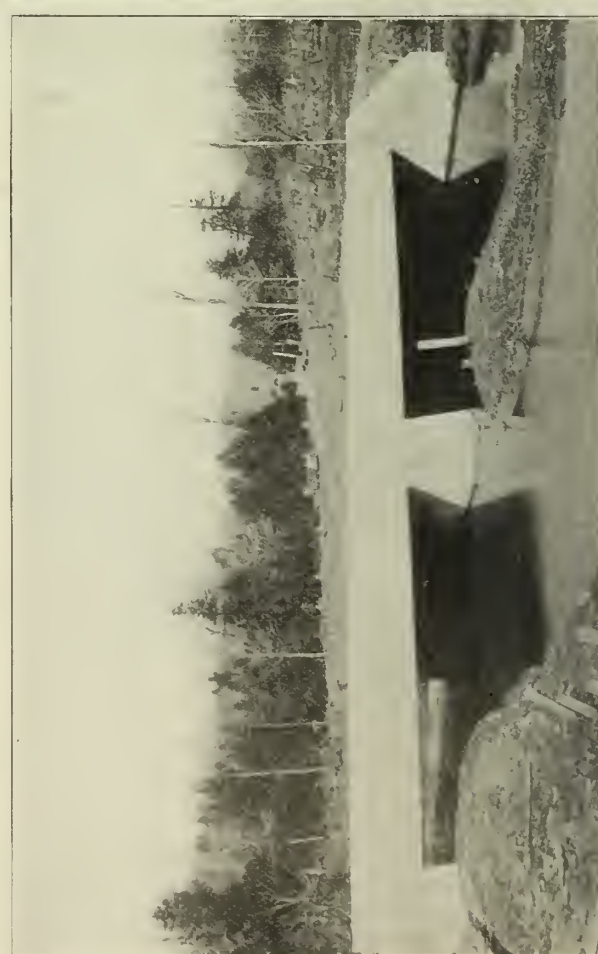


Fig. 23—Two 21-Foot, Solid-Floor I-Beam Girder Spans, Western Maryland Extension.

directly, into a fight for power on one side and for existence on the other side.

It is claimed by railway officials that the total value of railway property in the United States is \$15,000,000,000, more or less. It is not true, as might be inferred from the assertions of politicians and of sensational newspapers, that this property is owned by a few magnates whose only concern is to rob the public. The railways, collectively, are a useful and valuable asset of the whole nation. They are owned by the holders of their stocks and bonds, mostly innocent investors, including men and women who have bought the securities with the accumulation of their savings, and children and helpless people are represented by the investment of trust funds in these securities.

The American Society of Civil Engineers cannot afford to place its endorsement on a report which may be used to increase or decrease the return to the owners of these railway properties. If the report was absolutely conclusive, the society could with propriety stamp it with approval, establishing the truth, without regard to its effect on any interest; but this is not the case. The principles claimed and

The writer has received a letter from Mr. Jared How, an attorney-at-law in San Francisco, criticizing the committee's treatment of the subject of depreciation, and, being in full accord with Mr. How's criticisms, he offers this as a contribution by Mr. How to the discussion, as follows:

"The writer paid no attention to the contents of the report excepting so far as it deals with the subject of depreciation, and he is impressed with the idea that the committee takes an unfortunate attitude toward it.

"The basal principle of the relation between a public utility, a steam railroad, for example, and the public, is that of contract. The right to construct and operate a railroad is not a general right which appertains to every citizen as such. It is a right obtained only through the grant of a franchise from the sovereign power. The grant and acceptance of the franchise create a contract, the consideration of which on the part of the public is executed by the grant, and on the part of the grantee is executory and rests in the obligation to exercise the franchise in the manner contemplated by the grant. So a railroad company, having accepted a grant of a right to construct and operate a rail-

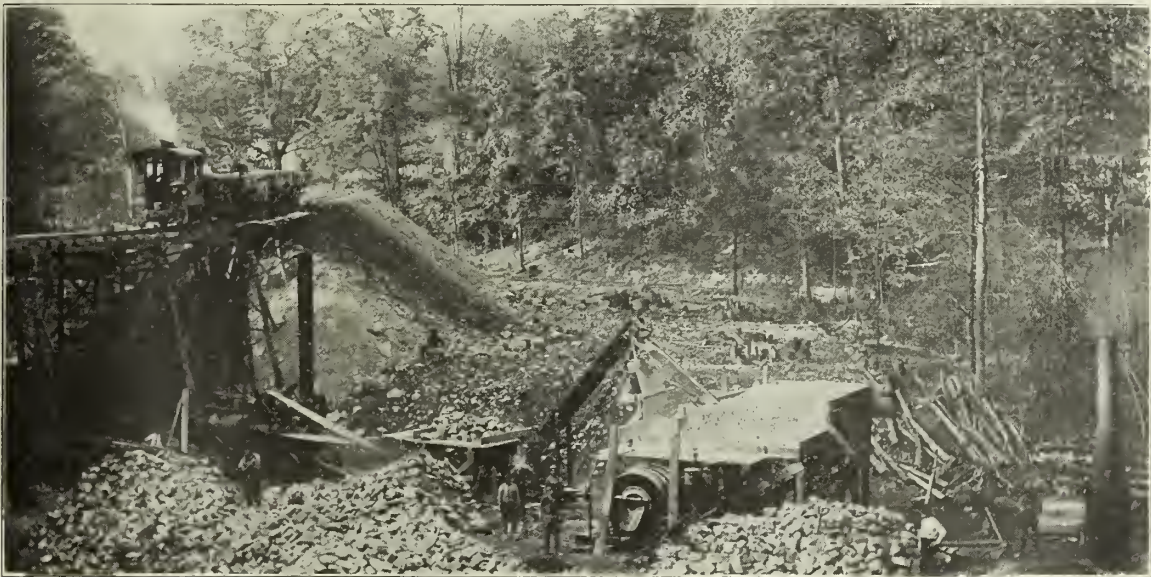


Fig. 22—Progress View of Work on 15-Foot Concrete Arch Over Town Line Run, at Markleton, Pa.

the conclusions drawn will be disputed by a large number of the members of the society. The committee itself does not consider this report as final: it reserves the right to add to the report before its final publication.

This report should be received by the society without any endorsement, good or bad. It is carefully prepared, and contains much valuable information. It will be interesting and useful when published in the Transactions, but it should not be assumed to be an expression of the society as a body. It should simply be received with thanks. The reception and publication of such a report is an honor to its writers. The society is careful to publish the statement in its Transactions that it "is not responsible for any statement made or opinion expressed in its publications." This statement, which applies to every paper published by the society, should have equal application to the report under consideration, and should apply with special effect to it, for the reason that there will be great diversity of opinion regarding its contents. Even if it were considered necessary for the society to take action regarding the approval of the report, it would not be right for such action to be taken at the annual meeting, which is attended by a comparatively small number of members. If a division is sought on the question of approving the report, it should be submitted to the whole voting membership of the society for such action.

way as a common carrier, is under contractual obligation to operate it as such and to furnish adequate and safe facilities for the conduct of all business which shall come to it. In other words, it is under obligation to keep its road and equipment up to 100 per cent condition for efficiency, and to operate it up to that standard so far as the needs of the public require service. The manifest difference between the relation with the public of a warehouseman or an innkeeper, for example, and the owner of a railway, is that while the use of the property of each is of such character that the public has an interest in it and therefore may regulate the exercise of the use for its own protection, the warehouseman and innkeeper are under no obligation to continue their properties in the public use, and the owner of the railway is under such obligation.

Furthermore, the warehouseman and innkeeper are not under obligation to furnish ample accommodations to serve all who shall apply to them. Each of them is justified in refusing to accept offered patronage, on the ground that he lacks facilities to care for it. The owner of the railroad property is not thus justified. If his facilities are insufficient, he must provide himself with more. The only possible ground for the distinction is that the warehouseman and innkeeper have no contract relation with the pub-

lic, and the owner of the railroad has such a relation; and his obligation growing out of that relation is to provide himself with such property and to operate it, when acquired, in such manner as shall be, not only inoppressive to the public, but, as well adequate for the reasonable necessities of the public for the contemplated service for which his franchise was granted to him by the sovereign.

"The fact that property of a railroad company is devoted to the public use does not make it public property. It is still private property, although it must be used for the service of the public; and, as such private property, it is under the protection of the provision of the constitution of the United States that no state shall deprive any person of property without due process of law—and by 'property' is meant, of course, the profitable use of property, as well as the title to it and dominion over it. Whether an owner of property is deprived of its profitable use seems to the writer to be clearly a question of fact to be determined by the application of the principles of economics, and not a

a return without interference by the state—as 95 per cent of the amount of present cost of the property. If the property actually and reasonably cost \$5,000,000, two years before this valuation was made, and could reasonably be reproduced at the time of the valuation for not less than that amount, as might well be assumed, then, if the owner shall be limited at the time of the valuation to a return on only \$4,750,000, it seems to be clear enough that somewhere he has wholly lost, or has at least lost the valuable use of \$250,000. There is no force in the suggestion that he is entitled to earn and lay aside this \$250,000 during this period of two years in which the depreciation is alleged to have accrued. Even if he shall be able to earn it, he may not consider it as a return of a part of his investment and devote it to his private use as such. He is under exact obligation to use it in replacing the depreciating articles when they shall have depreciated to the point of ineffectiveness. In other words, because the proper maintenance of the property is the very first charge against the earnings of a



Fig. 25—Finished Roadbed and Track, One Mile West of George's Creek, Western Maryland Extension.

question of law. The writer, therefore, comes to the consideration of the question of depreciation of railroad properties—the precise question being whether confinement of a railroad owner, whose property is maintained in 100 per cent condition of efficiency, to a return on its depreciated value predicated on its cost newly produced, and not on its efficiency as an instrument, is, economically considered, a partial deprivation of the valuable use of his property.

"The writer has before him, professionally, an estimate, made by an engineer of a state, of the present value of a line of railway. This railway was constructed as one task within a period of about two years, and cost about \$5,000,000. The property was operated for some special traffic during construction. The valuation was made as of a date about 20 months after the road was turned over to the operating department. The state engineer finds its original cost and its reproduction cost; and then he estimates the 'condition per cent' of each item of physical property, and averages them for the total, with the result that he estimates the present value—the value on which the owner is entitled to

railroad company, and because the property must be maintained ordinarily in perpetuity, money properly necessary for replacement of portions of the property when they shall have depreciated into inefficiency, and reserved by the company for that purpose, may just as well be said to be devoted to the public use as may the physical property of the company actually used in operation. It may, perhaps, be invested by the company until the necessity for its use arises, but if the investment proves unfortunate, and the money is lost, it must be replaced, and, apparently, at the expense of dividends which otherwise might be properly payable; and, if the depreciation fund is invested and produces income, of course, that income ought to be included in the general income of the company on the net of which the reasonableness of its rate of return is to be figured.

"Therefore, if the physical property is to be valued on a depreciated basis obviously the depreciation fund necessarily segregated for the purpose of covering depreciation should also be valued, and a fair return should be allowed on both. If one builds a line of railroad 150 miles long,



Fig. 27—Concrete Retaining Wall of Western Maryland Ry. in Connellsville.

the cross ties may all be laid in one year and may cost \$325,000. Assuming the life of the ties to be 8 years, the railroad, in the eighth year of its existence, is none the less valuable to the public and none the less valuable to the owner, if he has on hand, and applicable to no other purpose, money sufficient to replace the cross ties at the end of the year. Why, then, should he be limited to a return on the value of the property, less cross ties, unless, indeed, he shall have added to that lessened value the amount of money which he shall have laid aside as necessary for furnishing new cross ties? The writer cannot avoid the conclusion that if the owner is thus limited he is deprived of the valuable use of a portion of his property devoted to the public service.

"This is not much of an argument, The writer has not time to be as convincing as he is sure the soundness of his views on the question would permit. He writes because he thinks it will be calamitous if the society goes on record

in favor of economic practice, which seems to be utterly iconoclastic, and without a dissent."

Correspondence.

THE BUILDERS OF THE PANAMA CANAL.

Wheeling, W. Va., March 10, 1914.

Editor, Railway Review:

Will you be kind enough to give me space for comment on your leading editorial of March 7, 1914, relative to Colonel Goethals' work on the Panama Canal?

Efforts to diminish public appreciation of anyone are always ungracious, and deserve a stronger term of condemnation in the present case.

You state "the important work of planning and preparation was done by his predecessors." It is true that invaluable work was done by Mr. Stevens in planning and constructing the transportation facilities connected with the question of excavation and in the purchase of plant for the same purpose, etc., and no one has been more ready than Colonel Goethals to acknowledge the debt due Mr. Stevens. Colonel Goethals stated in 1913, "people talk about the success of the army engineers at Panama, but it was fortunate that Mr. Stevens preceded us. The real problem of digging the canal was the disposal of the spoil, and no army engineer in America could have laid out the transportation scheme as Mr. Stevens did. We are building on the foundations he laid, and the world cannot give him too much credit."

The actual work of excavation was, however, largely carried out during Colonel Goethals' incumbency as chief engineer, and the design of all concrete-handling plants, rock-crushing plants of the locks and dams, hydro-electric plant, permanent terminals and buildings, dry dock, coal-handling plants, permanent machine shops, permanent relocation of the Panama Railroad, etc., as well as the construction of these items have all been under his direction. Your statement, therefore, that the important work of planning and preparation was done by his predecessors is correct only in part.

You further state, "he had the remarkable advantage of controlling his work under military rule, an advantage that no contractor or civil engineer could have." Before the expiration of his period of service on the Isthmus, Mr. Stevens was both chairman and chief engineer of the commission holding exactly the same position occupied by his successor. There is nothing "military" about Colonel Goethals' handling of the work, unless it is his prompt decision,



Fig. 28—Fourth Crossing of Casselman River at Harnedsville, Pa.

sound judgment, persistence, energy, patience, courtesy, and uniform justice. Colonel Goethals' work has not only been administrative, but has required the highest engineering ability, and there was no important feature connected with any part of the canal work which was not carefully scrutinized by him and which did not receive his approval before the commencement of construction.

While figures, in a way, are deceptive, to show the relative magnitude of the work accomplished and expenditures made by Colonel Goethals and his predecessors, it may be noted that the work under Colonel Goethals is represented by the detailed items already given, and by 195 million cubic yards of excavation; nearly 5 million cubic yards of concrete; and a complete reorganization of the working force of the canal; all accomplished at an expenditure of nearly three hundred million dollars. Under all of his predecessors the work

equally willing to share the discredit had the attempt to construct the canal been a failure.

J. P. JERVEY,
Major, Corps of Engineers.

The Railroad Men at Panama.

Under this title, Mr. Theodore P. Shonts, in the North American Review for February, gives an interesting statement of the work accomplished at Panama prior to Col. Goethal's taking charge. From this we make the following extracts:

"It was a propitious outcome of my acquaintance among railroad officials that I was able to put my hands upon men especially fitted to become heads of the various departments of the canal work. Following the resignation of John F. Wallace as chief engineer, I had the good fortune



Fig. 29—Bridge No. 1 at George's Creek Junction; Progress View.

accomplished is represented by certain preliminary work such as partial construction of terminals, temporary quarters, the temporary reconstruction of the Panama Railroad, purchase of plant, the establishment of an effective department of sanitation, and excavation amounting to less than $8\frac{1}{2}$ million cubic yards, all accomplished at an engineering expenditure of approximately 37 million dollars. Colonel Goethals has been continually on the Isthmus, excepting his brief leaves and when absent annually, on duty, to appear before Congress in connection with appropriations, from March, 1907, to the present date, or a total of seven years. The total time spent by his predecessors amounted to less than three years.

Your statement that "somehow a military touch seems to influence people, as a uniform is supposed to attract the ladies" is most unjust. Neither Colonel Goethals nor any of his military assistants ever appeared on the Isthmus in uniform, either officially or otherwise, and every effort was made to avoid any assumption of military rank, officers even dropping their military title in the signing of all official correspondence.

In view of the facts as above stated, I feel that but slight recognition has been given Colonel Goethals for his distinguished services, and that he is fully entitled to whatever credit is due for success in the construction of the Panama Canal. One might inquire if those who are now so willing to share the honor connected with its completion would be



Fig. 30—East Abutment of Salisbury Viaduct, W. H. Ry. Extension.



Fig. 31—Third Crossing of Casselman River, Masonry Near Completion.

in June to secure in his place John F. Stevens. Mr. Stevens had been active in the construction of the Great Northern Ry., and afterward in its operation. He severed his connection with the Rock Island road as vice-president in charge of operation to accept the position of chief engineer of the canal. On his resigning this position, after having succeeded me as chairman of the Isthmian Commission in March, 1907, he became vice-president in charge of operation and maintenance of the New Haven lines, and subsequently president of a railroad constructed by him across the state of Oregon for the Hill system. Mr. Stevens' first assistant at Panama was J. G. Sullivan, who is now chief engineer of the Canadian Pacific Ry. David W. Ross, who had been purchasing agent and afterward superintendent of transportation of the Illinois Central R. R., left the latter position to become head of the canal's purchasing department, and is at present vice-president of the Interborough Rapid Transit Co., of New York. Edward J. Williams, paymaster of the Chicago & Northwestern Ry., became dis-

bursing officer on the isthmus, and up to date has paid out two hundred and fifty million dollars without an error. From the Rock Island road, where he was assistant general manager, came W. G. Bierd to take charge as general superintendent of the operation of the Panama Railroad. The Oregon R. R. & Navigation Co., a part of the Harriman system, contributed its general auditor, E. S. Benson, who assumed control of the accounting department of the canal construction. W. G. Tubby, for years general storekeeper of the Great Northern Ry., left that position to perform the same duties at Panama. Jackson Smith, who, as railroad contractor and in other capacities, had had a very extensive experience with construction labor, took charge of the department of labor and quarters. Richard Reid Rogers, who was general counsel to the Isthmian Commission and the Panama Railroad, still holds the latter position, and is also general counsel to the Interborough Rapid Transit Co. W. Leon Pepperman, who had formerly been assistant chief of the Bureau of Insular Affairs at Washing-



Fig. 32—Fifth Crossing of Casselman River.

ton, was chief of the office of administration of the Commission, and today holds the position of assistant to the president of the Interborough Rapid Transit Co."

After describing in some detail the difficult conditions met and how they were overcome, Mr. Shonts concludes as follows:

"It had been agreed between Mr. Roosevelt and myself when I accepted the chairmanship of the Isthmian Commission that I might withdraw from that position, with his sanction, so soon as the construction of the canal was under full headway. I did not, therefore, sever all my railroad connections, although for two years I devoted my entire physical and mental energies to the problems of the big ditch. My resignation was not handed in until thirty-five thousand men—within five thousand or six thousand of the maximum number employed—were on the commission's pay-rolls; all the machinery essential to the comple-

"1. The chairman shall have charge of all departments incident and necessary to the construction of the canal or any of its accessories.

"2. He shall appoint the heads of the various departments, subject to the approval of the commission.

"3. The head of each department shall report to and receive instructions from the chairman.

"This order, with a subsequent minor amendment, is that of the present organization on the isthmus, except that there have been changes made in the titles of the heads of departments to conform with military usage. It was this concentration of supreme authority in one man that has enabled Colonel Goethals, as head of the military regime at Panama, to carry on and complete in such manner as to command the wonder and admiration of the world the work planned and begun under the railroad regime, as it enabled me—encouraged by the unfailing support of President Roose-

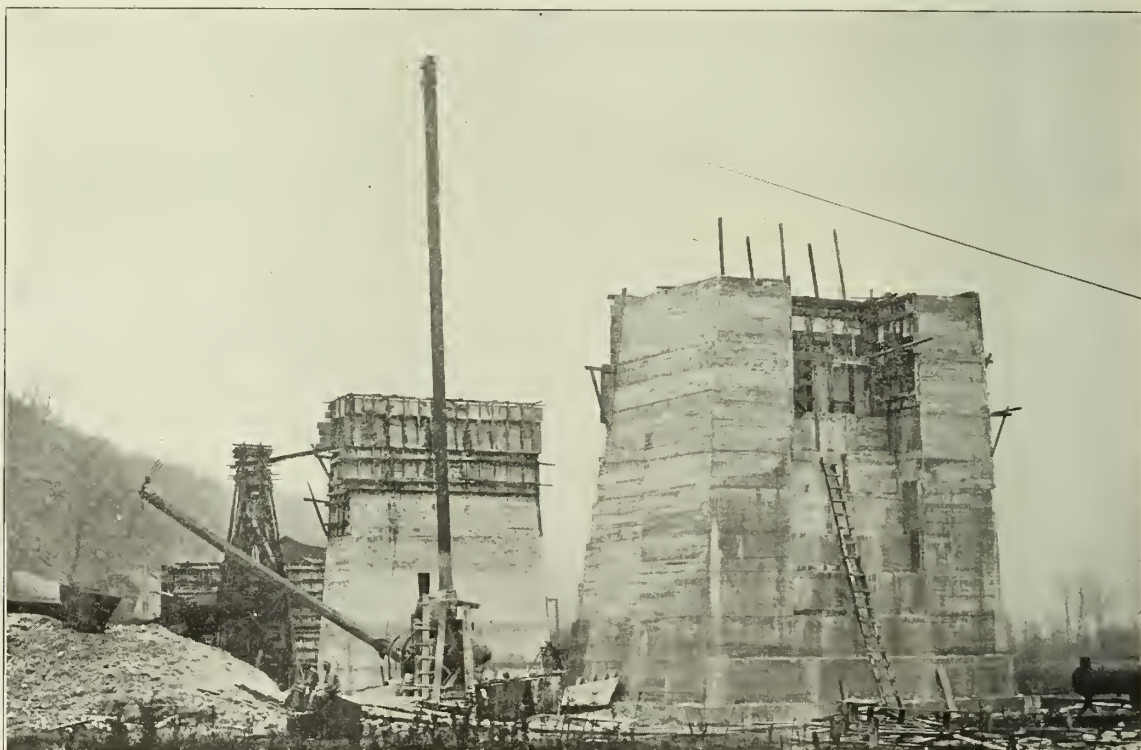


Fig. 33—East Abutment of Bridge at Station 820, East of Connellsville 1¼ Miles.

tion of the canal, except that for the lock construction, had been designed, constructed, assembled on the isthmus and put into operation; the more serious difficulties attendant upon industrial operations in the torrid zone overcome, and the entire project well under way.

"Colonel Goethals' splendid achievement in carrying to what is already practical completion, without setback or delay, without a hitch of any kind or a hint of scandal, the great work of the construction of the Panama canal, while demonstrating the thoroughness with which the railroad men prepared the way on the isthmus and the care and precision with which their plans were laid, is one of which the United States army may well be proud. Incidentally it may be remarked that so wisely considered was the order of President Roosevelt, issued to the commission of which I was chairman in November, 1905, that it has not since been necessary to amend it in any important particular. The order was as follows:

"The organization shall consist of the chairman and the following heads of departments: chief engineer, general counsel, chief sanitary officer, general purchasing officer, general auditor, and manager of labor and quarters. The duties of each shall be as follows:

velt and sustained by the loyal and able co-operation of the other members of the commission and heads of departments—to accomplish such vast results in so short a time."

Correspondence.

COL. GOETHALS AND THE CANAL.

Chicago, March 12, 1914.

Editor, Railway Review:

This is really an unpropitious time to discuss Col. Goethals. The foam is still on the crested wave of his popularity and I think I estimate him aright in believing and he discerns what is froth and deprecates it.

The Colonel was recognized by his fellows as having the sterling qualities which are requisite for a high calling and he was placed in an exceptional position and he has discharged those duties exceptionally. The position brought him face to face with most trying executive problems and he has met them bravely, wisely and well. He was given arbitrary powers such as were never previously, within my knowledge, vested in any engineer, and he has exercised



Fig. 34—Third Crossing of Youghiogheny River, West Ohiopyle, Pa., Looking Northwest.

those powers judiciously. His training in military discipline has schooled him in obedience to authority and when that authority was finally vested in him, he knew how to use it aright.

It is a fact that the engineering problems of Panama were not such as to call for the highest exhibition of engineering skill, but such as they were, their solution was not the unaided work of the military engineers, as an inspection of the roster of civil assistants and the designation of their duties abundantly shows. This work did call for executive

ability of a high order and that ability manifested itself in the executive head who has earned the esteem and the approbation of his country and he has it.

Isham Randolph.

A recent decision of the United States Supreme court will compel the railroads to defend innumerable troublesome lawsuits. The decision holds that "if railroads allow noxious weeds to grow on their rights of way, and the weeds go to seed, and the seed is blown into a farmer's field and

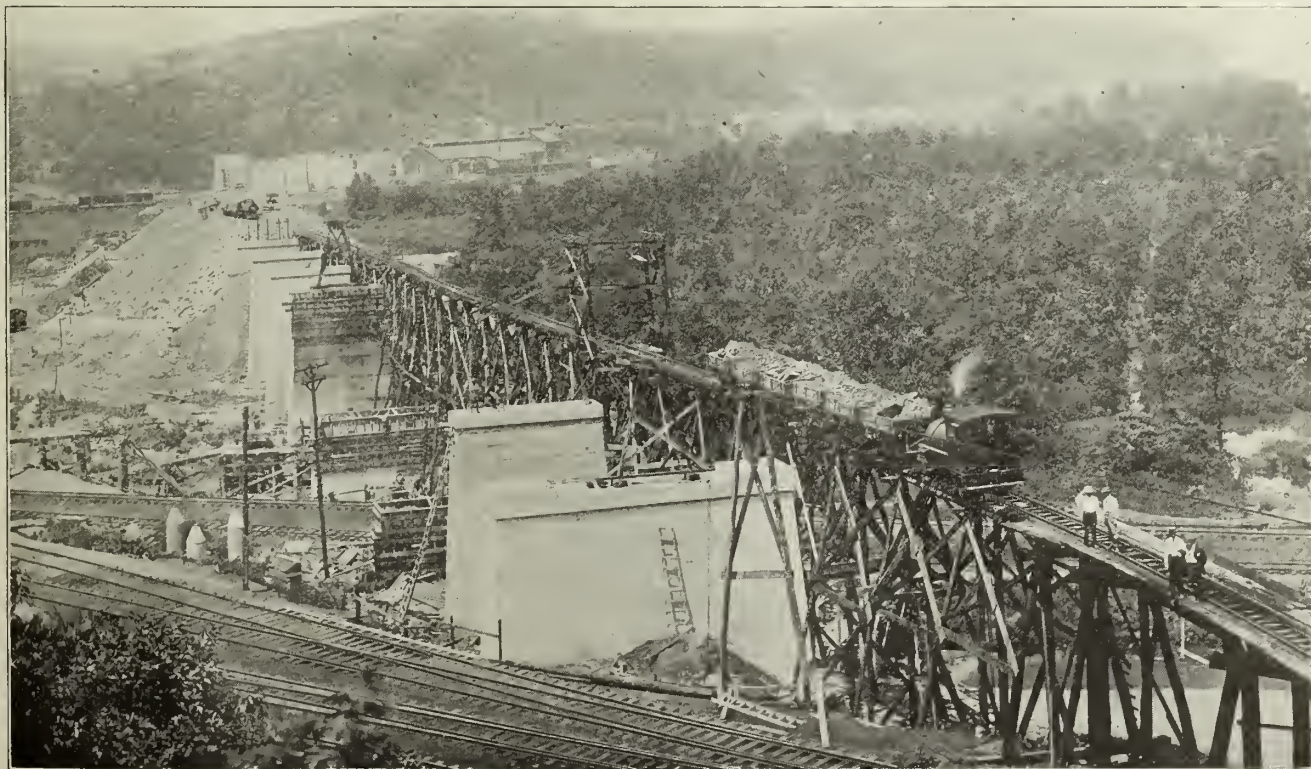


Fig. 35—Masonry for Bridge at Station 800, Looking West.

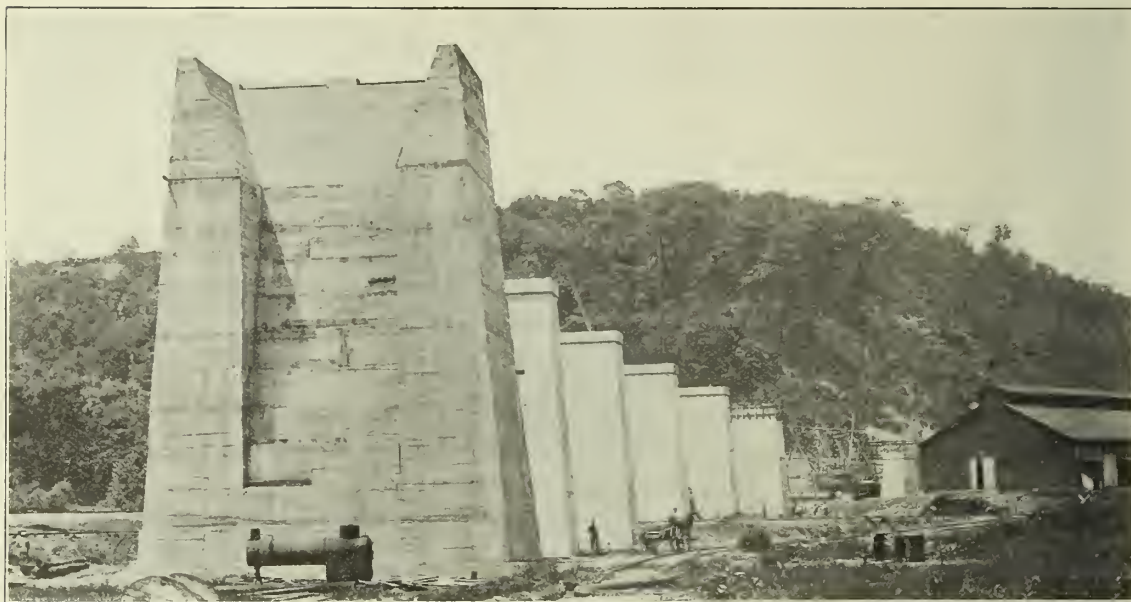


Fig. 36—Masonry for Bridge at Station 820, Looking West.

grows, the road is responsible for the damage." One manager says: "Isn't this a clear case of trespass? We do not raise the wind. The seed comes to us from this same farmer, who has simply discovered another way to play the universal game of breaking into the railroad treasury."

Future Tie Material in the United States.

By H. H. GIBSON, EDITOR OF "HARDWOOD RECORD."

From a paper read at the annual meeting of the American Wood Preservers' Association, New Orleans, La., Jan. 20-22, 1914. The paper deals in an intelligent manner with the gradual decline in supply of present timbers which render satisfactory service in the natural condition of the wood and their replacement with inferior timbers which cannot be used with any economy except by chemical treatment. The analysis of the sit-

uation is logical, and indicates careful study of forest conditions as well as accurate knowledge of the lumber markets.

The demand for tie material is great, with constant tendency to increase, and with assurance that the demand will continue. The substitute question has not seriously entered the cross-tie business. Scores of patents for metal and other composition and combination ties have been issued, but for all practical purposes such ties may be ignored. They cut practically no figure at all in the supply in this country, because they are not used. Wood is furnished and, as far as can be foreseen, it will continue to furnish the ties.

New lines will be built, but even if demand for new tracks is ignored the call for ties for repair work will continue and it must be met. The general public may not be aware of the fact that seven ties are used for repairs and renewals for every one that goes into new lines. Of the 126,155,000 ties bought



Fig. 37—Masonry Complete for Third Crossing of Casselman River, Looking West.



Fig. 39—Double-Track Through Truss Bridge of 240-Foot Span Crossing B. & O. R. R. at Keystone, Pa.

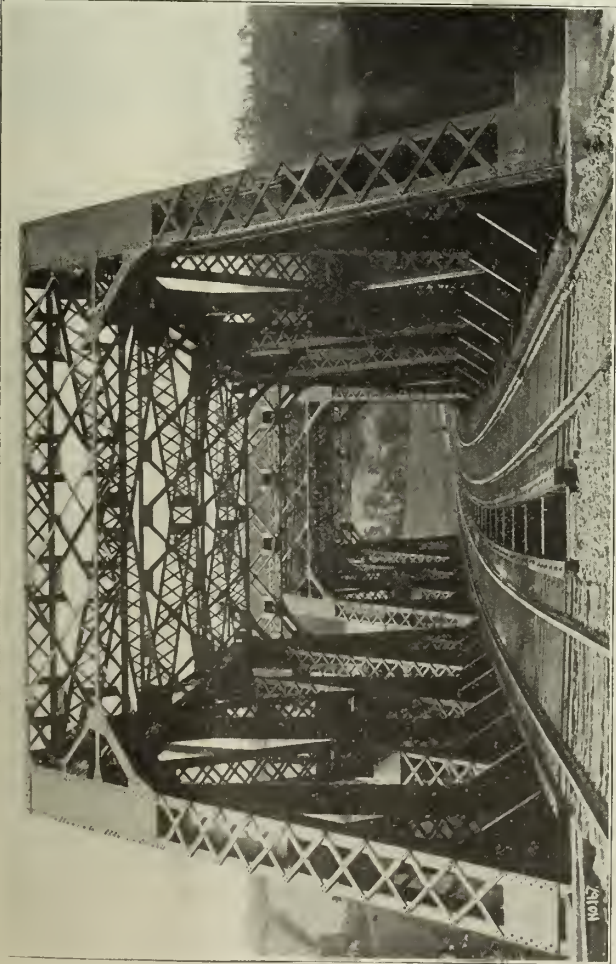


Fig. 38—Bridge No. 1 at George's Creek Junction, Looking West.

by steam and electric roads in 1911, only 11,041,324, or 8.2 per cent, went into new construction; the others were for renewals, and the proportion used for renewals was still higher in later statistics. This is an effective answer to the argument sometimes advanced by poorly informed persons, who say that the country's railroads are now practically all built and the demand for ties will soon fall to a small percentage of what it now is.

Two things are wrong with this argument. First, the building of new lines is not at an end, nor anywhere near it; and second, if it were so, the call for ties would not greatly diminish, because tracks will have to be maintained, and the principal demand is for repair work. The fact must be accepted that enormous quantities of ties must be provided every year as far into the future as men are now privileged to look; and the question which demands a practical answer is, where are these ties to come from? Are the forests producing them as fast as they are wanted, and, if so, will the supply continue in the future or will it decline?

It is not necessary to sound a sensational alarm. The country does not want sensations; it wants facts and careful conclusions. A good many scares on account of the lumber situation have turned out to be less warranted than at first was supposed, and it is unnecessary to repeat the experience; but the situation demands attention.

In round numbers, 125,000,000 cross ties are needed yearly. This is equivalent to 4,000,000,000 board feet, and the ties cost the railroads approximately \$15 per thousand feet, board measure. Practically the entire quantity is cut from nine or ten kinds of wood, chief of which are oak, pine, Douglas fir, cedar, chestnut, cypress, tamarack, hemlock and redwood. Specifications sent out by the principal railroads of the country list 78 woods that will be accepted for ties; but many of these are simply subdivisions of the oaks and pines, though a number of the so-called minor species are named.

A casual examination of tie statistics will suffice to show that a few woods are furnishing most of the material, although the forests of the United States contain over 500 different species of wood. It might be supposed that when the few woods which now are furnishing the bulk of the ties become scarce, the tie cutters can simply switch off to some of the 500 other kinds and go on cutting. That would be a simple solution of the problem if it were practicable, but serious obstacles are in the way of doing it. Four out of five of the forest trees of this country, taken as they come, are unfit for any kind of ties, and must be left out of all consideration, both for the present and in the future. They are either too small or too scarce.

The kinds of wood and the number of ties bought in 1911 by steam and electric roads in this country are shown in the list which follows:

Oak	59,508,000
Southern pine	24,265,000
Douglas fir	11,253,000
Western pine	2,696,000
Cedar	8,015,000
Chestnut	7,542,000
Cypress	5,857,000
Tamarack	4,138,000
Hemlock	3,686,000
Redwood	1,820,000
Gum	1,293,000
Maple	1,189,000
Beech	1,109,000
All others	2,682,000

Total135,053,000

Nearly half of the ties are oak and about half of the remainder are pine. These two woods constitute 65 per cent of all. The largest demand is made on oak, because it has been regarded as the best tie wood, all things considered; and the

first indications of diminishing supply are seen there. The railroads can still buy all the oak ties they want if they are willing to pay the price; but the contractors are obliged to go farther to get them, to take a little lower class of trees, and to charge more for the ties. In some localities no scarcity is apparent, but when the country as a whole is considered, it is quite noticeable. In Arkansas, for instance, the supply may be somewhat ahead of demand at times, while in Pennsylvania, Ohio and New York the railroads may have trouble in procuring the oak ties they need. Some regions which formerly had more oak than they could use now have little or none. There is no question that oak in this country is being cut much faster than it is growing, and it is only a matter of time until scarcity will be everywhere felt. This is probably true of white oaks more than of red oaks, as far as ties are concerned, but it holds generally for all oaks. Most ties are cut from small trees, and this practice strikes the oak supply of the future in a vital spot; for a tree that will make three or four ties now would be good for as many saw-logs some years hence. The oak-tie cutters, therefore, while utilizing a good deal of material which would otherwise be wasted, are industrious destroyers of prospective forests. They take the trees that are coming on,

for hemlock and tamarack. They are as important now in the tie business as they will ever be, but they may hold their own for some time.

Chestnut is a substantial tie material, but it is now passing through a crisis on account of the blight, and no dependence for the future can be placed in it.

The situation may be summed up in a way to show that the trees which now furnish the bulk of ties, and have done so for years, cannot do so much longer. Ties, however, must be had, and new sources of supply must be found. What are the possibilities along that line?

Douglas fir, western yellow pine and redwood are abundant in the war West. They are supplying about 16,000,000 ties a year now, and for years to come they could furnish all the railroads of the United States. In fact, there is enough of these three woods on the stump now to supply for 200 years all the ties wanted, provided the demand would not increase above what it is now.

Two factors stand in the way of turning Douglas fir, western yellow pine and redwood over to the railroads as a reserve source of ties. The wood is needed for other purposes, and it is so far away from the majority of the railroads that the cost of



Fig. 40—Fifth Crossing of Casselman River, at Confluence, Pa., Looking South.

and the railroads, as well as other industries, will miss these trees in years to come. If white oak ties could be had when and where needed, and at reasonable prices, railroads would use a few of any other wood.

The second important cross tie source is pine. The four southern yellow pines are considered best in the pine class, and longleaf pine, being harder and more durable than the others, is at the head of its class. This is the tree commonly known as Georgia pine, hard pine and heart pine. Two other southern yellow pines are largely cut for ties, shortleaf and loblolly. They are softer than longleaf pine and decay more quickly when exposed to the weather. Statistics do not show the relative numbers of ties cut from the different southern yellow pines, but all are important.

Longleaf pine grows slowly and reproduces poorly. When present forests are cut little more need be expected from that tree. The situation is much the same with shortleaf pine, but not with loblolly, of which more will be said in a future paragraph.

It is thus seen that white oak and southern yellow pine, which at present are the chief sources of ties, are being depleted. The process is not so rapid as to call for immediate alarm, but the tendency is unmistakable. Much northern white cedar remains, but its growth does not half make good the cut, and any increased demand would quickly bear results in lessened supply. In other words, there is not enough of this cedar to last long if tie cutters should undertake to make good there what they will soon lose in white oak. The same holds

the 2000 or 3000 miles haul would be prohibitive. The railroads must find ties closer home, if possible, or as long as possible.

In a preceding paragraph it was shown that the average cost of ties, when bought by railroads, was about \$15 a thousand feet, board measure. It happens that the average value of sawed lumber in the mill yard is practically the same, taken for the whole country. The value quoted for the ties applies when delivered on the right-of-way, which is generally near the place where they are to be used—their ultimate market. The lumber, on the other hand, is valued in the mill yard, the point of production, which averages about 300 miles from its ultimate market. The important point to bear in mind is, in making this comparison, that railroad ties, foot for foot, are cheaper than lumber, though the difference is small. It amounts to approximately the freight on a 300-mile shipment of lumber; that is, an operator can get a little more for his logs reduced to lumber than if he made them into ties, but the difference is not large enough to pay for sawing the ties. Otherwise tie timber would be sawed into lumber. There is a nice balance here, a sort of competition between the lumberman and the railroads for the tie timber. The railroads have to pay enough to draw it away from the lumberman. In a former paragraph the statement was made that railroads could still procure all the white oak ties they want by raising the price. They would need to raise it only in those localities where lumbermen are now outbidding them.

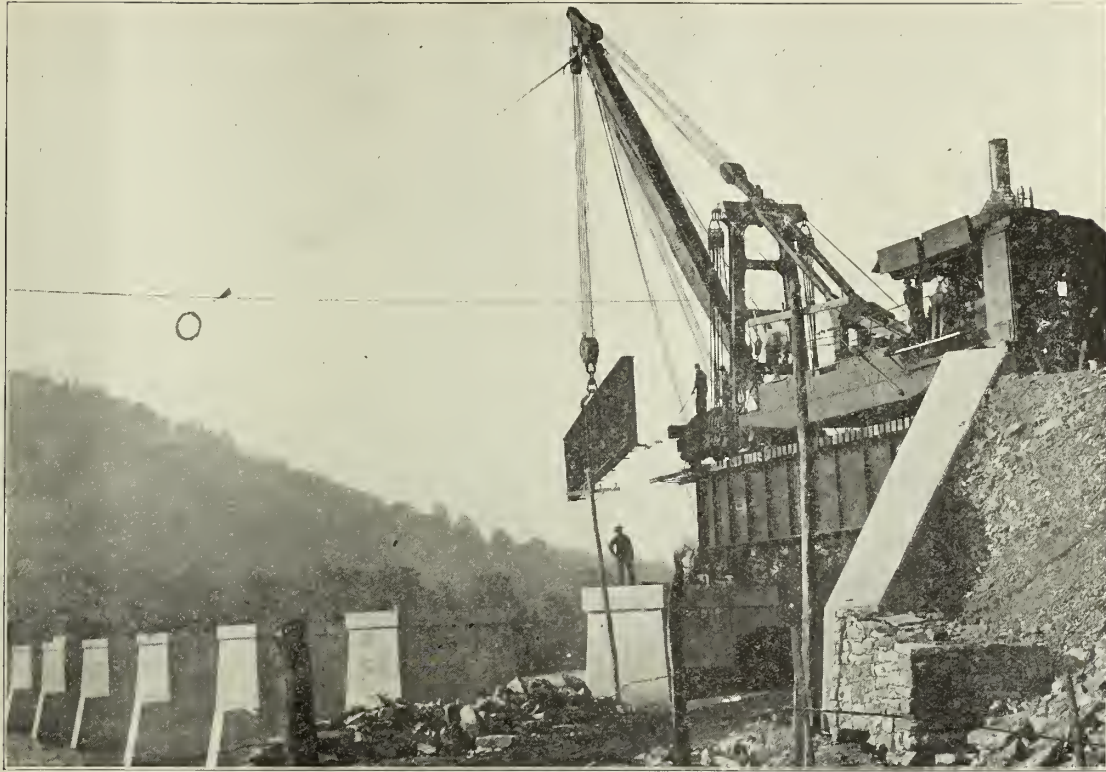


Fig. 41—Traveler Placing Second Span, First Crossing of Youghiogheny River.

This phase of the situation is somewhat modified by the fact that ties are often made of timber of such small sizes or otherwise of such inferior grades that if converted into lumber it would not be very valuable. This is really the saving grace in the situation, because if railroads were compelled to buy ties made of oak fit for quarter-sawing they could not afford to touch an oak tie.

As far as absolute scarcity of tie timber is concerned, it will be many a year before railroads are unable to get some kind of ties if they are able and willing to pay the price; but the time is not far off when the manner of providing ties for the country's railroads will need radical revision. The re-

vision has already begun, and its basic principle does not consist so much in searching for new woods as in treating with preservatives the old woods to make them last longer. The salvation of the railroads lies in that direction. They must get along with fewer ties by making them give longer service.

The search for new woods has been thorough. It has been clearly seen that white oak cannot hold its place indefinitely, and it has been a question what shall take its place. Various suggestions have been made, and commendable efforts have been put forth to provide for the shortage when it comes. Enthusiasts have suggested that the semi-tropical hardwoods in southern Texas and Florida be utilized for cross ties. The hard-

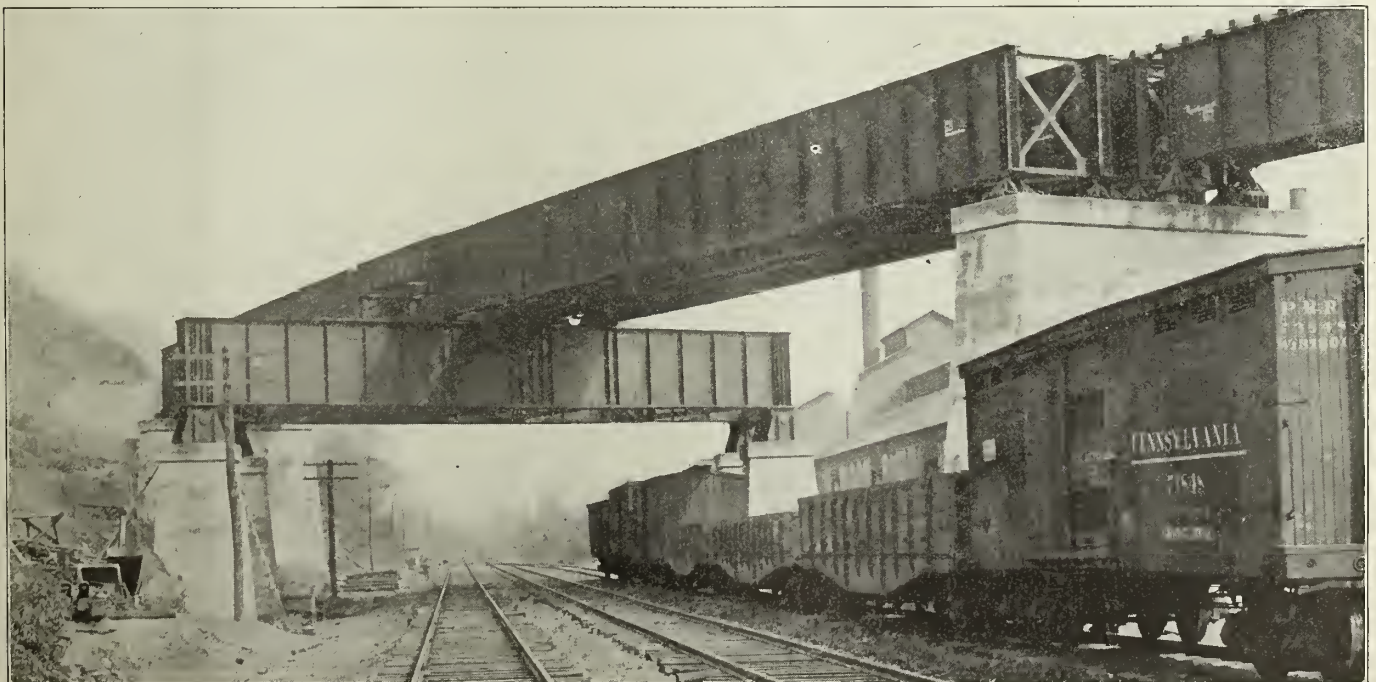


Fig. 42—Bridge at Station 820 with Steel Work Erected.



Fig. 45—Top View of Salisbury Viaduct.



Fig. 46—Viaduct Construction of Pittsburgh & Lake Erie R. R. in Connellsville, Pa., Connecting with Western Maryland Ry.

the matter. All of the semi-tropical woods from Key Largo, Florida, to Devil's River, Texas, would hardly make enough ties to last the railroads of this country one year. To depend on those woods to really help the situation is a delusion and a snare. The list of alleged semi-tropical tie timbers is long enough, to be sure, and includes mangrove, lignum-vitae, blackwood, strongback, button wood, inkwood, mesquite, huisache, catsclaw, horsebean, Texas ebony and fifty more, but a personal acquaintance with the region will speedily convince any one that the names are about all there is of the trees. Trunks are few, small, crooked, branched and deformed. Railroads in the immediate vicinity use some of the woods for ties, but it is because they are convenient.

Some of the country's leading railroads anticipated tie shortage some years ago and undertook to plant trees and grow the necessary timber. The move was commendable and deserved

better success than attended it. In the first place, not enough planting was done to make a "drop in the bucket." Had all the trees done well they would not have furnished enough ties to amount to much; but there were other troubles. In the East the planted locust was eaten up by beetles; the chestnut was threatened or attacked by blight. In the South the catalpa was a fizzle; and the eucalyptus plantations on the Pacific slope are still in the inchoate and experimental stage.

Meanwhile the railroads must have ties, and they will continue to buy them in large quantities. The standby timbers, such as white oak, hard pine and Northern white cedar, are still holding out, but they cannot meet the demand much longer, and other kinds of timber must make up the deficiency.

The reasonable thing to do is to treat all ties with preservatives, to make them last longer. By doing that the demand can be cut down nearly one-half, because a properly treated tie lasts nearly twice as long as one in its natural state. That, of course, depends on the kind of wood. Some last a long time in the wood's natural condition, and preservative will not double their period of usefulness; but others decay quickly if unprotected, and the life of such can easily be doubled.

Preservative treatment is neither new nor experimental. It has been tried and proved. In 1912 there were 112 treating plants

in the United States, nearly ninety of which were well equipped. Steam railroads operate twenty-two plants for treating their own ties and other timbers. In 1911 there were 31,141,231 ties treated in this country, and it is interesting to note the various woods making up the total. The following table gives the information:

Southern pine	11,606,392
Oak	9,433,002
Douglas fir	3,628,706
Western pine	1,789,036
Gum	1,182,095
Tamarack	755,414
Beech	730,328
Birch and maple	620,047
Hemlock	535,255
Elm	292,008

Spruce	102,808
Cypress	101,864
Lodgepole pine	92,158
White pine	78,273
Hackberry	62,568
Chestnut	47,538
Sycamore	32,244
Cedar	26,000
Hickory	21,441
Walnut	2,000
Ash	1,390
Cherry	674
Total	31,141,231

The tendency is apparent in the above table. The treatment is being applied to woods which decay quickly without it, thereby drawing upon new sources of supply. The reports do not specify, yet it is well known that most of the nine million and more oak ties which passed through the treating plants were in the red oak or black oak class. These woods in the natural state decay quickly when laid in track; but treatment lengthens their life. Nine million red oak ties lessens the drain by that much on the white oaks. Even such woods as gum, beech, elm, white pine, sycamore and hickory make good ties after being passed through the preserving tanks. A practically worthless tie wood in its natural condition is converted into a serviceable piece of timber by the injection of preservatives.

In that direction lies the hope of the situation. Ties can be made of timbers heretofore regarded as scarcely worth cutting for that purpose. Practically every tree that grows in this country, if large enough, is good for ties, if treated. If very soft, like buckeye, aspen and white pine, plates can be used under the rails to prevent rapid wear.

Viewed in that light, the tie situation is not particularly discouraging. Some of the old tried woods are becoming scarce, but dozens of others heretofore hardly used are available with the aid of the treating tank. A practically clean sweep can be made of all trees on a tract, provided they are of suitable size. That will bring ties to the tracks which heretofore were left as an encumbrance on cut-over land. Utilization will be closer, waste will be less. It will not be a question of finding new sources of tie material, but of making better use of well known sources. It costs more to treat a tie than to use it untreated, and for that reason woods which naturally last well will continue to be sought; but when they can no longer be found, or cannot be procured except at a price exceeding that of cheaper woods that have been given treatment, the cheaper woods will come in.

The time will doubtless arrive in the United States, as it has already come in France and Germany, when ties will be cut from planted timber; but that time is a good while in the future. A little planting has been done, and is being done, but for many years the railroads must look to natural woodlands for ties. Nature is still able to plant trees in this country a good deal faster and more cheaply than man can do it, but Nature needs man's help in caring for them after they are planted.

Some of the species which hold out promise as sources of ties because they grow rapidly, reproduce readily, take preservative treatment easily and have extensive ranges, are loblolly pine in the South and white pine in the North; willow oak in the South and red oak in the North; and the cottonwoods and willow in the South and Middle West. These are not the only ones, but they are important. Rapid growth and good trunk form are essential. Loblolly pine in particular is remarkably promising because of its wide range, vigorous growth, dense stands, phenomenal reproduction and the value of the wood. Willow oak on fertile Southern land grows nearly as fast as loblolly. It is in the red oak class. Black willow on good land grows as fast as either.

In the far West the tie problem is not serious. The pines and firs already of tie size are sufficient for all needs for many years; but, none the less, preservative treatment is as essential there as in the East; and it may be safely predicted that before many years few untreated ties will be laid anywhere in this country.

How a Railway System Belongs to the Territory it Serves.

BY FAIRFAX HARRISON, PRESIDENT, SOUTHERN RY.

President Fairfax Harrison, of the Southern Railway, addressed the Chamber of Commerce of Chattanooga on the subject "The Southern Railway Belongs to the People of the South." From this address the following is taken. It shows the financial contribution to government, education, public improvement, banking, and general improvement, of a railway system of 10,000 miles, 59,000 officers and employees and 100 millions of annual revenue.

In a very real sense the Southern Ry. belongs to the people of the south. It is not only their highway to market, but its fiscal operations are part of the life of the communities along its lines. Of the one hundred and three millions of annual revenue collected last year by the railways included in the Southern Ry. system, there was immediately paid out again along its lines at least seventy-six millions, an amount not far short of the total collections from the people of the south: for approximately twenty-two millions of the total revenues were collected from people outside of the southeastern states—a fact not often taken into consideration, the explanation of which is that an appreciable part of the passenger traffic of the system consists of the transportation of residents of other localities traveling in the south, and, furthermore, that to a large extent freight charges on southern products shipped to other localities are paid by the consignees.

What then becomes of these great revenues collected in the south? Are they hurried away to some cavern in Wall Street? No. The fact is that all the moneys collected in the south are deposited in southern banks which are drawn upon from time to time only as funds are needed for proper fiscal purposes. The funds of the system thus become an important factor in strengthening the banks of the territory, and so are at all times at the service of the southern people.

To a large extent, the moneys collected for transportation service on our lines are not withdrawn at all from the southern communities in which they are collected. An analysis of Southern Ry. expenditures for the last fiscal year shows that, of every dollar disbursed, 41.71 cents went to the payment of wages, substantially all of which are paid along the line of the road, and so remain in southern banks, a disbursement which, for the Southern Ry. proper, averages about two million dollars a month. The purchase of materials and supplies used 23.20 cents, and, under our policy of buying as far as practicable from southern people, 19.12 cents of this was expended in the south and only 4.18 cents in other localities. Miscellaneous operating expenses required 6.09 cents, all spent in the south. Taxes, all paid in the south, required 3.65 cents. Interest, rentals and other miscellaneous payments accounted for 20.83 cents, and the holders of the company's preferred stock received 4.42 cents. It is unfortunately impracticable to determine the proportion of interest and dividends paid to southern owners of Southern Ry. securities. I wish it was all paid to southern people; but, leaving these entirely out of account, it is seen that at least 70.57 cents out of every dollar expended by the Southern Ry. remains in or is brought into the south. It may be added that these figures do not take account of expenditures for additions and betterments amounting last year to three millions and a half and in ten

years to twenty-seven millions of which the major part, expended on roadway and structures, was practically all paid out along the line of the road. We may then take it as established that what the southern people pay the Southern Ry. lines for transportation remains a part of the working capital of the southern people; but it is interesting to pursue the thought a step further to a realization of what these disbursements by the Southern Ry. in the south mean in the life and growth of the southern people. Of the total of seventy-six millions paid out along the Southern Ry. lines last year approximately forty-three million dollars went to the army of 59,000 employees and thus, on the conventional basis of five to a family, directly supported about 295,000 southern people, or about six and one-half times the population of Chattanooga at the date of the last census.

The real preferred stockholders in the matter of priority of claim, are the political governments of the states, counties, and cities along its lines. Their claim upon railroad revenues comes ahead even of that of employees, and they took \$3,743,704.39 in the last fiscal year. In 1912, our school taxes in these states amounted to something over \$800,000, or an average of twenty-eight hundred dollars for each county traversed by our lines. At the average annual compensation of school teachers in the southern states this would more than pay for ten teachers in each county. It represents \$2.64 out of every \$100 of school taxes paid in these states and amounts to fifteen dollars for each school building in the states traversed by our lines. Every dollar paid to the Southern Ry. for transportation charges thus includes a substantial contribution to the maintenance of the system of public education in the south.

Payments by the Southern Ry. system in the same year of taxes directly assessed for public roads and bridges amounted to \$447,966.63, or an average of \$1,571.81 for each county along our lines. Every dollar paid for transportation charges thus includes also a substantial contribution to the maintenance of the public highways of the south and is an indirect but none the less real public support of the progressive movement for good and better roads.

There are few families in the south who do not hold an insurance policy of some sort; either an assurance on life or against the risk of fire. The invested funds of the great insurance companies are, therefore, matter of vital concern to the southern people and, in large measure, are their own assets held in trust for their benefit. We find that the chief insurance companies report their holding of securities of the Southern Ry. system, including terminal bonds on which the Southern is a joint guarantor, aggregating more than eighty million dollars. In that great fund, the integrity of which depends upon the continued solvency of the Southern Ry. lines, the southern people have a vital proprietary interest, an interest which, as they realize it, should be to them a constant spur to protect themselves by maintaining, as they can and will, the basis of Southern Ry. credit.

I assert with confidence that the facts to which I have called your attention are full warrant for the claim that in a very real sense the Southern Ry. belongs to the people of the south; so much so that its annual reports might more properly be addressed "To the People of the South" to advise you of the results of the management of your property, for today it belongs more to you than it does to the stockholders. More than this, its management is and always has been devoted to the interests of the south. Its officers are mostly southern-born men and those who were not born in the south have been here long enough to become identified with our interests, our peculiarities, our responsibilities, our prejudices, and our aspirations as a people; they talk the same language as the people of the south. I look

forward to the time when there may be more southern men sitting on our board of directors, where I know that they will be welcome.

As an organization then, the Southern Ry., with full appreciation of, and acquiescence in, the present tendency of public sentiment as to what a railway is and should be, stands pledged to the southern people, and is proud to declare itself one of their own institutions. As such it invites the southern people to help it to become more and more their efficient servant and at the same time the object of their pride and affection. They need have no fear of its future if it has their confidence.

Fair Compensation for Parcel Post Still Ignored.

Congress has passed the bill providing for the expenditures of the postoffice department for the next fiscal year. Once more, however, congress has failed to compensate the railroads for carrying the parcel post. The bill is based upon estimates of the postoffice department that next year the parcel post will handle 600,000,000 packages, yielding a revenue to the postoffice of \$60,000,000. Concerning the latest developments in this situation, a statement has been issued by Ralph Peters, president of the Long Island R. R. and chairman of the Committee on Railway Mail Pay, representing 264 railroads operating 218,000 miles of line in the United States. Mr. Peters says:

"The postmaster general in his annual report of Dec. 1, 1913, stated that in view of the prospective 'prodigious growth' of the parcel post, 'the railroads, of course, will become entitled to additional compensation for this extra service imposed upon them, and the department is engaged in gathering all statistical data necessary for ascertaining a correct basis for fixing a just, fair, and adequate compensation for the service rendered.' On February 17th, the railroads' committee was advised by the postoffice department that it had made a recommendation to congress that 'on account of the increased weight of mails' due to the parcel post, the postmaster general should be authorized to add to the compensation of the railroads not more than $\frac{1}{2}$ of one per cent.

"This recommendation would have added only \$254,000 to the mail pay of all the railroads in the United States. Congress took no action on the recommendation, evidently considering the proposal too trivial for consideration, and preferring to await the recommendation of the joint congressional committee now investigating the whole subject.

"In Great Britain the railways receive 55 per cent of the revenues from the parcel post. Before the establishment of the parcel post the railroads in this country received for transporting the mails at least $\frac{1}{3}$ of the postoffice revenue. Assuming that their service is no greater in handling the parcel post than with other mail, this increased revenue of \$60,000,000, to the postoffice department should in all fairness mean increased payments to the railroads of at least \$12,000,000.

"Nevertheless, the appropriation bill passed by congress provides no payment to the railroads beyond the provision already made that five per cent might be added to the pay of railroads on which there had not been a weighing since January 1, 1913. At a time when the Interstate Commerce Commission is insisting that the railroads shall make a fair charge for every service rendered, it seems in the highest degree unjust that no provision should be made adequately to compensate the railroads for providing and operating the transportation machinery without which the mail service would be practically impossible."

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WILLARD A. SMITH	- - - - -	President and Manager
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CLYDE F. BURNS	- - - - -	} Assistant Editors
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Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, MARCH 14, 1914.

The gradual growth of unfilled orders for steel shows a moderate and encouraging expansion. Current productive capacity of the mills averages close to 75 per cent, with plate mills running 80 to 85 per cent, and with quite a volume of business pending. The tone of the market even at this dull time is strong. Prices outside of pig iron are firm and the large volume of business awaiting release gives the entire market a sense of strength which will hold quotations at least where they now are.

The report of the Interstate Commerce Commission regarding the accounting of the Chicago, Milwaukee & Puget Sound Railway, is given in full in another column, because one needs to read it in full in order to understand the matter. The explanations made by the railway officers, seem to have been presented in the hearing and to have been considered; so that there is no apparent ground for a rehearing.

There is no action to be based upon this decision and the securities of the road are not impaired by it. The railway company has revised its accounts and agrees to strict observance of the law hereafter. The purpose of the decision is to show how the law has been

evaded and to let it be known that the Commission will "hereafter expect a more exact observance of the prescribed accounting systems by the carriers and their officials." They make it plain also that they will hold to the strictest accountability, those above the accounting officers who direct the latter to evade the rules and regulations.

The law granting to American vessels engaged in coast trade exemption from Panama Canal tolls, was aimed at the railways. They were not to be permitted to operate vessels through the canal themselves; and the vessels competing with the railways in transcontinental traffic were to receive what was practically a large subsidy. This measure is now in all probability to be repealed, because of the charge that it violates our treaty with Great Britain. The bearings of this proposition on the railway situation do not seem to be given any attention at Washington or elsewhere.

The least that can be said of the present situation of Rock Island affairs, is that the scheme of holding companies was unwise in its conception and disastrous in the outcome. The purpose of course, was to retain control of the road without tying up the money of the schemers in it. In the reorganization which must result in wiping out all but the real company—the Chicago, Rock Island & Pacific Railway—some innocent investors who were misled will be sufferers. The collateral trust bond holders of the Rock Island Company seem to be in a strong position when they decline to submit to an assessment in order to give some value to the stock of the New Jersey company. They state that they will not be a party to any plan of organization until satisfied that such plan is to the best interest of the bondholders. In other words they propose to stand on the bond, which is supposed in such event to be more secure than the stock which it underlies.

Financial factors are indulging in some ruminations concerning the contingency which must be faced in the event that the Interstate Commerce Commission decides to construe literally the provisions of the Panama Canal act, regarding ownership by railroads of subsidiary water lines. Practically every railroad in the country which has any considerable interest in water transportation, has made application to the commission for permission to retain its ownership of or in such lines. Failing to secure this permission, the companies must divest themselves of such ownership, under the terms of the act, prior to July 1, of this year. The phraseology of the statute is most comprehensive, for it provides that the commission may allow the respective railroads to continue their interests in the water lines, only in case it finds that such interest does not "exclude, prevent or reduce competition" between the rail and water carriers. If

interpreted stringently the commission may very likely draw the line in such a way that it will necessitate sweeping changes.

The problem which in that event will confront banking interests is to provide for the absorption of the amount of capital involved with as little tremor as possible. The dissolution of the present relations and the flotation of new companies means readjustment in capital investments reaching into hundreds of millions of dollars. In instances of which the New York, New Haven & Hartford is the best example, with a capital investment in subsidiary steamship lines amounting to upwards of sixty-six million dollars, the circumstances under which the dissolution is effected will have a material relation to the prosperity of the parent company. Speaking in general the larger part of the investment in water carriers is centralized in comparatively few port cities of the country, and in many cases the local business men of the cities affected are feeling it incumbent upon them to scrutinize the impending readjustment and take what steps are necessary to foster the transportation interests of their home town.

The papers seem very willing to publish the vagaries of Clifford Thorne, railroad commissioner of Iowa, because they lend themselves readily to the methods of the writers of scare-heads. It is hardly conceivable that the Interstate Commerce Commission would attach any importance to the charges which he makes, that the railways have concealed their real earnings by swelling their maintenance accounts. An attempt to go into this subject was made at the former rate hearing, but it amounted to nothing. Maintenance costs have increased greatly, largely owing to the increased weight of equipment. Mr. Thorne claims that this revolution in railroading has given the railways greatly increased earnings; but apparently thinks that this should be accomplished without increased maintenance costs. If this were true, the railways would undoubtedly be having comparatively smooth sailing. But in the past eleven years for instance, locomotive maintenance costs have increased about one half, per mile run; and one-third per ton mile. The car record is not very different, and track and structures suffer in proportion. While transportation costs have been forced down, except for advances in wages, maintenance costs have grown in startling ratios.

Loose charges based upon superficial examination of accounts are easily made. They should receive no credence unless accompanied by proofs. Mr. Thorne thinks he "smells a mouse" and wants others to test his location of it. Probably there is no feature of their accounts which the railways would be more glad to have looked into than maintenance costs. They have figured them over with a view to keeping them down for years. Some authorities regard low maintenance charges as evidence that a property is being allowed

to run down and high maintenance costs an evidence of good management. Low costs are evidence of good management only, if the property is kept up as it ought to be; but under existing conditions high costs are an inevitable concomitant of the best management.

A fair reading of our comments on the excessive adulation bestowed upon Col. Goethals will show that we did not depreciate his great work in building the Panama Canal, but deprecated extravagant eulogy which could only be embarrassing to him. There seems to be a general idea that an army officer succeeded where civilians had failed. There was no failure in the work done by Wallace and Stevens and Shonts. The newspapers wanted the "dirt to fly" at once. When Goethals took hold everything was ready and it began "to fly" faster and continued "to fly." Col. Goethals has repeatedly given proper credit to his predecessors like that quoted in the letter of Major Jervey, in another column. In a measure the statement on the National Geographic Society medal "to whose ability and patriotism the world owes the construction of the Panama Canal" is correct. It would also be correct on a medal to Stevens in just the same sense.

Our suggestion as to military glamour was not used in the sense our correspondent infers. We have had several presidents of the United States whose only qualification was military glory. We mentioned it as one cause of extravagant eulogy; which ought to be tempered by acknowledgement of the debt due to others who were not army men, but who did a great work well and prepared the way for such magnificent executive achievement as that of Col. Goethals.

George Westinghouse.

In the death of George Westinghouse the world has lost one of the great men, not only of his own time, but of all time. He was a great constructive force in modern life.

Macauley says: "Of all inventions, the alphabet and the printing press alone excepted, those which tend to abridge distance, have done most for the civilization of our species." The locomotive was the joint product of several minds. Few inventions in connection with the development of railway transportation stand out as the exclusive product of one man. The power brake made railway operation as it is today, possible. Upon it depend and to it are due the speed, safety and comfort of passenger travel; and without it the cost of moving freight could not have been reduced to anything like present figures.

The economic value of the air brake is beyond computation. Every individual in the community profits by it. It not only contributes to physical prosperity, but hastens the intellectual and moral development of the race. It is a control of railway trains which has quickened communication, and thus abridged distance.

and lengthened the average span of life measured by what is comprised in it.

There has never been any question regarding the absolute originality of Mr. Westinghouse's invention of the air-brake. Others have devised varying methods of applying the principles which he invented; and some have contributed by design and invention to the present perfection of brake apparatus. But the company which bears his name has always led in progressive development; and all that has been accomplished is directly traceable back to the original genius of its founder.

It has seemed to us that the greatest triumph of inventive power was in the invention of the quick action brake for freight service. In the progress of the railway development, it became desirable to apply power brakes to freight cars in order that the power of locomotives might be used in drawing larger trains; as well as for the protection of trainmen and greater safety and reliability, of operation. The Master Car Builders' Association through a committee headed by Godfrey W. Rhodes, then superintendent of motive power of the Chicago, Burlington & Quincy Rd., undertook a study of the subject and finally arranged for field tests to be made at Burlington, Ia. It was considered necessary that brake requirements should be suited to trains of at least fifty cars in length. There were several devices then put forth by various inventors and manufacturers. At the first series of tests it was found that none of these could safely operate on a train of that length, owing to the shock resulting from the time required for the braking power to go from the engine to the rear of the train. The forward cars stopped so much sooner than those in the rear that the effect was something like a collision. There was one exception—an electro-pneumatic brake which offered the advantage of the quick action of electrically operated valves. But the use of electricity in those days and on freight trains was practically impossible and it was recognized that the coming brake must use only one kind of power, and that in such a way that the interchange of cars would not prevent its universal use. The representatives of his company reported to Mr. Westinghouse that the air-brake, as used on passenger cars, could not meet the prescribed conditions of freight service. He had by that time become greatly interested in electrical development and other subjects; but he resolved to save the day for the air-brake. He shut himself up for some months in his shop laboratory, determined to secure the quick action needed for long trains. After some months of study and experiment, he emerged in triumph with the quick action brake and was able in a short time to exhibit throughout the country a freight train of fifty cars under safe and absolute control at all desirable speeds. There was no chance about this—no happy thought or adventitious circumstance—but simply a consciousness of power and a

determination to conquer characteristic of the highest type of genius.

Mr. Westinghouse contributed in many other ways to mechanical improvement, both as an inventor himself and as a promoter of the ideas of others which he made practical successes through his foresight and insight, and the courage of his convictions. Draft gears, signalling, and especially electric traction and other applications of electricity to the use of a man owe their present measure of success very largely to his ability not only as an inventor, but a man of affairs. The list of his achievements is a long one and almost, if not quite, unequalled.

It is gratifying that he reached large reward in honors and in wealth. The King of Italy and the Republic of France decorated him, and engineering societies were unstinted in their recognition. But greater than these was the universal public appreciation which placed him high among the benefactors of the race. When business troubles came through the magnitude of one of his undertakings, he fought manfully and the first time successfully. It is a matter of regret to those who knew him well that the last few years of his life were somewhat embittered by his loss of the full control of a great company for the success of which he had struggled and worked incessantly. It was hard for him to reconcile himself to this—an event really due to qualities of mind and heart worthy under ordinary conditions of the highest praise.

Generosity, confidence in men whom he deemed worthy of esteem, breadth of view and courageous daring, won love and respect; but in this case resulted in a reverse which he did not consider merited or wise. But all of his great enterprises have won out and continue to be the successes which he foresaw. Those directly interested financially continue to share large returns; and greater still is the benefit to the public which will ever honor and revere the name of George Westinghouse.

Railway Valuation and Rate Making.

Valuation of the railways has become a lively occupation of our national government, if not one of livelihood, and the prospects seem to be that it will be even livelier, not only with the government but with the railways as well. A very interesting thing about the situation is that the government, with all of its commissions and bureaus and other departmental machinery, is entirely without experience in the business; and, comprehensively speaking, the railroads are not much better off. In keeping with the democratic spirit of our institutions it is, therefore, both permissible and desirable that all persons who have ideas as to how an inventory of the railroads should be made shall come to the assistance of the government. Not a few have already signified their willingness to do this for compensation; and yet, withal, there is no lack of

others who stand ready to give advice on the subject, without money and without price. The interest which many persons are taking in the matter is from the highest of motives and sense of patriotic duty.

Among the latter class is the American Society of Civil Engineers, which recently appointed a committee to "Formulate Principles and Methods for the Valuation of Railroad Property and other Public Utilities." The report was presented at the annual meeting of the society in January and, by request of the committee, was received as a progress report. By action of the board of directors it was brought up for discussion again on March 11. In the annual meeting it was voted that the report of the committee should not be published in the Proceedings until it shall have been put in final form by the committee. For this reason the report is, for the present, withheld from publicity. The discussion of it, however, was in open meeting and has been sent out in the published proceedings.

One of those who contributed to this discussion was Mr. Onward Bates, whose remarks are printed elsewhere in this issue. Particular interest in Mr. Bates' comment on this report is the feeling, very ably expressed, that the committee had gone out of its way to find material for its report, thereby, in a sense, exceeding the intended scope of the subject assigned to it. Instead of confining itself to "principles and methods" for work of valuation in general, the committee took up the special inquiry of "Valuation for the Purpose of Rate Making." As widespread attention is being given to this report, not only by a large part of the membership, but by outsiders as well, it seems desirable at this time to give to Mr. Bates' arguments the currency which they appear to merit, particularly in view of the fact that an evening of this week was set down in the society's calendar for further discussion of the report.

Mr. Bates very forcibly calls attention to the danger that is impending to property and business interests through the avowed governmental policy of valuation of the railways, even when looked upon in the most favorable light. He points out that the government, in any case, has the upper hand, if not, indeed, absolute authority in the matter, while the power of the railways can be only suggestive, at the most. "Men with bright minds and plausible language" are finding in the government's organization for this work an attractive opportunity for employment and, whether "balanced by experience and a sense of responsibility" or not, many of these men will surely find places on the government's side of controversies that are bound to arise.

Since, so far as the decision on questions of difference is concerned, the authority will be entirely one-sided, it is, manifestly, a delicate matter for associations of large influence to express themselves conclusively on this question of valuation. For this reason, Mr. Bates argues that whatever shall be the final

form of the committee's report, it should be received by the society merely as information, representing the views of the committee as individuals, and be published without formal approval by the Society.

Furthermore, in dealing with that phase of valuation in general which relates to rate making, the committee should have eliminated entirely from its consideration the question of associating railway properties in this connection, for he shows, as is clearly recognized by all authorities on the subject, including the Interstate Commerce Commission itself, that valuation of railway property is entirely useless for any purpose of rate making. It is quite clear that the committee had proceeded in ignorance of, or with indifference to, this settled principle. In other words, the committee should not have classed the railways in the same category with gas plants, electric lighting and other local public utilities, even if it were conceded that the committee were justified in looking at the question of rate making at all.

In answer to a criticism for having taken up this question of rate making, the chairman of the committee, at the annual meeting, explained that the committee having found the work involved in the subject so enormous, and that valuation for the purpose of purchase and sale, for taxation, and for other purposes were "not identically the same," it was decided to limit the report to only one side of the question, namely to valuation for the purpose of rate making.

Obviously the committee was unable to see how railway rates, in origin and practice, are essentially different in character from those of concessions of a municipal class. If it be true that a picked body of men of recognized engineering ability, in an effort to lay down principles of general application to this great work of valuation, have gone astray right at the outset, need it be emphasized that the whole proposition, from start to finish, is likely to prove to be one grand experiment? The government has set itself to the task with elaborate organization and, so far as any one is aware at present, the work will have to be continued at unknown expense.

Program of the Rate Hearing.

The Interstate Commerce Commission issued an order, March 7, calling for information regarding "the purposes, effects, nature, and extent of special services" performed by the eastern railroads for shippers, and "the extent to which these services are such as may be called 'free,' and the extent to which compensation is received therefor." The information is sought by the commission as having important bearing upon the pending application of the roads for advances in rates. The special services concerning which information is desired, are: Allowance of free time for loading or unloading carload freight; collecting and delivering freight; storing freight; transporting containers; furnishing or paying for wharfage or dockage; refrigeration service; loading and unloading carload freight reconsigning carload freight, and special services not covered by these headings. Responses of the railroads are required to be in the hands of the Commission in complete form by April 7.

The commission has revised its program for hearings in the rate advance case. A further hearing on the proposed charges for spotting and ferry car service was held at Washington, Thursday, March 12, at which representatives of Philadelphia, New York and Boston were given opportunity to be heard. The hearings previously assigned for March 16 and 17 for oral arguments concerning spotting service have been cancelled in order to afford all parties interested further opportunity to present written statements or briefs. Such statements and briefs will be accepted at any time prior to March 24. The oral arguments will be heard by the full commission on Monday and Tuesday, March 30 and 31. These arguments will be confined to the so-called spotting service. Further hearings to be an-

nounced later will be held concerning ferry car service, after which the date for oral argument on that question will be fixed. Separate hearings will also be held later, relating to the Chicago Tunnel service and to the lighterage services at New York and Chicago, the dates for which will be fixed soon. A hearing will be held in Washington March 28 "regarding the storage of freight at terminals and loading and unloading carload freight." Hearings previously announced for March 12, 13 and 14, on lake and rail rates, have been postponed until April 2, 3 and 4. Hearings on applications to continue after July 1 holdings of water lines, under the discretionary authority conferred upon the commission by the Panama canal act, will begin April 8 and continue during the month.

St. Paul and Puget Sound Accounts

Report by Interstate Commerce Commission in the Matter of Rates, Practices, Accounts and Revenues of Carriers

Results of investigation by the commission in the accounting practices of the C., M. & St. P. Ry. and the C., M. & P. S. Ry. Serious irregularities in the accounts of the parent road and of its subsidiary described, criticized and condemned. Development of authority of commission to deal with accounting practices of interstate carriers. Overstatement of income accounts; erroneous statement of expenses; improper report of property investment; the percentage allowed for depreciation of equipment. The culpability for this situation, and the course which the commission will follow in future violations of its accounting regulations. By Commissioner Harlan.

The purpose of this proceeding is sufficiently indicated by its general title. It was instituted as a basis for the formal investigation, from time to time as circumstances might require, of the failure of carriers subject to our jurisdiction to follow and obey our accounting classifications and otherwise to comply with the accounting rules and regulations heretofore prescribed by the commission for interstate carriers. The accounting practices of the Chicago, Milwaukee & St. Paul Ry. Co. and of the Chicago, Milwaukee & Puget Sound Ry. Co. are the first to come under our observation since the inquiry was instituted.

Before stating the facts respecting the accounts of these two companies, as developed upon the record, it seems proper briefly to review the circumstances that led the congress to delegate to this commission authority to deal with the accounting practices of interstate carriers and to explain the successive steps in the development of that authority as it is now embraced in section 20 of the act.

As originally enacted the act to regulate commerce required interstate carriers to file annual reports with the commission covering specifically defined items. It also provided that the commission, in its discretion, might prescribe a uniform system of accounts for carriers subject to its jurisdiction. But the act contained no provision for the enforcement of the orders of the commission in such matters. This defect was remedied by the amendments of 1906, which not only prescribed penalties for the violation of the rules and regulations of the commission but established a process by mandamus for enforcing our orders. It also provided for a force of examiners having authority to inspect the accounts, records, and memoranda of carriers. This gave to section 20 a vitality that was theretofore lacking and put the commission in a position effectively to administer the law respecting the accounts of interstate carriers.

Beginning with the year 1888 the steam railroads were required to render annual statistical reports of their operations on

blanks provided for the purpose by the commission. So far as mere form was concerned these reports were therefore uniform. They did not inspire public confidence, however, because the commission, as just stated, was then without effective authority for the enforcement of any accounting rules had such rules been promulgated. It is true that classifications of operating expenses were issued in 1883 and reissued in revised form in 1892. There was also a classification of expenditures for construction. But those classifications were not issued under order, and all the commission could do to secure their observance was to request the carriers to comply with them in order, so far as possible, to secure uniformity in their reports to the commission.

Immediately after these defects in the act were corrected by the Hepburn amendments of 1906, the commission entered actively upon the work of formulating a system of accounts for steam railroads. The co-operation of the railroads through their association of accounting officers were enlisted, and the result was that three important classifications were issued under an order of the commission on June 3, 1907, to become effective on July 1 following. These were the classification of operating expenses, the classification of operating revenues, and the classification of road and equipment expenditures.

It is not our purpose here to discuss the principles underlying these classifications. It will suffice to say that one of the points in greatest need of regulation from an economic point of view, as disclosed by the previous delinquencies in the accounting of railroad companies, was the drawing of a correct line between expenditures for property and expenditures for operation. The need of such a distinction in railroad accounts is elementary; nevertheless, all students of railroad economics are well aware of the fact that, prior to 1907, when the commission was given real power to control such matters, the accounts of carriers in many cases were influenced more by other considerations than by a desire to reflect the actual facts. A financially strong road making large net earnings would not hesitate to conceal the facts by adding to its operating-expense accounts sums disbursed in improving its property; on the other hand, a financially weak road, seeking to enhance its credit by a good showing of operating results, would include in its property accounts sums expended in operation. The result was that a carrier's annual and monthly statements of net revenue often reflected nothing more than the particular showing desired by its executive. These reports were often used for speculative purposes, and the stockholders and the general public were left without any assurance as to

whether the dividends declared were paid from income or surplus or out of capital.

A correct statement of the property account of a carrier is of scarcely less importance than a correct statement of its expenditures for operation. It is our understanding that prior to 1907, when the commission had no efficient control over such matters, the accounts representing the cost of road of many steam railway companies had substantially no real significance, except as they demonstrated the utter disregard of all accounting principles. As a rule they represented neither investments nor assets. Although described as "cost of road and equipment," they frequently bore no relation whatever to cost. They often included, at par value, large amounts of stock issued as premiums to promoters and investors in bonds or held in the treasury of the issuing company, in the hope that the future growth of the company's traffic, or the exigencies of corporate control, might give them some value. But in promulgating its classification of expenditures for road and equipment in 1907, at which time the commission was first given effective authority to prescribe a system of accounts and to enforce its observance, the fundamental rule laid down by the commission was that all entries in the accounts of a carrier under that head should be in terms of cash only, thus showing what it cost to create the property at 100 cents on the dollar. The general basis for the rule was that a correct statement of the investment is the beginning of correct accounting; and this sound principle gives us a balance-sheet statement of cost that is a record of the actual investment.

Recognizing the value of the accounting rules promulgated by the commission, as well as the benefit of some supervision over their accounts through official agencies, practically all the carriers subject to the act have yielded a cheerful acquiescence in our classifications and regulations and have adjusted their accounts in substantial obedience to their requirements. The spirit of co-operation with us in this work and a recognition by the carriers of the true functions of proper accounting are becoming increasingly manifest. This general statement, however, involves some exceptions. There have come to the knowledge of the commission several instances of serious departures from our accounting regulations, some of which are so important as to require our attention in this proceeding. The first of these instances since this inquiry was instituted arose upon our examination of the accounts of the Chicago, Milwaukee & St. Paul Ry. Co., and of its subsidiary, the Chicago, Milwaukee & Puget Sound Ry. Co., hereinafter respectively referred to for convenience as the St. Paul company and the Puget Sound company.

In 1905 the St. Paul company commenced the construction of a line to the Pacific coast, extending from a point in South Dakota on the Missouri river to Seattle, a distance of 1400 miles. It intersects the Northern Pacific at a number of points and traverses much of the territory occupied by that line. By availing itself of the services of the Northern Pacific for the transportation of materials, the St. Paul company was therefore enabled to carry on the construction of the new line from several different points at the same time, thus greatly facilitating and expediting the work. Portions of the new line were in operation and commercial traffic was moving over them in substantial volume early in the year 1908. The entire main line was opened for traffic on August 1, 1909. During the period of construction and between the years 1906 and 1909, inclusive, the St. Paul company transported men and materials for the construction of the new line. It also advanced the funds for construction, amounting on January 1, 1909, to about \$82,000,000.

Under the accounting rules of the commission the St. Paul company was permitted to include in its accounts a proper revenue for such transportation, rents for equipment and other of its facilities used in the construction of the Puget Sound, and interest on the funds advanced. This should have been done from month to month and from year to year as the service was

performed and the funds so made available to the Puget Sound company. That course, however, was not pursued. On the contrary, the St. Paul company included in its income accounts for the year 1910, all the interest, rents, and revenues assignable to the period prior to July 1, 1909, the sum total amounting to over \$4,600,000. In the same year it also decreased its operating-expense accounts by crediting thereto more than \$500,000 on account of salvage from cars destroyed previous to the year 1907. By means of these entries the income of the Chicago, Milwaukee & St. Paul Ry. Co. for the year 1910 was overstated by more than \$5,000,000.

As the result of this overstatement of income for the fiscal year ending June 30, 1910, the report of the St. Paul company for the succeeding year showed an apparent falling off in revenue and income as compared with the previous year of over \$2,000,000. In its report to its stockholders for the latter year the explanation offered by the officers of the company was that, "the large decrease in the net operating revenue is accounted for by the inability to obtain increased rates and the great increase in the cost of labor."

This statement was not in accordance with the facts in the case. Had the income for the year 1910 been properly reported the net income for the following year instead of showing a decrease would have shown an increase of about \$2,800,000 over the net income for the fiscal year ending June 30, 1910. The reference to "the great increase in the cost of labor" was no less at variance with the real facts. In its report to this commission for the year ending June 30, 1910, the St. Paul company, under the heading "employees and salaries," shows the following tables:

Number of employees June 30, 1910, excluding general officers	56,658
Total yearly compensation	\$30,998,418.73
Average daily compensation	\$2.23

The report for the fiscal year ending June 30, 1911, gives the corresponding statistics for the year, as follows:

Number of employees June 30, 1911, excluding general officers	48,083
Total yearly compensation	\$30,942,724.10
Average daily compensation	\$2.27

So far, then, from being an increase in the expenditures for labor during the fiscal year 1911, the expenditures on that account were about \$50,000 less than in the previous year, according to the company's own reports to the commission.

These departures from what were the actual facts are sufficiently serious to merit the strongest condemnation. The delinquencies in the accounting of the Puget Sound company are, however, of even greater significance. The construction of this line was generally regarded as a notable project and its progress attracted wide attention. The outcome of the enterprise, in respect of the financial returns to the parent company from its operations, was also a matter of both general and special interest, for a showing of profit from its operations could not fail to enhance the credit of the parent company. A large traffic was offered to the Puget Sound line as soon as it was opened, and the evidence before us leads us to think that a correct showing of the operating results for the first year would have been most satisfactory. Not content, however, with a statement of the facts, the income of the Puget Sound was greatly overstated, a variety of expedients having been restored to for this purpose.

As we have heretofore indicated, the Puget Sound line was opened for regular commercial traffic on August 1, 1909. Its first annual statistical report was filed with the commission for the eleven months ending June 30, 1910. During that period the road moved a large revenue traffic and at the same time was engaged in completing the construction, more particularly, of its branch lines. In consequence of this condition of affairs expenditures for construction were made while expenditures for operation were also going on. In accounting for these two classes of expenditures for entirely different purposes, large

amounts were included in the cost of construction that should have been entered up as expenses of operation. This course resulted in an inflation of the property account and at the same time made an unwarrantably good showing of the returns from operation. The net income was also overstated by including in the cost of construction certain interest items accruing after August 1, 1909, when the road was opened for public service. Under our rules and regulations this interest should have been charged to income; and this departure from our regulations alone involved nearly \$500,000 of error in the report of the Puget Sound company for that year. Moreover, revenues were overstated by including charges for the transportation of construction material at rates substantially higher than those exacted under its published tariffs by the Northern Pacific. This was done notwithstanding the recognized practice of carriers to use rates on such materials which represent only the actual cost of the service.

The result of this course was to augment both the revenues and the cost of property accounts. While overstating those accounts the Puget Sound company on the other hand included in its operating expenses no charges whatever for depreciation of its equipment. Had these different items been carried to its books in accordance with the rules and regulations of the commission and in conformity with correct accounting practices the income for the Puget Sound company for that year, reported at \$2,255,440.18, would have been practically eliminated. Its dividends of 2 per cent paid out of "income" for the first year of its operation could not have been paid; and without this income the St. Paul company, which was practically the sole holder of the stock of the Puget Sound company, would not have been able to pay its own dividends for the year 1911 out of its income. In order to have made the payment in full it would have been compelled to resort to its surplus from previous years.

The unlawful practices just described were continued after June 30, 1910, and the fictitious showing of income for that period was used by the officers of the Puget Sound company to aid in the sale of its bonds. A letter written by the chairman of its board of directors and published in the *Commercial & Financial Chronicle* of March 18, 1911, contains this statement: "Although the Chicago, Milwaukee & Puget Sound Ry. was opened for traffic only on August 1, 1909, it is already earning a large surplus over the interest on its first-mortgage bonds. For the six months ended December 31, 1910, the surplus income of that company after the payment of all charges, including interest on the \$123,000,000 first-mortgage bonds, amounted to \$1,635,952."

It should be stated that only \$27,175,000 of these bonds have been sold to the public, the remainder being held in the treasury of the St. Paul Company.

Another violation of proper accounting and of the commission's accounting regulations by the Puget Sound company has occurred in its report of property investment. As heretofore explained, the underlying principle of the classification of expenditures for road and equipment is that the entries in those accounts shall be stated in cash values. In this first report to the commission the Puget Sound company reported its investment in road and equipment at \$236,333,988, and this amount was carried into our official statistics of railways for the year 1910. Our subsequent investigations of the accounts of this carrier show, as it now admits, that the statement was about \$100,000,000 in excess of the cash investment of the company at that date.

Its officials attempted to explain this by saying that the laws of the state of Washington forbade the company to issue bonds without first issuing capital stock to an equal amount. They assert that there never was any pretense that the stock so issued represented a cash investment and that it was never disposed of but was retained in the treasury of the company with no intention at any time of offering it to the public. We have not examined the laws of that state to ascertain how far

they may explain the situation. But the course pursued was in violation of the commission's rules and, to the extent of \$100,000,000, falsified the statistical report for that year officially issued by the commission.

In the grand total of the report that sum may make only a small percentage of error. This, however, does not excuse the Puget Sound company for the misstatement of its investment. Even if the laws of the state of Washington compelled it to issue a large amount of stock representing no investment in order to legalize its issue of bonds, there was no necessity for including the par value of that stock in its property investment account. In fact the fundamental rule, to which we have alluded above, specifically excludes from the investment account items which do not represent investments in terms of cash. Except for the error thus unlawfully injected into our statistics this violation of our accounting regulations is now of no great importance because the St. Paul company has recently absorbed the Puget Sound company by merging the whole property under the one company.

Since the hearing we have been advised of another matter which may appropriately be mentioned here, namely, that the St. Paul company, having first established a percentage of depreciation of equipment of $1\frac{1}{2}$ per cent a year, began on January 1, 1913, to set up a charge of only one per cent. This means, omitting the item of salvage, that its equipment has an estimated life approximating 100 years, a position that is wholly indefensible as we understand these matters and one which that company will not be able in any event to justify. The investment in equipment by the two companies, now merged into the St. Paul company, approximates \$100,000,000. A reduction of one-half of one per cent in its charge for depreciation, therefore, means that its net income from operation is inflated by a half-million dollars a year. If the charge ought properly to be three per cent the entry on its books of only one per cent would mean an inflation of its net income from operation by \$2,000,000 a year. The St. Paul, however, does not stand alone in this disregard of correct accounting principles. Moreover, the matter of depreciation is having attention in another connection, and the course of the St. Paul company in that regard need not be further considered here.

The other violations of the commission's accounting rules and regulations, hereinbefore described, are explained by the St. Paul company as having resulted from negligence, inattention, and a lack of familiarity on the part of its comptroller and those under him with the requirements of the commission. It is said that the comptroller, now deceased, was accustomed to the older methods of accounting and had not yet put himself fully in touch with the methods prescribed by the commission and that for this reason the accounts of these carriers, in the details mentioned, were not in harmony with the commission's regulations. There is no sufficient basis of record, however, to enable us to condemn or acquit the comptroller either of full responsibility or of his share of responsibility for the condition of the accounts of these companies here described; but there are grounds for thinking that his responsibility was very materially qualified and minimized by the instructions and directions given him by the executive and other officials.

Whatever may be the fact in that regard the commission now feels that the present accounting officers of the St. Paul company are fully advised of the commission's requirements, and a more careful observance of our rules and regulations is promised for the future. This we confidently anticipate will be realized. Nevertheless we feel it our duty to make this record of what has transpired in the past. We do not mean to be understood by anything here said as intimating that the St. Paul company is not a valuable property and is not achieving the results reasonably anticipated from the extension of its line to the Pacific coast. The last report of the Puget Sound company to this commission as a separate property covered the period July to December, inclusive, of the year 1912. The earnings for that period, as compared with the earnings of the correspond-

ing periods of previous years, show a very substantial growth. After making all due allowance for undetermined misstatements in the reports, the showing of results of the operation of the new line must be regarded as very favorable. What we wish to make clear is that the accounts of these companies have not correctly shown the facts, a condition of affairs not creditable to the St. Paul lines or to their officials.

It is desirable also to take this occasion to make some announcement with respect to our own future course in cases of accounting delinquencies of this nature. As has already been said, the principal classifications in our system of accounts for steam railroads were formally announced on June 3, 1907, and became effective on July 1 of that year. It was not a new system, embodying principles of railroad accounting originating with the commission or which were unfamiliar to railroad men; on the contrary, the system was put in effect by the commission only as the result of prolonged conferences with the accounts of the carriers. We availed ourselves of the best thought of these experts and of the best practices then in effect among the carriers of the country. While the system finally prescribed does not conform exactly to the accounting practices theretofore observed by any particular railroad, it represents the consensus of opinion among the accounting officers of the country as to what system would best and most accurately reflect the true facts and accord with sound business principles.

We have regarded the interval since the promulgation of the earlier and more important classifications as a formative period and have patiently considered and disposed of the questions that have arisen under them. The underlying principles of the system have been maintained and have fully justified themselves. This application to particular states of fact have from time to time been the occasion of doubt, correspondence, and final disposition; in this work of perfecting the system and making precedents for the application of its principles we have had, generally speaking, the cordial co-operation of the accounting officers of the carriers. The result of this experience is about to be expressed in a revision of the classifications. These, however, will embody no important modifications of the general principles underlying the commission's rules.

It should also be said that during this formative period we have not invoked the penalties of the law against carriers and their officials for errors and failures to observe our rules and regulations. As these matters have come to light they have been corrected, after being called to the attention of the carriers involved. One or two vital principles in the accounts have been the subject of litigation in the courts. The water lines denied our jurisdiction over their port-to-port transactions. On that point the views of the commission were sustained in *Interstate Commerce Commission v. Goodrich Transit Co.*, 224 U. S., 194. The rules governing the treatment of property abandonments were also contested, and the commission was sustained in that respect in *Kansas City Southern Ry. Co. v. United States*, 231 U. S. 423. With respect to all other infractions of our rules and regulations that have come to our attention satisfactory conclusions have resulted from our conferences and correspondence with the delinquent carriers, or they are in process of adjustment. In the case now under consideration the accounts of the St. Paul company are being recast to bring them into harmony with our rules and regulations so far as that is now possible.

It is, perhaps, unnecessary to emphasize the necessity and importance of statistical reports from carriers that will be uniform and truly reflect their condition so far as it may be represented in their accounts. Recent years have witnessed the exposure of glaring instances of the financial wrecking of transportation agencies by those in positions of authority. In many of these instances the application of correct accounting rules and principles, with proper knowledge on the part of the public and of all the stockholders of the conditions thus reflected,

would have gone far to avoid such consequences. Moreover, the general public interests demands that the financial reports of carriers shall be true records of the facts that they purport to show. Public confidence both at home and abroad in the financial statements rendered by our carriers is very necessary to the further development of our transportation facilities; and to the degree that the accounts of any carrier are tainted with the suspicion of untrustworthiness, to that extent they will tend to impair this confidence among investors in the securities of our transportation companies and thus work to the detriment of all such enterprises.

But in order that an erroneous impression may not obtain as to the commission's relation to such matters it should be understood that the law places upon the carriers the full responsibility for the correct statement of their accounts in accordance with the prescribed rules and regulations. The responsibility does not rest upon the commission, and the burden of such a requirement would be sufficient to demonstrate the impracticability of any such plan. It is well to add that the present statements of the assets and liabilities of carriers are still largely affected by the record and accounts of the period prior to the legislation giving authority to the commission over the accounts of carriers. Moreover, it is important to observe, with reference to the current accounts of the carriers, that our force of examiners is relatively so small as to make it impossible at regular intervals to inspect the accounts of the railroads and other instrumentalities of interstate commerce, and thus to give assurance that the results of their operations, their income, their assets, and their liabilities will be correctly shown on their books. We are thus compelled to rely in large measure upon the co-operation of those in charge of the accounts of the carriers in reaching these results.

The formative period to which we have referred must now be considered as having come to an end so far as all the important principles and requirements of our regulations are concerned, and we shall hereafter expect a more exact observance of the prescribed accounting systems by the carriers and their officials. Accounting officers understand the true functions of accounts and realize their importance in determining the correct economic condition of the transportation properties with which they are affiliated. Their instincts and training are such as naturally lead them to keep their accounts as they should be kept. They would not have the confidence of their superior officers if this were not the case. But in many instances the accounting officers of carriers have not been left free to follow their natural inclinations in this regard.

Irrespective, however, of the influences brought to bear upon an accounting officer to turn him from his true course as an accountant and from his duty, under the law, of keeping the accounts in accordance with the system prescribed by the commission, it is nevertheless his hand, or the hand of some one immediately under his authority, that makes the wrongful record, and it is the accountant, therefore, to whom the commission must look in the first instance for the proper carrying out of its rules and regulations. Under our regulations and prescribed form the oath of the accounting officer must be attached to the annual report of the carrier to the commission, together with that of the executive; and, from the necessities of the case, it is the accounting officer who is immediately responsible and whom the commission will first hold responsible when it becomes necessary to invoke the penalties of law; but we shall not hesitate to call to account with even greater severity anyone above the accounting officer in authority who may share in the responsibility for any violation of the accounting rules and regulations which have been prescribed for the use of the carriers that are subjected to the act.

Efficiency in Handling Railway Equipment.—There is one feature in the handling of railway equipment that appeals to the writer as being responsible for more of the

inefficiency which prevails than any other one thing, and that is the errors which are made in the clerical work which of necessity must be done in connection with car handling. It has been the writer's observation throughout a somewhat extended railroad career that the clerical or accounting work in connection with railroad transportation is lamentably weak, and it seems that one of the best reforms that could be inaugurated would be to endeavor to effect an improvement in this regard. This point is aptly illustrated by the well-known fact that immense outlays are made by the railroads in maintaining special offices for the adjustment of over-charge claims, the great proportion of

which exist because of laxity in the methods of billing, etc., and to the same extent this proneness to error exists in the clerical work connected with the movement of cars. There is not sufficient preliminary training required before placing a yard clerk, for instance in a position to confuse the situation and bring about delays, and when errors are thus made there is a disposition to regard same as a necessary evil. The standard pertaining to clerical work is very, very low and the results are much more serious in retarding efficiency than are generally appreciated.—John N. Faithorn, proceedings of the St. Louis Railway Club.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Alaskan Railroad Building.

Welcoming the building of a railroad in Alaska by the government, J. M. Hannaford, president of the Northern Pacific, expresses the opinion that it will be a good thing for the railroads. Discussing the proposition recently, Mr. Hannaford said, according to an interview published in the New York Commercial: "It does not foreshadow government ownership. It will benefit us if the government, by this undertaking, gets some practical knowledge of the railroad business. The government and the people sometimes seem not to realize that the railroads have their troubles. The rates on the Panama road, which is owned by the government, show that it cannot operate a railroad successfully. I wish we could get such rates as they charge on that road."

Governor Baldwin On the New Haven Road.

Declaring that "The wise man in the good book says: 'There is a time to break down and a time to build up,'" Governor Simeon E. Baldwin, in a strong plea before the State Business Men's Association, at Hartford, Conn., March 10, demanded that the railing against the New York, New Haven & Hartford R. R., cease. He said in part:

"As I look about our state, and see its great transportation system in the process of being pulled to pieces, I wonder if we shall be more efficiently served by the fragments, than we have been by the whole. It will call for some building up. There have been many things done by the New York, New Haven & Hartford Railroad, under its old management, which few can now approve. Some of them were done at a time when the standard of corporation morals was lower than it now is—lower than it ever ought to have been. What was fifty thousand dollars of its money paid into the treasury of one of our great parties for, a few years ago? Why was that enormous price paid for the Westchester road? Why were 8 per cent dividends paid so long, in years when they were not earned?

"But of what avail, now, is it to reiterate our disapproval of all these things? The company is under the control of new men. It is pursuing a new policy. The time for that road breaking down has passed, and the time for building up has come. It ought to be built up by being allowed to charge higher freight rates. It ought to be built up by ceasing to criticise every wrong step it has ever taken, and beginning to acknowledge what good things it has done. It has been a good thing for Connecticut for a man to be able to buy a mileage ticket in New Haven that would take him to the Canada border on a two-cent a mile rate, over roads where the charge used to be three cents, or over three cents. It has been a good thing for Connecticut to have every grade crossing abolished between New York and

Westerly. It has been a good thing to have electric locomotives running over long stretches of our territory.

"It has been a bad thing to rail at everything the road did, that was blameworthy, until the whole working force became demoralized, and accident followed accident with such frightful rapidity. The present head of the System has stated publicly that since he took office about nine-tenths of the time of the chief officers had been taken up in meeting attacks on the company and attending investigations of its affairs, and hearings before government bureaus, and one-tenth only left for looking after the operation of the railroad.

"I believe it would be better for the business of Connecticut to turn about, and make the railroad officials give up only a tenth of their time to outside matters and put the other nine-tenths where it will tell most in bettering the great system of transportation which is the life of Connecticut."

The St. Paul Disclosures.

"To the average business man Interstate Commerce Commissioner Harlan's public censures of the accounting methods of the Chicago, Milwaukee & St. Paul Railway Company sound a good deal like fault-finding for the sake of finding fault. In one breath Mr. Harlan speaks of 'serious irregularities,' '\$100,000,000 overvaluation,' 'reports used for speculative purposes' and 'the stockholder and the general public left without any assurance whether dividends were paid from income or surplus or out of capital' and in the next declares: 'We do not mean to be understood by anything here said as intimating that the St. Paul Company is not a valuable property, and is not achieving the results reasonably anticipated from the extension of its line to the Pacific coast.' Since the commission affirms that the St. Paul is 'a valuable property' and is 'achieving the results reasonably anticipated,' which means, if it means anything, that it has ample assets behind the securities issued and is making a success of its Pacific extension, the only possible effect of all this technical fault-finding is needlessly to alarm investors and move them, possibly, to a ruinous sacrifice of their holdings. The Interstate Commerce Commission might properly have admonished the St. Paul to more speed in straightening out its accounts. But what is the use of issuing proclamations that insinuate there is something radically wrong when the specifications show only technical errors? It was this sort of assault on business from the nation's highest place that brought on the Roosevelt panic of 1907."—Chicago Inter Ocean.

Texas Railroad Policy.

A statement compiled by the Texas Business Men's Association shows 424 miles of steel laid in 1913. Regarding

this subject, the association has circulated the following comment: "Six counties in Texas get their first railroad, but we still have 27 counties that have no railroad facilities. The development of railroad properties in Texas is 25 years behind the times. The railroads built during the year have, in the main, had their right-of-way paved with gold, for we have spent a million dollars for bonuses. What are we doing to encourage railroad building? We now have a hundred million dollar law suit against the Katy; hearings for rate reductions are usual occurrences and new burdens are frequently laid upon the common carrier, but such action is not calculated to influence investments in railroad securities. If we are to get our share of railroad facilities we will have to get behind the railroads instead of in front of them."

Correspondence.

THE HEADLIGHT SITUATION.

New York, March 10, 1914.

Editor, Railway Review:

I am pleased to note that you have given some space in your editorial pages to the status of the headlight situation, although I must take exception to some of your conclusions. There is a great deal of difference between railroading in Europe and in the United States, and what may be considered good practice on the other side could not be worked out satisfactorily here. This applies to headlights probably as much as anything else, and it is not at all strange that English railway officials are unable to understand the "present turmoil in this country over locomotive headlights." We might go further and say that there are a great many in this country who are unable to understand this agitation.

The main issue has been befogged to a very large extent and it would appear from the testimony of those who are in favor, or who have been in favor of legislation, in various states, that their principal idea was to get all the locomotives in the country equipped with electric headlights, no attention being paid to natural laws and existing conditions which might make the adoption of such headlights an additional risk instead of a safety appliance. There has been a great deal of argument, pro and con, as to what the real object of the headlight is, and those of us that are willing to look the issue squarely in the face must acknowledge, even though we are headlight men, that the headlight, whether it is used on an American locomotive or an English locomotive, is more of a marker than anything else. It is ridiculous for anyone to say that trains can be safely operated at night by the use of the high power electric headlight. Railroads are operated today by signals, and it is out of the question for a man to attempt to put a light on the front end of the train to light the right of way which will do more than God Almighty's sunlight during the daylight hours. The engineer depends upon his signals during the day when he can see as far as his vision will carry. To my mind, therefore, it is rather a serious proposition to require a light at night of such high candle power and intensity that it is liable to obscure signals, blind crews on opposing trains, and people at crossings and stations.

The fact that the high power electric headlights are accompanied by such disadvantages is clearly shown by the report of the Headlight Committee shows that when the headlight referred to in the proceedings of the hearings at Washington January 16th and 24th, before the Sub-Committee of the Interstate and Foreign Commerce Committee. The report of the Headlight Committee shows that when the headlight reaches a certain candle power its advantages are outweighed by the disadvantages. It therefore follows that, no matter what the purpose of the headlight, it should be as powerful as possible without producing the blinding effects and with-

out producing phantom lights and distorting colors of signals, but it is not necessary to reduce the candle power of the lights on the front end of our trains to the low standards which you mention are used in England.

Now, regarding the bills at Washington. There are, as you state, three bills up for consideration. Two of these bills are identical. These turn the matter over to the Interstate Commerce Commission, instructing them to make tests of the various kinds of headlights, and authorizing them to issue orders requiring the proper kind of headlight. This bill was first introduced in the Senate by Cummins of Iowa and is known as Senate Bill No. S-2675 and was later introduced in the House by Talcott of New York, and is known as H. R. Bill No. 7952. These bills were prepared by the national representative of the Brotherhood of Locomotive Engineers and introduced at the request of that body. The other bill, strictly an electric headlight bill introduced by Judge Raker of California, known as H. R. Bill No. 103, is backed by the Firemen's organization. I believe that every member of the Sub-Committee of the Interstate and Foreign Commerce Committee is convinced that the arguments presented by the railroads against the adoption of the high power electric headlight are well worthy of consideration, and that this matter rightfully belongs in the hands of the Interstate Commerce Commission.

As stated in my testimony before the committee, I cannot see how anyone who is sincere on the subject can consistently object to a thorough investigation by the Interstate Commerce Commission before any definite action is taken.

Oscar F. Ostby,
Chairman Legislative Committee,
International Acetylene Association.

President Rea Comments Upon the Situation.

Speaking before the annual meeting of stockholders of the Pennsylvania R. R., at Philadelphia, March 10, Samuel Rea, president of the company, charged investors in railroad securities to insist upon fair treatment for railroads by the federal government. As railroad investors constitute a large part of the population, President Rea asserted the country could not prosper until they received as fair consideration in the matter of railroad securities as do other branches of industrial finance.

Mr. Rea said: "No serious public consideration is at present being given to the investors who have furnished the capital for all the railroads, and thereby provided the most substantial foundations for the past and present progress of the country, and without the prosperity of the railroads the country cannot prosper. If large numbers of railroad men and others depending on railroads for every character of supplies and work are out of employment and a general loss of confidence exists and suspicion has been engendered, no attempt must be made to place this responsibility upon the railroad management. They have issued warnings and made petition for fair dealing, but without effect.

"The time has come when all fair minded men and investors, as a whole, must individually and collectively impress on their state and federal Senators and Representatives and the government that they are a part of the nation entitled to at least fair consideration. This statement is not made to predict calamity, but it is made to prevent calamity, and because heretofore we have used our efforts to influence investors from asserting their rights, but we will no longer occupy that position, while every other interest in this country petitions for their own special warfare, and are having the benefits of legislative protection."

The sixty-seventh annual report of the Pennsylvania R. R., covering the calendar year 1913, issued last week,

contains comment by President Samuel Rea, pertinent in this same connection. He describes the dilemma in which railroads of the country find themselves, as the result of present public regulatory policies. We quote extracts as follows:

"The operating results of the year 1913, like those of 1912, were affected by legislation such as the 'extra crew' laws and other expensive measures, and by wage increases granted as the result of arbitration under the Erdman act. The 'extra crew' laws alone involved an expenditure by the Pennsylvania Railroad system East of Pittsburgh and Erie of \$850,000 in round figures, and this will convey some conception of the extent of the needless expenditures that have been placed upon all of the railroads in this territory. During 1913 the conductors and trainmen on 41 of the railroads in Eastern territory, comprising about 100,000 men, submitted a request to the various carriers for an increase in wages, in which your company and others could not acquiesce. The matter was finally submitted to arbitration, being the first wage controversy to be settled under the new federal law known as the Newlands act, with the result that working conditions were further restricted, and an increase in wages was granted approximating for all railroads concerned about \$6,000,000 per annum, or 7 per cent. This award was made Nov. 10, 1913, effective Oct. 1, 1913, but the increased wages have not yet been paid, as further interpretations of the award are now being made and settlement will follow. The expenses for the year 1914 will be increased approximately \$730,000 as the result of this award.

"It is evident therefore that the ability to regulate wages and working conditions, and other heavy operating expenses, has, as the result of federal and state legislation, largely passed from the control of your management, as has also the power of your company and other railroads to charge reasonable rates for the public transportation service rendered. The gravity of the situation is indicated in the following quotation from the recent award of the board of arbitration in the matter of conductors' and trainmen's wages:

"This board has no authority to determine the passenger and freight rates to be paid in the Eastern territory; neither is it in a position to determine whether such an increase is justified, as a matter of fact, by all of the circumstances. This board, however, believes that it must make its finding as to what is a proper rate of pay to be awarded to the conductors and trainmen as a result of this arbitration, without any reference to the dilemma in which the railroads are evidently placed by the laws which make it impossible for them to increase passenger and freight rates without the authority of the Interstate Commerce Commission or of the railroad commissions of the various states. To take any other view of the question would be to decide that no increase of pay, while the laws remain as they are, can ever be made except voluntarily by the railroads. Such a decision would render arbitrations like this, valueless; and it would be in effect to hold that railroad service in the Eastern territory must continue to be rendered at existing rates of pay, even though this were to condemn the employees of the railroad to work for rates of pay which have been determined by the most careful inquiry to be inadequate. At the present time a ton of freight is moved in the Eastern territory more than three miles for the value of a two-cent postage stamp. This is the cheapest railroad service to the shipper to be found on the face of the globe. In the face of such a fact, it would be unjust to say that railroad employees must continue to be satisfied only with what can be paid from freight rates as low as this. The Interstate Commerce Commission, and not this arbitration board, has the duty of determining whether the railroads can earn in addition to their other charges, without an increase of freight rates, the rates of pay that this board believes to be due at

the present time to the conductors and trainmen, which rates are embodied in the award following.'

"It is difficult to escape the conclusion that some way must be found whereby the serious but divided responsibility of governmental regulation of rates, wages, and other railway matters shall either be concentrated under one administrative branch of the government, or the results of legislative acts, orders of commissions, and awards of arbitration boards shall be recognized by rate regulatory commissions, so that regulation of wages, rates and other matters may continue without working a manifest injustice to the railroads, and those who have invested in their securities.

"In view of the steady increase in expenses, taxes, and other necessary outlays which has caused a continued decrease in the return on its investment in the railroad and equipment provided for public service so that the return is inadequate, your company and other eastern railroads, in May, 1913, petitioned the Interstate Commerce Commission to grant permission to advance freight rates on the basis of five per cent, with reasonable minima, and with the modifications necessary to preserve existing differential relations between communities, thereby supplementing the petition made in 1910, for an increase in freight rates which the commission decided not to grant, but upon the understanding that 'if actual results should demonstrate that their forecast of the future proved incorrect, there might be ground for asking a further consideration of the subject.'

"The commission has instituted proceedings on its own initiative to determine whether the present rates of transportation yield adequate revenues to the common carriers affected, and if not, what general course the carriers may pursue to meet the situation. In order to develop the whole situation your company has, in co-operation with other carriers, submitted extensive data relating to the investment in railroad and equipment, earnings, costs of operation, income, etc., for the last sixteen years, in addition to which the officials of your company are prepared to submit further evidence in support of the general exhibits which will emphasize the necessity for your company to obtain higher rates. The commission has also ordered the carriers to furnish extensive information relating to various features of operation and traffic and the relation of the carriers and its employees and officials with respect to contracts for purchase of material and other arrangements, and prompt compliance is being made to this request.

"While there is no objection to furnishing the additional information desired, beyond the great delay and expense involved, the serious aspect of the situation at the present time is that no immediate decision may be expected if all the features involved in the commission's inquiries are to be considered and determined before action is taken upon the important question at issue, and meanwhile railroad revenues are rapidly declining. If, however, these inquiries and the information furnished in response thereto can be made a matter of subsequent investigation, an earlier determination of the entire question is possible; in fact as the commission, through the uniform accounting system in effect since 1907, supplemented by special investigations and the work of its own examiners, has full information as to the inadequate return earned by the railroads on the capital invested in railway lines and equipment, there would seem to be no substantial barrier against immediately granting the very small measure of relief sought in the application, and so urgently needed."

The Pennsylvania Railroad has put in the Broad street station at Philadelphia several teleautographs to inform patrons and the employees of the road regarding the movements of trains. Reports will be made whether trains are

late and on what tracks they will arrive and depart for the information of the traveling public.

Interlocking Control of Eastern Lines Charged.

Documents were submitted to the Interstate Commerce Commission, March 6, as evidence for the shippers in the advance rate hearing of the eastern railroads, by Frank Lyon, representing the Pittsburgh Coal Co. They comprised statements, charts and diagrams compiled by Frank J. Warne from the commission's records, and intended to show that the hundreds of railroads in the East are controlled as to their financial operations, rates and practices, through ownership, lease, or interlocking stock ownership, by a few great systems. It was Mr. Lyon's contention that such control is inimical to the shipping public, because, he asserted, it practically eliminates competition. In the eastern territory there are approximately 897 separate railroad companies. Of those, the tables showed that 606 are controlled by twelve systems. The total number of transportation companies in which the New York Central exercises either a majority, joint or minority interest, through stock ownership or through lease, contract, or agreement, is 204. By way of another example, the total number of transportation companies in which the Pennsylvania company has a majority or minority interest through stock ownership or through lease, contract, or agreement, is 245, of which 138 are controlled through majority interest and 107 through minority interests. It was contended by Mr. Warne in his statement that all the directors of the several large systems also were directors or officers of from five to fifty or sixty separate corporations subsidiary to the parent systems.

Concrete Poles in Storms.

The strength of the reinforced concrete telegraph pole has been demonstrated upon more than one occasion during violent storms to which poles of the wooden type readily succumb. A most severe test inflicted upon them occurred during the recent blizzard. A striking example of their strength as exemplified in this storm, was in the case of the telegraph line of the Pennsylvania R. R., where a large number of reinforced concrete telegraph poles were exposed to the storm which swept over the Hackensack meadows in the vicinity of the west entrance of the Pennsylvania tunnels leading into New York city.

The company had erected many of these poles in recognition of their durable and storm-proof properties. The storm center was in and about New York city, and so violent was the wind, which reached a velocity of 70 to 80 miles an hour, and so great the accumulation of snow and ice, that New York was practically isolated for a time, at least so far as above-ground telegraphic communication with Philadelphia was concerned. The company's telegraph line was out of commission for a long time and many of the wooden poles were broken down by the wind and the burden of snow and ice. In no case, however, did a reinforced concrete pole collapse. So severe was the stress that the wooden cross-arms upon some of these poles were broken, but the poles themselves remained intact.

A similar record for reinforced concrete poles was made wherever they were put to the test. These poles are made of Portland cement concrete, reinforced with steel rods to take care of tensile strains. They are not only time-proof, but keep in far better alignment than poles of the customary type. They do not rot as do wooden poles and never rust as is the case with steel poles. At the present high price of timber, concrete poles are not prohibitive in first cost, and, considered as a long-time investment, are found to be economical. The Pennsylvania and other railroad companies

are establishing their own manufacturing plants and it is likely that the next few years will witness a marked increase in the installation of concrete poles on all important lines.

The National Malleable Castings Co., Cleveland, has issued circular No. 51, describing National rail braces and tie plates. This company manufactures these articles of malleable iron, a material which has superior rust resisting qualities, rendering the fastenings subject to minimum damage from atmospheric conditions and brine drippings from refrigerator cars. Stock patterns are on hand for a large variety of designs, of which a few are illustrated in the booklet.

* * *

The Brown Hoisting Machinery Co., Cleveland, Ohio, has issued pamphlet C 1914, on Brownhoist safety crabs and winches. These machines are fitted with Weston's patented safety lowering device, which assures perfect control of the load.

* * *

The Remy Electric Co., Anderson, Ind., has issued a new catalogue which describes the American locomotive electric headlight, which is well-known as a product of this company, and the entire line of Remy automobile starting, lighting and ignition apparatus, as well.

* * *

Late bulletins by the Bureau of Mines are bulletins No. 58, a resume on the subject of fuel briquetting in the United States, and No. 60, a preliminary report on hydraulic mine filling as practiced in the anthracite fields of Eastern Pennsylvania. Copies of these bulletins may be had on application to the director of the bureau at Washington, D. C.

* * *

Morgan T. Jones, Monadnock block, Chicago, has published a pamphlet entitled, "A Plan Suggested to Promote the Efficiency of Railway Material Inspection," copies of which can be obtained upon application to the above address. Railroad officials should be greatly interested in this pamphlet.

Italian Government Railways Lose Heavily in Profits.

INCOME FOR LAST FISCAL YEAR BELOW THAT OF EIGHT YEARS AGO UNDER PRIVATE COMPANIES.

Italian state railways in the fiscal year 1912-13 saved for net profits a sum not only smaller than that of the previous year, but less than that attained by the private companies working with their smaller capitalization prior to nationalization of the railways eight years ago. On a commercial basis the system would be bankrupt. This showing is brought out in preliminary figures covering the Italian state system for the last fiscal year, received in Chicago by the Bureau of Railway News & Statistics.

The returns, though incomplete, serve to emphasize the severity with which the universal rise in cost of railway operation has cut into railway profits and the almost invariable fact that government owned and operated systems, free from the necessities felt by a commercial enterprise and therefore, with less incentive to economizing have been the greatest sufferers.

Total receipts of Italy's railways for 1912-13 amounted to about \$116,900,000, a gain of some \$4,800,000 over 1912. In the same time working expenses rose to above \$92,000,000 while charges expanded to almost \$19,000,000 leaving a loss of almost \$200,000 in net profits to apply on larger capital. Most of the advance in operating costs may be attributed to wages and fuel. Wages paid in 1912-13, at about \$53,000,000, represented an increase of almost \$6,000,000 in two years. The average yearly wage per employee has risen in the eight years since nationalization from \$276 to \$366. On June 30, 1913, there were in the employ of the Italian railways 149,449 men, an increase for the year of 1900. The cost of fuel for the year showed an increase of almost \$2,300,000 over 1911-12.

The net operating revenue estimated as accruing to the state is placed at 2.3 per cent on the \$1,350,000,000 sunk in Italian railways before payment of charges. As Italy pays

from 3 to 6 per cent on her public debt the railways, on a commercial basis would be bankrupt. Yet Italy regards its railways not as a commercial but a national instrument. Difficulties in geographical conditions of the country, rendering the application of private capital to some of the more mountainous and poorly populated sections unlikely coupled with a pressing need of bringing North and South into closer and more harmonious relations have determined

the people on government ownership despite the losses from more expensive operation.

Action already had been taken to recoup the railways from their higher expenses before the unfavorable showing for the last year occurred. Under a law of April, 1911, the government advanced rates on passenger traffic from 6 to 9 per cent and added 2½ centimes a ton to the rates on freight shipments.

The Railway Supply Man's Point of View

The Railway Supply Man.

Is it not well to pause at least for one issue and analyze the railway supply man, and see what kind of an individual he is? Perhaps we can best do this by selecting some representative and discussing his qualifications and characteristics fully and freely. The annual exhibition of the National Railway Appliances Association, which is held next week from March 16th to 20th, at the Coliseum and First Regiment Armory, Chicago, very naturally suggests a representative man. The fact that a man becomes president of this association is in itself evidence conclusive of the fact that he is a bonafide representative railway supply man. More than this, any one who personally knows Tom R. Wyles, appreciates at once the truth of this statement. Resourceful, logical, energetic,



Tom R. Wyles, President, National Railway Appliances Association.

optimistic, successful, and breathing always the air of good fellowship and a broad and generous viewpoint on all things, Tom Wyles stands clearly a typical representative of the modern railway supply men.

By the time this article is seen by our readers, the "Big Show" will be in full swing. It is a business proposition,—this exhibition,—clean and clear cut,—therefore a single purpose and no side shows. Thousands of tons of material and equipment are exhibited there by hundreds of concerns, representing millions of dollars,—all done for the purpose of placing before railway officials in concrete form what has been accomplished in the way of improvements in railway equipment during the past year. The National

Railway Appliances Association is what it is, and the success that it is, because of the railway supply manufacturers who have given their time, thought, and energy, to its building. Tom Wyles is president because he has been one of those men who have done so much to bring it to where it now is. While one president does not make the organization, and one individual does not make it a successful organization, the present executive officer has had his share, and a large share, in making the annual exhibition of importance and of value to both the railway officials and the railway supply men.

However, Wyles was successful before this organization existed, and his work with it is only incidental to the other things which he has been doing for many years, which make him a representative railway supply man. Not that Tom Wyles is old, because he is not—he is a young man yet, but the association is still much younger. The early training of the railway supply man is found so often and with so many of them in the railway field; and many a railway supply man is only a reformed railway man. Wyles is no exception; his early training was in railway work, and he always refers to it as a good training. A man needs a good training to sell railway equipment or appliances. He needs more than a good training; he needs a good product. That's what it settles down to in these strenuous days. Without detracting at all from the suavity and ability of the vice-president of the Detroit Graphite Co. as a salesman, we must admit that we believe "superior graphite paint" has had something to do with Tom Wyles' ability to paint a very large proportion of the railroad bridges of this country. Any man who has known Wyles for two months never thinks of him without thinking of good paint, with emphasis on the word "good." After you have given Wyles an order for a few barrels of paint, you have an indefinite feeling that he is so particular about having that paint just what it should be in every respect that he is going down to his plant in Detroit and make it himself. Wyles is a director of his company, and while it is hardly to be supposed that one of his official duties in that regard is to don overalls and mix paints, yet you always have a kind of feeling nevertheless that he knows personally just how that paint ought to be mixed, and is dead sure that it is going to be mixed according to his directions. Possibly this is just because he is one of those fellows who inspires confidence, and you can't help but believe what he says. This confidence in the statement he makes increases as you come to know him better, because of that infallible faculty that he has of invariably backing up with facts any statement which he has made.

What a man is, is what really interests one. Tom Wyles is no man's fair weather friend. You only just begin to appreciate the fellow and see how far his friendship will go when you find one of his friends in a position where things are going the wrong way. Wyles is always on the front seat of the ambulance, and generally driving the horses and breaking the speed limit, when any of his friends are in trouble. He is the first man on the spot, and he

doesn't stop with offering "first aid to the injured," but he sticks by you until you are out of the hospital, and then watches you to see that you get along all right. Even after you are back in good trim, and everything is going right again, you can tell by the expression on his face that there is nobody in the world any more delighted than is he.

There is another thing that we are not particularly interested in, but he is, and probably he will read what we have to say and will be disappointed if we do not refer to the fact that he occasionally plays golf. Perhaps this is his one weakness,—not that he plays golf, but that he thinks he can. Probably a man has a right to have a little opinion about himself as regards some one thing, and as golf playing seems to be about the only thing over which Tom Wyles seems to be a little bit set-up, we can forgive him in that particular, because the weather is warming up and it will only be a question of a few weeks when his inferiority as a golf player can be demonstrated before witnesses.

Wyles says that the first important incident in his career was his entrance into this mundane sphere, the 14th of January, 1872. He has not yet thoroughly clarified his memory of previous states of existence and is not altogether certain about predisposition to paint things. He was born in Virginia, where his parents had come from England in 1870; and owing to the death of his mother, spent his childhood with relatives in England and received his schooling there from 1879 to 1889, when he returned to Virginia. In 1891 he entered the service of the American Refrigeration & Transit Co. at St. Louis, as stenographer and clerk, and later as contracting freight agent at Chicago. In 1898 he went with the Detroit Graphite Co., and has remained with them ever since. In 1908 he was elected second vice-president; in 1911 a director; and in 1912 president of the Dominion Paint Wks., Limited, the Canadian plant at Walkerville. He has just been made vice-president of the parent company.

When all is said and done, it is the men like Tom Wyles in the railway supply business who make a fellow feel glad that he is one of them,—make him feel proud to belong to the same clan,—give him some satisfaction in the work that he is doing in life. There are lots of good fellows in the railway supply business, and we have not intended to intimate by anything that we have said that Wyles is the only one. What we have said about him we would like to say about a great many other people who are helping to make the railroad industry the great power which it is.

The Westinghouse Dinner.

On Saturday evening, March 7th, at the Fort Pitt Hotel, Pittsburgh, the Westinghouse interests in the Pittsburgh district held their fourth annual banquet under the auspices of the Westinghouse Club, which includes the staffs of the Westinghouse Air Brake Co., the Westinghouse Elec. & Mfg. Co., the Westinghouse Machine Co., the Union Switch & Signal Co., the R. D. Nuttall Co., and the Pittsburgh Meter Co. There were about 500 men present and the evening was spent listening to speeches and songs and viewing moving pictures. One of the most striking features of the arrangements made by the committee was the installation by the Union Switch & Signal Co. of a standard semaphore. This semaphore was electrically operated and controlled from the speakers' table, the object being to furnish a warning to the speakers should they exceed the time limit. A small card was distributed giving the explanation of the signals as follows: Green, proceed; yellow, proceed under forced draft in order to finish before the next signal; red, stop! danger!

The toastmaster was W. A. Bole, assistant general manager of the Westinghouse Machine Co. and director of the Trafford

City foundry. A. L. Humphrey, vice-president and general manager of the Westinghouse Air Brake Co. spoke on the products and possibilities of the company. He called attention to the fact that the company since its organization had never failed to meet a payroll on time, nor passed a dividend, executed a note or issued a bond. They have manufactured during their 45 years of existence a sufficient number of brakes to equip a train of cars which, if placed on one track end to end, would encircle the earth. The speaker unhesitatingly placed the air brake as one of the greatest inventions of the nineteenth century.

Col. H. G. Prout, vice-president of the Union Switch & Signal Co., called attention to the value of automatic signal system as an aid to travel, mentioning particularly the recent accident of the interlocking tower of the Boston & Maine station at Boston, which compelled the road to annul 239 trains a day. While the loss of passenger revenue to the company was very serious, it was by no means to be compared with the loss of the public using this station.

Mr. C. A. Terry, vice-president of the Westinghouse Electric & Mfg. Co., spoke on its recent achievements. He said that "deeds are men" and therefore a story of the accomplishments of the company would necessarily be a story of the men responsible for same. He thought that greater than the mechanical products of the company was its achievement in gathering, co-ordinating and developing the group of electrical engineers and commercial men who made its success assured.

The main address of the evening was that of Mr. Guy E. Tripp, chairman of the board of directors of the same company, who discussed the administration bills now before congress looking to the regulation of trade.

He said that he fully endorsed the principle laid down by President Wilson that "private monopoly is indefensible and intolerable" and believed that its prohibition would do the things that President Wilson says it will do. He yielded to no one in his respect for the institutions of the United States, and particularly for the high office of its president, and he furthermore regretted to see growing up in this country, particularly among the young people, the lack of respect for laws and executive authority.

He discussed, in some detail, the various bills in a constructive manner suggesting certain changes which he believed would prove to be for the benefit of the country, summarizing his suggestions as follows:

"The suggestion is that the Trade Commission bill be modified along the lines I have outlined and that the Sherman law definitions bill and trade relations bill be abandoned altogether because all the acts prohibited or defined in these bills can be prohibited or defined by the trade commission itself. That the interlocking directorates bill be greatly modified and that the anti-holding bill confine itself practically to prohibiting a holding company from owning securities of competing corporations. If legislation should be framed along these safe and conservative lines, I do not view its effect upon the future of the Westinghouse Electric & Mfg. Co. with dismay, because we have always been a competitive concern and we have learned our business lessons under competitive conditions of the severest kind."

The type of supply man who spends his time in running down his competitors' products, and dropping innuendos regarding railway people who use them, does his own house more harm than good. The railway man has some pride in his business and in railway men in general. He knows that the person who talks that way about others will, on occasion, talk the same way about him. He knows, too, that all virtue is not the monopoly of one particular supply establishment. It's a pretty good rule to talk about the merits of your own goods, rather than the demerits of those of the other fellow. Then if that other fellow offers you bigger pay and a better job and you go with him you won't have to stultify yourself by going around

taking back what you said before. There are some supply men who, although they may not know it, are really black listed by railway men, because of indiscreet and loose remarks which they drop from time to time—to say nothing of plain, direct, every day lying. You can't boost your own goods very much by throwing mud.

Stanley W. Midgley Goes With "Acme."

If there were a sort of "sons of veterans" in the railway supply army, S. W. Midgley would be in its ranks. He is the eldest son of J. W. Midgley who, when the writer first knew him, was with the Chicago & Northwestern Railway. He was a real power in railway traffic matters and for over twenty years was Commissioner of the Western Freight Association. Many articles from his pen in the columns of this and other railway journals evinced his power as a thinker and writer.

S. W. Midgley has been in the railway supply business for the last twelve years, beginning with the National Car Coupler



Stanley W. Midgley.

Co. as general sales representative; and for the past six years he has been with the Curtain Supply Co. as western sales manager. He is now "playing ball with another league," having resigned that position and accepted a similar one with the Acme Supply Co., of Chicago. This keeps him in the passenger car appliance field, but with a larger line to handle.

Supply Trade Notes.

—The Interstate Car Co., Chicago, has been incorporated in Illinois, with a capital of \$100,000 by David L. Blelock, 223 East Sixtieth street, C. S. Holzmann and C. E. Fitch.

—In the new passenger station of the Great Northern Ry., at Minneapolis, Minn., which was illustrated and described in our issue of February 28, 1914, Hutchinson train indicators are used at each gate entrance to show the time and destination of all departing trains.

—J. N. Kinney, who for the past seven years has been connected with the American Hoist & Derrick Co., St. Paul, Minn., has resigned his position with that company, having been appointed eastern sales manager for the Ohio Locomotive Crane Co., of Bucyrus, Ohio, with offices at 30 Church street, New York.

—G. W. Alden, who for the past ten years has been connected with the McMyler-Interstate Co., of Bedford, Ohio, has resigned his position with that company, having been appointed western sales manager for the Ohio Locomotive Crane Co., of Bucyrus, Ohio, with offices located in the Fisher building, Chicago.

—The Transportation Utilities Co. announces the appointment of Frank N. Grigg as sales agent, with office at 1201 Virginia Railway & Power building, Richmond, Va. Mr. Grigg was, for a short time with the Standard Heat & Ventilation Co., prior to that, ten years with the Adams & Westlake, and prior to that, eleven years with the Chesapeake & Ohio Ry.

—The Wheeling & Lake Erie R. R. has placed orders for selector equipment, to operate in connection with three telephone circuits, with the General Railway Signal Co., of Rochester, N. Y. The selector equipment will be installed as follows: Brewster to Toledo, including branches to Huron, Dalton and Orrville—dispatching circuit, comprising 33 selector stations. Brewster to Norwalk, including branch to Huron—message circuit, comprising 23 selector stations. Brewster to Terminal Junction, including branch to Steubenville—message circuit, comprising 20 selector stations. The order specifies the standard equipment of the G. R. S. selector system, including selectors, bells, key cabinets and the necessary reactance and capacity units, which will be delivered at an early date.

—The Union Switch & Signal Co. has declared a stock dividend of 33 1-3 per cent, payable in common stock on April 20 to holders of both common and preferred stocks of record of March 31. This action followed a special meeting yesterday of the stockholders, at which an increase in the capital stock from \$5,000,000 to \$10,000,000—all the new stock to be common—was approved. The company has also declared the usual quarterly dividends of \$1.50 a share on the common and preferred stocks, both payable April 10 to holders of record March 31.

—The gross business of the American Steel Foundries in 1913 aggregated \$17,425,941, comparing with \$14,319,571 in 1912, and is the largest since 1910, when the total was \$17,173,740. The annual report shows net earnings of \$2,031,271, comparing with \$1,543,839 in the previous fiscal year. The balance of \$1,033,591 for dividends equals 6.01 per cent on \$17,184,000 capital stock outstanding, comparing with \$777,757, or 4.53 per cent, on the same amount of share capital in the previous year. Four quarterly dividends of one-half of 1 per cent each were paid during the year, the aggregate being \$343,680, comparing with no dividends paid in the preceding year, leaving a surplus of \$689,911 for the twelve months, against \$777,757 in 1912. The company's total surplus at the close of last year stood \$1,243,149.

President R. P. Lamont says in part:

"At no time during the year did all of the plants operate at full capacity. The volume of orders on hand at the beginning of the year was large, but new business steadily declined, and by the end of the year the plants were operating at less than 50 per cent of the total capacity. By far the larger portion of your company's business comes directly or indirectly from the railroads and their purchases at the present time are much below normal, both for new equipment and for repairs. Unless the railroads get some relief in the near future in the matter of increased freight rates, the present year will not be a good one for business depending upon them. Your plants and organization were never in better condition to handle a large volume of business, but there is very little business in sight at the present time. Anything that our stockholders can do toward helping to bring about a more favorable attitude toward the railroads will directly benefit your company."

—For the 40 center entrance P-A-Y-E car bodies which have recently been ordered by the San Diego Electric Ry., San Diego, Cal., and on which an option on twenty more was taken, Eccles & Smith Co., Los Angeles, Cal., secured orders for: Hale & Kilburn rattan and cherry slat seats, Chicago City Ry. type of pressed aisle end, and pressed steel oval pedestal base. Also pantasote curtains, ring fixtures, and Rex-all metal rollers, Curtain Supply Co.'s manufacture. Together with, Sterling-Meeker double registers and wearproof mats, manufactured by the Wear Roof Mat Co., Chicago. Specifications also embody: American Mason safety treads, manufactured by the American Mason Safety Tread Co. Peacock hand brakes, manufactured by the National Brake Co., Buffalo, N. Y.

—J. T. Anthony has been appointed assistant general eastern sales manager of the American Arch Co. He was born February 1883. He graduated at Georgia Tech. in 1902, was engaged in textile manufacturing for four years, entered the service of the Atlantic Coast Line R. R. in 1906, and entered the service of the Central of Georgia Ry. in January 1907 in the motive power department. He took the position of combustion engineer with the American Arch Co., in January, 1912, and was made assistant to president in January, 1913, which position he held until March 1, 1914, when he was appointed to his present position.

—Harlow D. Savage has been appointed general eastern sales manager of the American Arch Co., with office at 30 Church street, New York. Mr. Savage was born at Memphis, Tenn., April 16, 1860. He was educated in the public schools and at Kenyon Military Academy. Previous to his connection with the American Arch Co., Mr. Savage was with Ashland Fire Brick Co. from June 1907 to March 1, 1914. He is an officer and a director in various corporations and has for some time been military aid to the governor of Kentucky with the rank of colonel.

—Arthur J. Odegaard, manager of the St. Louis office of the Spencer Otis Co., and former assistant purchasing agent of the Rock Island Lines met death in the fire which destroyed the Missouri Athletic club in St. Louis, Mo., on March 9. He was about 32 years old. Mr. Odegaard was a very popular man. His death is a sad loss not only to his company but to his many friends among railroad and supply men for he had a great faculty for making fast friendships.

RAILWAY NEWS.

Alabama, Tennessee & Northern.—The recent mortgage given by the Alabama, Tennessee & Northern Ry. has no bearing on the future plans of the company for extensions, but was a detail in the perfecting of the reorganization and consolidation which occurred in May, 1913.

Brinson Railway.—See Railway News under Savannah & Northwestern Ry.

Butte, Anaconda & Pacific.—The Butte, Anaconda & Pacific Ry. has sold to the Guaranty Trust Co., of New York, and Kidder, Peabody & Co., \$3,000,000 of 5 per cent 30-year bonds. The proceeds will be used to finance the Georgetown extension, and the electrification of the company's main line, and the line to the smelter on Anaconda hill, and also the line to the Anaconda company's mine.

Chicago & Alton.—The Chicago & Alton R. R. has been granted permission to issue \$999,000 of bonds. It is stated that \$125,000 of the issue is designed to meet equipment notes which soon will fall due. The remainder will pay for improvements made in October, November, December and January.

Chicago, Milwaukee & St. Paul.—It is stated that the Chicago, Milwaukee & St. Paul Ry. has postponed indefinitely the work of double-tracking between Minneapolis and Aberdeen, S. D., a distance of 283 miles, of which 140 miles has been already double-tracked. It was expected that the remaining 143 miles were to be constructed this spring.

Cincinnati, New Orleans & Texas Pacific.—New second main track on the Cincinnati, New Orleans & Texas Pacific

Ry. between Sherman and Dry Ridge, Ky., a distance of four miles, has just been put in service, completing a continuous double track stretch of 24.8 miles from Erlanger, Ky. Work is progressing on the second track under construction from Dry Ridge to mile post 37, a distance of 5.4 miles, and that, with the completion of this and other work, will give the road 37 miles of continuous double track from Ludlow, Ky.

Denver & Salt Lake.—President Newman Erb of the Denver & Salt Lake R. R. upon his recent return from a three weeks' business trip to London and Paris, is quoted as follows:

"The purpose of my trip was to confer with my European associates regarding several important matters, one of which was the arrangement of that part of the financing of the tunnel under the continental divide that is to be borne by the Denver & Salt Lake R. R. Co. The estimated cost of the tunnel is \$4,500,000. Of this amount the City of Denver is to supply \$3,000,000 through an issue of bonds. The railroad company is to furnish the balance of \$1,500,000. I am happy to announce that I was able to arrange for our part of the financing. I cannot give any details at this time, but probably will be able to do so shortly."

Detroit, Toledo & Ironton.—The Detroit Toledo & Ironton R. R. is planning to use gasoline-electric motor cars on its lines south of Lima, Ohio. Following the reorganization of the company, it is planned to rebuild all bridges, renew ties and put down a considerable amount of new heavy steel rails. New water and coaling stations will be built, new round houses erected here, and passenger stations will be remodeled. New locomotives will be purchased, it is said, and heavy repairs made to old equipment.

Erie Railroad.—The Erie Railroad has been authorized to issue \$13,500,000 par value of its three year 5½ per cent collateral gold notes, dated April 1, 1914, and payable April 1, 1917, also \$4,550,000 par value two and one-half year 5½ per cent collateral gold notes, to be dated Oct. 1, 1914, and payable April 1, 1917. These notes of a total par value of \$18,050,000 are to be sold at not less than 98½ per cent of par value and accrued interest. The proceeds are to be used for refunding outstanding notes and to reimburse the treasury for moneys actually expended for additions and betterments.

Pennsylvania Railroad.—To prevent a repetition of the demoralization in traffic which followed the recent blizzard, directors of the Pennsylvania Railroad have made an appropriation of \$300,000 to place underground the company's telephone, telegraph and signal wires on the New York division. Work will be started at once on the line between Trenton and Rahway, N. J., a distance of 25 miles. This is a cost of \$12,000 a mile, so that the total cost of placing underground all wires between Philadelphia and New York will exceed \$1,000,000. The company will construct six ducts underground, two of which will be used by the company at once. One will be a spare duct, one will be used for signal circuit and two will be provided to take care of future growth.

The stockholders of the Pennsylvania Railroad have authorized the creation of a mortgage under which bonds may be issued in such amounts and at such times as may be required properly to finance the company. This is in line with the announcement reported in the Railway Review of January 31.

Pere Marquette.—At a special meeting of the stockholders of the Pere Marquette R. R., March 9, a new board of directors was elected as follows: Frank W. Blair, Detroit, Mich.; Dudley E. Waters, Grand Rapids, and S. M. Felton, Chicago, the three receivers of the company; George H. Russell and S. L. Merriam, Detroit; William L. Clements, Bay City; James B. Peters, Saginaw; William R. Roach, Hart, Mich.; B. F. Davis, Lansing; Albert E. Sleeper, Bad Axe; William A. Garrett, Chicago; E. H. Price and E. V. R. Thayer, Boston; F. W. Stevens and William H. Porter, New York. The following day the new board elected William A. Garrett, chairman.

Savannah & Northwestern.—At a recent meeting of its stockholders the name of the Brinson Railway, built by George M. Brinson and recently extended from Waynesboro to St. Clair, Ga., was changed to the Savannah & Northwestern Ry.

Southern Pacific.—The Southern Pacific Co. is relaying its lines with heavier rails, as follows: Louisiana Western—Extending east from Lafayette and east from New Iberia, a total of 35 miles—90 lb. steel. Texas & New Orleans between Beaumont and Liberty, 35 miles—90 lb. steel. Victoria diver Galveston, Harrisburg & San Antonio between Hilje

and Victoria, 35 miles—75 lb. steel. Houston division, 20 miles—90 lb. steel. El Paso division east of Langtry, 20 miles—90 lb. steel. Houston & Texas Central between Palmer and Garrett, 20 miles; Mexia cut-off, 48 miles—90 lb. steel. Houston East & West Texas from Teneha east, 12 miles—75 lb. steel. This is the present state and it is intended to continue until every division is covered.

PERSONALS.

W. J. Dunlop has been appointed storekeeper at the East Side terminal of the Baltimore & Ohio R. R., Philadelphia, Pa., to succeed H. L. Mortimer.

J. L. Woods has been appointed assistant purchasing agent of the Nashville, Chattanooga & St. Louis Ry., with headquarters at Nashville, Tenn., effective March 1.

Stanton Ennes, superintendent of the Mesabi division of the Great Northern Ry., with headquarters at Superior, Wis., has resigned to take service with the Western Maryland Ry.

T. H. Barker has been appointed storekeeper of the Baltimore & Ohio R. R. at Benwood, W. Va., succeeding R. T. Ravenscroft.

F. J. Angier, superintendent of timber preservation of the Baltimore & Ohio R. R., has been appointed storekeeper at Green Spring, W. Va. At Green Spring the Baltimore & Ohio operates a large timber-treating plant, and matters relating to supplies at that point in the future will be handled through Mr. Angier.

G. E. Votaw, superintendent of the Breckenridge division of the Great Northern Ry., Breckenridge, Minn., has been appointed superintendent of the Mesabi division, with headquarters at Superior, Wis., succeeding S. Ennes, resigned to accept services with another company.

L. P. Featherstone, president of the Gulf & Interstate Ry. of Texas, has resigned and E. P. Ripley has been elected president of that company.

Harry I. Miller, formerly receiver of the Buffalo & Susquehanna Ry., has undertaken, at the request of directors, an exhaustive examination into the physical and financial condition of the Boston & Maine R. R.

Roldin A. Brown has been appointed trainmaster of the Peoria and Mattoon districts of the Illinois Central R. R., with headquarters at Mattoon, Ill., effective March 12.

John W. Bledsoe has been appointed trainmaster of the Effingham and Indianapolis districts of the Illinois Central R. R., with headquarters at Mattoon, Ill., effective March 12.

C. R. Craig, purchasing agent of the Mobile & Ohio R. R. and the Southern Railway Co. in Mississippi, has been appointed purchasing agent of the Southern Railway, with office at Washington, D. C., succeeding F. S. Wynn who was recently elected secretary of that company. J. A. Turner has been appointed purchasing agent of the Mobile & Ohio and Southern Railway Co. in Mississippi, with office at Mobile, Ala., succeeding Mr. Craig.

W. E. Lefaire who was appointed purchasing agent of the Denver & Rio Grande R. R., on March 1, entered the service of St. Louis & San Francisco R. R., in the purchasing department September 18, 1890. He remained with that company over fifteen years, leaving them on December 1, 1905, to accept position as chief clerk to General Purchasing Agent S. F. Pryor, who at that time handled the purchasing of all materials for the Missouri Pacific, St. Louis Iron Mountain & Southern, Texas & Pacific, International & Great Northern, St. Louis, South Western and American Refrigerator Transit Co. Mr. Pryor resigned from the Missouri Pacific, March 1st, 1911, and Mr. Lefaire continued service for an additional three years, up to March 1, 1914, under the jurisdiction of C. A. How, general purchasing agent, his experience in the purchasing department having extended over a period of twenty-three years.

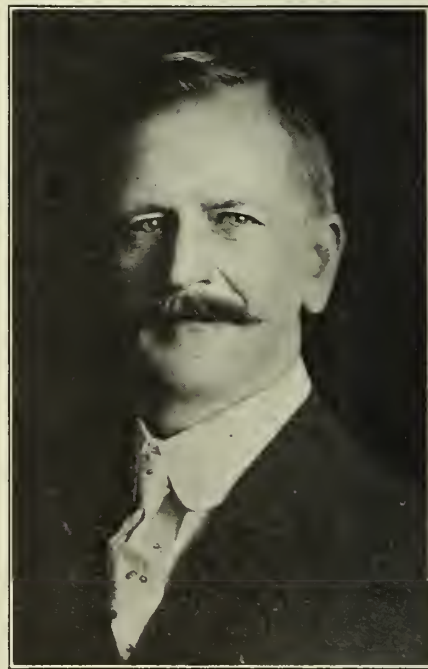
E. L. King who has been appointed superintendent of telegraph of the Southern Pacific Co., as noted in these columns, was born at Dixon, Cal., August 16, 1875. He entered the employ of the Postal Telegraph Co. in 1890 as messenger, was manager of that company's offices at Colusa and Woodland, 1892 and 1893; 1894 to 1900, with the Southern Pacific Co. as operator, roadmaster's clerk and agent at various points on the Sacramento division; operator and later clerk in superintendent's office of the same company until early in 1901; 1901 to 1906, dispatcher at Sacramento; 1906 to 1907, chief dispatcher, South Pacific, Sparks, Nev.; 1907 to 1910, train dispatcher at Sacramento; 1910 to 1912, chief dispatcher, Shasta division. Mr. King was appointed trainmas-

ter of that division in October, 1912, and in February, 1914, superintendent of telegraph of the Pacific system of the Southern Pacific Co.

J. B. Norcross, effective March 9, has been appointed joint superintendent of telegraph of the Maine Central R. R. and Western Union Telegraph Co., vice E. A. Hall who has retired from active work after a long term of faithful service. The joint superintendent of telegraph will have immediate charge of the management and maintenance of the telegraph; commercial telegraph business transacted at offices of the railroad company, and has jurisdiction over telegraph operators so far as their duties pertain to these matters. Office at Portland, Maine.

F. C. Donaldson, formerly of the Ohio division of the Baltimore & Ohio Southwestern R. R., has been appointed trainmaster of the Springfield district, Cincinnati, Hamilton & Dayton Ry., with office at Hume, Ill. M. S. Kopp has been appointed trainmaster of the Cincinnati, Hamilton & Dayton, and C. W. Havens assistant trainmaster in the territory between Erie Junction and New River Junction, with headquarters at Dayton, Ohio. The position of assistant trainmaster at Lima has been abolished. The jurisdiction of F. M. O'Connor as trainmaster has been defined as the Indianapolis division proper, including the Indianapolis yard. The territory of G. E. Reel, trainmaster, has been defined between Erie Junction and Hates, with headquarters at Lima, Ohio.

Samuel F. Clark, whose appointment as general purchasing agent of the Spokane, Portland & Seattle Ry., and affiliated lines has been noted in a previous issue, commenced his railroad career April 20, 1896, in the general stores of the Great Northern Ry., at St. Paul, Minn., and for fourteen years was division and district storekeeper at various points on the Great Northern line. November 1, 1909, he resigned from the Great Northern as storekeeper at Hillyard, Wash-



Samuel F. Clark, Purchasing Agent of the Spokane, Portland & Seattle Ry., and Affiliated Lines in Oregon.

ington Store, which is the western district storehouse for that company, and immediately assumed charge of the general storehouse of the Spokane, Portland & Seattle Ry., at Vancouver, Wash., remaining there until August 1, 1911, when he was transferred to the disbursements bureau of the accounting department of the Spokane, Portland & Seattle at Portland, Ore., remaining in this capacity until February 1, 1914, at which time he was appointed general purchasing agent of the Hill lines in that territory.

J. M. Kurn, former general superintendent of the Atchison, Topeka and Santa Fe Ry., at La Junta, Colo., has been elected president of the Detroit, Toledo & Ironton R. R. Mr. Kurn was born at Mt. Clemens, Mich., November 10, 1870. He was educated in the public schools of Bay City, Mich., and entered railway service with the Michigan Central R. R., in January, 1885. He was operator at different stations on

the Mackinac division of that road until September, 1886. He entered the service of the Chicago, Burlington & Quincy R. R. in October, 1886, as operator and then worked for the Atchison, Topeka & Santa Fe Ry., in the same capacity at various points from December, 1887 to 1892. He was promoted to dispatcher in 1892; chief dispatcher, Colorado division of the Santa Fe, in 1901; from 1903 until June, 1905, he was trainmaster of the same division, and from June, 1905, to September 20, 1905, trainmaster of the New Mexico division, Las Vegas, N. M. Mr. Kurn was appointed superintendent of the Rio Grande division of the Atchison, Topeka & Santa Fe at San Marcial, N. M., September 20, 1905. He was transferred to the New Mexico division at Las Vegas, N. M., January 1, 1906, and on October 1, 1910, was promoted to general superintendent of the Northern district, Western lines, with headquarters at La Junta, Colo. As soon as plans for the reorganization of the Detroit, Toledo & Ironton were perfected last January, Mr. Kurn was offered the presidency. He accepted and resigned his position with the Santa Fe effective February 1, after having been, although not yet 44, in continuous service with that company over 26 years.

Henry W. Thornton whose appointment as general manager of the Great Eastern Ry. of England has been noted in these columns, was born in Logansport, Ind., in 1871. He began his career with the Pennsylvania Lines West of Pittsburgh, in December, 1894, as a draftsman in the office of the chief engineer, and held various positions in that office and the construction department until June, 1897, when he was appointed supervisor at Columbus, Ohio. In November, 1897, he was appointed assistant engineer of the Cincinnati division, and remained in that position until April, 1899, after which he was for seven months assigned to special work under the general manager. He was made engineer of maintenance of way of the Erie and Ashtabula division, November 1, 1899, and in March, 1901, became superintendent of the Marietta division. In May, 1902, he was appointed superintendent of the Cleveland, Akron & Columbus, and on December 23, of the same year, he returned to the Erie and Ashtabula division as superintendent. On February 1, 1911, he was appointed assistant general superintendent of the Long Island Railroad and the following November was promoted to general superintendent. Editorial comment with reference to Mr. Thornton's recent appointment was made in the Railway Review of February 21. We are pleased to reproduce in this issue the latest photograph of Mr. Thornton. He expects to leave for his new work on March 31.



Henry W. Thornton, Recently Appointed General Manager of the Great Eastern Railway of England.

John W. Meredith, whose appointment as general superintendent of the Central R. R. of New Jersey was noted in our issue of February 7, was born at Maiden Creek, Pa.,

in March, 1862. He was educated in the public schools and at Carroll Institute, Reading, Pa., and began his railway career in 1885 as an extra station agent on the Philadelphia & Reading Ry. Later in the same year he went with the Central R. R. of New Jersey, and has since been continuously with that company. He was agent at West End, then extra agent on the New Jersey Southern division; 1887 to



John W. Meredith, Who was Appointed General Superintendent of the Central Railroad of New Jersey.

1897, train dispatcher at East Long Branch, N. J., and then for four years trainmaster of that division. Mr. Meredith was appointed division superintendent at East Long Branch in 1911, and, as previously noted, general superintendent of the Central R. R. of New Jersey, February 1, 1914.

William A. Garrett, vice-president of the Chicago Great Western R. R., on March 10 was elected chairman of the new board of directors of the Pere Marquette R. R.

C. E. Hornbeck, trainmaster of the Great Northern Ry., at Sioux City, Iowa, has been appointed trainmaster of the Mesabi division, with headquarters at Superior, Wis. E. F. Bailey, hitherto trainmaster of the Mesabi division, has succeeded Mr. Hornbeck at Sioux City.

Carl R. Gray, whose election as chairman of the board and president of the Western Maryland Ry., was noted in our previous issue, was born September 28, 1867. He is a native of Arkansas and he was educated at the Arkansas Industrial university. Mr. Gray began his career as a telegrapher with the St. Louis & San Francisco R. R. in 1885. He remained with that company until May 1, 1911, holding positions as operator, ticket agent, clerk, commercial freight agent, division freight agent, division superintendent, superintendent of transportation, general manager and vice-president. He was second vice-president and general manager of the company from July 1, 1906, to November 30, 1909, and senior vice-president from November 30, 1909 to May 1, 1911. Mr. Gray became president of the Spokane, Portland & Seattle Ry., Oregon Electric Ry., and associated lines, May 1, 1911, and has been president of the Great Northern Ry. since May 15, 1912.

G. B. Purdue, trainmaster of the Grand Trunk Ry., having asked to be relieved account of illness, R. Kelley has been appointed trainmaster of the twenty-seventh and twenty-eighth districts, with headquarters at Durand, Mich.

J. F. Hoyer has been appointed purchasing agent of the New Orleans Great Northern R. R., with office at Jackson, Miss., succeeding F. L. Kinsman, resigned.

Frank S. Hill, assistant chief claim agent of the Lake Erie & Western R. R., has been appointed chief claim agent, with offices at Indianapolis, Ind.

L. H. Phetteplace, general superintendent of the Carolina,

Clinchfield & Ohio Ry., has been appointed general manager, with headquarters at Erwin, Tenn.

William Bartley, car accountant of the Lake Erie & Western R. R., has been appointed superintendent of car service, with office at Indianapolis, Ind., and the former office has been abolished.

F. L. Burkhalter, district engineer of the Southern Pacific Co., Portland, Ore., has been appointed division superintendent, with headquarters at Portland, succeeding L. R. Fields.

I. McQuiltin, controller of the Carolina, Clinchfield & Ohio Ry., with office at Johnson City, Tenn., has been elected vice-president in charge of finances and accounts.

E. H. Lee, chief engineer of the Chicago & Western Indiana R. R., and the Belt Railway of Chicago, has been elected vice-president and chief engineer of those roads.

TRAFFIC.

Charles A. Fullen has been appointed general agent of the Chicago Great Western R. R., with headquarters at Winnipeg, Man., effective March 10, to succeed Roy Bullen, resigned to accept service with another company. David W. Quick is appointed general agent at Fargo, N. D., vice Mr. Fullen.

J. B. Nettle, New York Central Lines, having been transferred, the office of general coal and ore agent, Pittsburgh, Pa., is abolished, and all matters pertaining to coal, coke and ore traffic will hereafter be handled by H. M. Griggs, general coal and ore agent, whose headquarters will be moved from La Salle Street station, Chicago, to the B. of L. E. building, Cleveland, Ohio.

Fred Zimmerman has been appointed general freight agent of the New York Central Lines with headquarters at Cleveland, Ohio, vice W. A. Newman, transferred.

C. A. Searle has been appointed general baggage agent of the Rock Island Lines, succeeding George F. Lee, deceased. The office of mail traffic and general baggage agent have been consolidated, according to a circular issued by J. E. Gorman, first vice-president in charge of traffic.

A. Brostedt, district freight and passenger agent of the Great Northern Ry. at Winnipeg, Man., has resigned to become general agent of the Canadian Northern Ry. at Calgary, Alta. He will be succeeded by W. T. Hetherington, district freight and passenger agent of the Great Northern at Montreal, who in turn will be succeeded by A. R. Brooks, agent at Hutchinson, Minn.

Ray F. Clark, has been appointed general agent of the Canadian Northern Ry., at Pittsburgh, Pa. C. E. Webb has been appointed traveling freight agent of the company, to succeed Mr. Clark at Chicago.

W. E. Duperow, general agent passenger department of the Grand Trunk Pacific Ry., Vancouver, B. C., has been made assistant general passenger agent of the Grand Trunk Pacific, with headquarters at Winnipeg, Man. C. E. Jenny, city passenger and ticket agent of the Grand Trunk at Toronto, Ont., has been appointed general agent passenger department at Vancouver, to succeed Mr. Duperow. W. J. Moffatt has been appointed city passenger and ticket agent, Toronto, succeeding Mr. Jenny and S. R. Joyce has been appointed travelling passenger agent, with headquarters at Toronto, succeeding Mr. Moffatt.

ENGINEERING.

H. H. Harsh has been appointed division engineer of the Cleveland division of the Baltimore & Ohio R. R., with office at Cleveland, Ohio, succeeding F. J. Bachelder, transferred. G. F. Eberly has been appointed division engineer at Wheeling, W. Va., to succeed Mr. Harsh.

F. Adams, division engineer of the Texas & Pacific Ry., with former headquarters at Boyce, La., has removed to Alexandria, La.

B. C. Milner, Sr., Louisville, Ky., formerly with the Southern Railway, has been appointed senior civil engineer, southern district, Department of Valuation, Interstate Commerce Commission, with headquarters at Chattanooga, Tenn. Mr. Milner is head of the contracting firm of B. C. Milner Sons Co. He resigned as division superintendent of the Southern Railway in 1907 to become general manager and chief engineer of the Cumberland Railroad and later in the same year organized the company of which he has since been president. His retirement from the company is announced.

F. W. Bettie, assistant engineer for the Terminal R. R.

Association of St. Louis, has been appointed division engineer of the Texas & Texas Ry., with headquarters at New Orleans, La.

W. S. Hanley, division engineer of the New Orleans Great Northern R. R., has been appointed chief engineer, and the office of division engineer has been abolished.

Arthur McGuire, division engineer of the San Pedro, Los Angeles & Salt Lake R. R., has been appointed chief engineer, with headquarters at Los Angeles, Cal., succeeding E. G. Tilton, resigned.

E. Gephart, master carpenter of the Chicago & Alton R. R., at Bloomington, Ill., has been appointed supervisor of bridges and building of the Northern and Southern divisions, with office at Bloomington. J. T. Martin, master carpenter at Mexico, Mo., has been appointed supervisor of bridges and buildings of the Western division, with headquarters at Mexico.

C. E. Apple has been appointed supervisor of bridges and buildings of the San Antonio & Aransas Pass Ry., with headquarters at Yoakum, Tex.

C. H. Spencer, engineer of the Washington Terminal Co., Washington, D. C., has resigned to accept appointment as assistant district engineer of the Eastern district, Division of Valuation, Interstate Commerce Commission, with headquarters at Washington.

C. S. Heritage has been appointed engineer of the Washington Terminal Co., Washington, D. C., succeeding C. H. Spencer.

W. E. Guignon, assistant engineer of the Northwest system of the Pennsylvania Lines West of Pittsburgh, with office at Chicago, has been appointed division engineer of the Zanesville division of the Central system, with headquarters at Zanesville, Ohio, succeeding A. C. Watson, transferred.

Jenks B. Jenkins, who has been appointed valuation engineer of the Baltimore & Ohio system, has been advanced from the position of assistant engineer, with headquarters at Baltimore, Md. Mr. Jenkins has had wide experience in railroad and municipal engineering. He was born January 28, 1869, and was graduated from the Western University of Pennsylvania in June, 1888. In 1887 he was engaged in railroad location work with an engineering firm and in May, 1888, became an assistant in the office of the city engineer of Allegheny, Pa. Mr. Jenkins was employed as a structural steel draftsman in 1893, and in January, 1894, became a topographer for the Baltimore & Washington Traction & Tramway Co. Later he was in charge of location of the Washington & Great Falls Electric Ry. Returning to Pittsburgh, he engaged in the private practice of engineering. From March, 1896, to December, 1897, he was a topographical draftsman in the department of street improvements of New York city. In June, 1898, he became assistant engineer of the board of public improvements of New York, in charge of street openings in the Borough of Queens. Mr. Jenkins became assistant engineer of the Baltimore & Ohio R. R., May 1, 1900, having previously been in the maintenance of way and real estate departments of the company, and as an engineer on the Staten Island Rapid Transit R. R.

William W. Slater, signal engineer of the Southern Pacific Co., San Francisco, Cal., has retired on a pension after a service of nearly fifty years. He was born in January, 1849, and began his railroad service in 1862 as a newsboy on Columbus, Piqua & Indiana railroad. From 1864 to 1868 he worked as telegraph operator on various eastern railroads and in 1868 he went to Salt Lake City, Utah, by stage to engage in the same work. In 1869 he opened the first telegraph office in Ogden. This was used exclusively for the business of the Southern Pacific and Union Pacific. Three months after opening this office, Mr. Slater saw the first Union Pacific train arrive. It was greeted by a large number of people, many of whom had never seen a railroad or an engine. The end of the Central Pacific track at this time was near Montello. In 1869 he became freight operator on the San Francisco & San Jose railroad. In June of that year he was made material clerk and operator at Warm Springs, securing track material for building the road from a point near Niles to the San Joaquin bridge, where it connected with the line being built from Sacramento, and also from a point near Niles, to a connection with the Cohen road at Hayward. This was completed in October, 1869, and the first through overland passenger train was run to Alameda to make boat connection for San Francisco in 1869. In 1865 he became signal engineer of the company.

Mr. Slater, being on the Pacific coast at a time when rail-

way signaling in this country was in its infancy, and, being thus far removed from observation of progress that was being made by eastern railroads and manufacturers in this line, had to rely upon his own abilities very largely in meeting the signaling problems as they arose in the development of the Southern Pacific system. Under these circumstances he invented a number of ingenious applications which met the situation successfully; notably, for one thing, a disk indication for use in the snow sheds over the Sierra Nevada mountains. The system of automatic block signals for single track, in use on all of the Harriman lines, was also developed by Mr. Slater. A summary of the interlocking and block signal work and development under his direction, from 1885 to 1914, follows: 1885—Interlocking plants installed at Oakland Pier, West Oakland, and First and Harrison streets, with automatic signals between them. This was the first signal work done on these lines. 1885-1901—Development of interlocking and block signaling in the vicinity of Oakland, Sacramento and Los Angeles. 1901—Thirty miles of block signals on the Tehachapi mountains installed. This was the first step in the block signaling of the through main lines by the Southern Pacific. 1902-1914—Rapid extension of the block system on all important main lines. At the same time the principles and standards of construction were laid down by Slater and served as a guide for all the Harriman lines in the extensive work carried out by them and many foreign lines in the Western and Pacific Coast sections of the country.

MECHANICAL.

M. P. Hoban, road foreman of engines of the Cincinnati Hamilton & Dayton Ry., will confine his duties to the territory between Troy and Cincinnati, with office at Dayton, Ohio. **W. B. Kilgore** has been appointed road foreman of engines, with jurisdiction between Troy and Toledo and office at Lima, Ohio. The position of assistant road foreman of engines at Lima has been abolished.

Charles F. Barnhill has been appointed master mechanic of the Beaumont division of the Gulf, Colorado & Santa Fe Ry., with headquarters at Silsbee, Tex., succeeding **A. B. Adams**, deceased.

OBITUARY.

G. D. Hughes, trainmaster of the Denver & Rio Grande R. R. at Helper, Utah, died at Salt Lake City, February 28, aged 36 years.

D. C. Idler, former master mechanic of the Vandalia Railroad, died at Indianapolis, Ind., February 23.

D. E. Fitzgerald, former assistant superintendent of motive power of St. Louis & San Francisco R. R., lost his life in the fire which destroyed Missouri Athletic club in St. Louis, March 9. Mr. Fitzgerald resigned his position with the railroad in February last to take a position with the Pierce Oil Corporation.

Adolph Butze former general purchasing agent of the Grand Trunk Ry., died at St. Luke's hospital, St. Louis, Mo., March 3, aged 68 years. Mr. Butze was connected with the Grand Trunk from May, 1896, until May 1, 1912, when he retired on a pension. He had previously been purchasing agent of the Wabash Railroad.

William C. Thompson, former auditor of the Southern Railway died at Thomasville, Ga., March 4, aged 75 years.

John J. Rogers commercial agent of the Missouri, Kansas & Texas Ry. at Chicago, died at Lake View hospital in that city, March 7, aged 67 years.

NEW ROADS AND PROJECTS.

Alaska.—The signing of the Alaska railroad by President Wilson is noted on a previous page.

Alberta.—A report says that the Canadian Northern Ry. will construct a line in Alberta this year, from Bruderheim to Vermilion and from Vermilion to Wainwright, then to Medicine Hat and the international boundary.

Arizona.—See New Road and Projects under Colorado.

A press despatch dated March 9, from Washington, D. C., says that preliminary negotiations for the construction of a railroad from Yuma, Ariz., southward into the Yuma valley, similar to that recently built from Yuma northward, have been opened between Secretary Lane, of the interior department, and representatives of the Southern Pacific Co. In a letter to Julius Kruttschnitt, of the Southern Pacific, the Secretary offered to grant that company a right of way for the proposed road.

British Columbia.—A bill has been introduced in the provincial parliament of British Columbia relieving the Kettle Valley Ry. from its obligation to construct its line from a point at or near Princeton, B. C., to a point at or near Otter Summit, the company having already agreed with the Vancouver, Victoria & Eastern Ry. & Navigation Co. to use the line of the latter now being constructed between the two points. The Kettle Valley is relieved from its contract to build its main line via Aspen Grove and will take the Princeton route instead. It will, however, when conditions warrant construct a branch line not exceeding 25 miles into Aspen Grove district from Otter Summit with another branch line not exceeding 20 miles to Copper Mountain from Princeton. As the company has extended a branch 20 miles up the North fork of the Kettle river from Grand Forks towards Franklin camp it will not be required to fulfill the provisions of the 1910 act and build to the camp until further and satisfactory development of the camp takes place. Owing to the route changes, it is provided that in lieu of the subsidy formerly arranged for, the province will pay \$5000 per mile for the line from Penticton wharf to a junction with the Vancouver, Victoria & Eastern at or near Princeton, not exceeding 75 miles, and from a junction with the Nicola, Kamloops & Similkameen Ry. at Merritt to Otter Summit not exceeding 30 miles. An extension of time may be granted by the lieutenant-governor-in-council. The sum of \$10,000,000 has already been expended by the Kettle Valley on construction; steel has been laid for almost 100 miles on the section between Midway and Penticton; the remaining 33 miles to connect Penticton with Princeton will be in operation by the end of 1914.

California.—See New Roads and Projects under Colorado. The directors of the Death Valley R. R. have authorized an issue of \$400,314 in bonds for financing the proposed line from the Ryan branch of the Tonopah & Tidewater R. R. to the Biddy McCarthy borax mine in Inyo county, Cal. See Railway Review of February 21.

Colorado.—The Southwestern Pacific R. R., it is reported, will file incorporation papers soon for the construction of a railroad from Grand Junction, Colo., to San Diego, Cal., with branch lines tapping the iron and coal fields of central and southern Utah and the Kaibab national forest, in Arizona and Utah. The construction of approximately 1000 miles of railroad is contemplated. An English syndicate is said to be financially interested in the project. Rolla E. Clapp, Semloh hotel, Salt Lake City, Utah, is engineer and western representative. See Railway Review of January 17, under New Roads and Projects, Arizona.

Florida.—The Atlantic Coast Line R. R. is reported to have completed extension from Dunnellon to Wilcox, Fla., a distance of about 50 miles.

Georgia.—Contract is reported let for the extension of the Waycross & Western R. R. from Sirmans to Milltown, Ga., a distance of six miles.

Kentucky.—The Bond Lumber Co., McKee, Ky., is reported interested in a line of railroad now being constructed from East Bernstadt to McKee, Ky., via McWhorter, a distance of about 28 miles.

Maine.—Perry & Whitney Co., 33 Broad street, Boston, Mass., contemplate the construction of 15 miles of railroad from Jackson to Bald Mountain, Maine, to develop timber lands.

Manitoba.—Contract is reported awarded to the Northern Construction Co., Winnipeg, Man., for construction of a railway from Winnipeg to Shoal Lake, for the Greater Winnipeg Water District. About 85 miles of track will be built.

Michigan.—The Lansing Connecting R. R. has been incorporated with \$50,000 capital stock by J. H. Moores and J. W. Potter. The company will establish unbroken connections between the Pere Marquette, Michigan Central, Grand Trunk and Lake Shore & Michigan Southern railroads by way of the Michigan Central in Lansing, Mich.

Minnesota.—The Grand Marais & Northwestern Ry. will complete construction of 40 miles of railroad this year. A right of way out of Grand Marais, Minn., has been located and a large force is engaged in clearing it. Grading will be started early this spring. The new line will extend through Cook county to Ely, Minn.

Montana.—The Great Northern Ry., it is said, is planning to build a 60-mile extension from Scobey, Mont., west to the northwest corner of the Fort Peck Indian reservation. The Big Horn Canon Irrigation & Power Co., it is said, will award contracts about July 1 for the construction of a 68-mile railway from the mouth of Big Horn cañon, north via St. Xavier and Hardin, Mont., to Custer, Mont. The work will necessitate a 600-ft. bridge over the Big Horn River. A. W. F. Koch, Hardin, is chief engineer.

New Brunswick.—The extension of the Intercolonial Rail-

way in New Brunswick is contemplated. It is pointed out that there are now two lines crossing New Brunswick, going south, one the Canada Eastern Ry. from Chatham to Fredericton the other the International Ry. of New Brunswick from Campbellton to St. Leonards. Both are transporters of goods to the United States, and both hand over their traffic to the Canadian Pacific Ry. A 40-mile line from Fredericton, N. B., to Vanceboro, Me., would place the Canada Eastern, now part of the Intercolonial, in direct connection with the Maine Central R. R. A bridge across the St. John river at Van Buren, Me., would place the International in contact with the Bangor & Aroostook R. R., which also connects with the Maine Central.

New Mexico.—The Hallack & Howard Lumber Co., Denver, Colo., plans to construct a railroad in northern New Mexico, it is said, from Caliente, N. M., westerly into the Carson national forest. The estimated cost is \$300,000.

Ohio.—The Ohio & Pennsylvania Belt Line R. R. has received bids to construct a part of its line, about three miles of railroad construction, from Loweville to Haselton, Ohio. The work includes over 200,000 cu. yds. of excavation together with masonry work for under grade crossings. David M. Wise, Youngstown, Ohio, is the engineer in charge of the work.

The Hocking Valley Ry. will begin construction on July 1, next, of an extension south from Columbus, Ohio, to make a direct connection with the Chesapeake & Ohio Ry. at Portsmouth, Ohio, a distance of about 90 miles. This work will take two years to complete.

Oregon.—The Big Creek Logging Co., Portland, Ore., is getting ready to add three miles of standard gauge track to its logging railroad.

A railroad to extend from Prineville in Crook county, Ore., to a junction at Metolius with the Oregon Trunk railroad and the Oregon-Washington R. R. & Navigation Co., will be built at once, according to plans announced by H. B. Scheel, secretary of the Hercules Sandstone Co., of Tenino, Wash., which is financing the project. The railroad will be 31 miles long and its estimated cost is \$600,000. Mr. Scheel is quoted as saying that actual construction of the line would begin within the next 30 days and the work practically completed this year.

Saskatchewan.—The Canadian Pacific Ry. has awarded contract to Dutton & Timson, Winnipeg, Man., for the construction of a branch about 13 miles in length from Advance, Sask., southward.

Texas.—The San Angelo & Gulf Ry. has established general offices at New Braunfels, Tex., and is negotiating for concessions and right of way for a line of railway to extend from San Angelo, Tex., to Aransas Harbor, an approximate distance of 500 miles. U. G. Dotson, Yoakum, Tex., is at the head of the project and will become president of the company as soon as corporation papers are filed.

The directors of the Quanah, Seymour & Gulf R. R. have announced that the road had been financed and that the work on the same would be continued to completion as soon as the right-of-way and bonuses were secured. It has been decided to amend the charter changing the name of the road to Central Railway of Texas. The capitalization will be \$550,000. The incorporators are: Judge L. E. Walker, Austin; Charles G. Johnson, Rockport; J. T. Weiser, Hico; W. S. Hunter, Dr. Pitt S. Turner, Hon. George W. Tyler, Dr. M. F. McElhannon and R. Y. Walker, Belton, and E. Couperthwaite, London, England.

Utah.—See New Roads and Projects under Colorado.

Washington.—The Chicago, Milwaukee & St. Paul Ry., is said to have awarded contract to C. J. Erickson, Downs building, Seattle, Wash., for the construction of 3½ miles of railroad to timber lands owned by the company, near Brinton, Wash.

Electric Railways.

The Shelbyville, Petersburg & Decatur Ry. is expected to let contract this month for first section of its proposed line from Shelbyville to Petersburg, Tenn., about 20 miles. The line is projected through to Decatur, Ala. S. P. Kirkpatrick, of Shelbyville, is president; G. B. Howard & Co., Franklin, Tenn., are engineers.

That the Nashville Traction Co. will make Nashville, Tenn., the centre of an elaborate and extensive system of interurban railways, and that it was primarily for this purpose that the rights of way were sought and secured in Nashville by this company, is the substance of a statement made recently by an officer of the company. He said: "Routes for a number of the interurban railways to be built have been tentatively selected, and surveys will be made in

the near future. When completed, the system will comprise a veritable network of such roads, covering middle Tennessee, and extending into west and middle Tennessee and Kentucky and Alabama.

The Windfall & Central Indiana Traction Co. has been organized to construct an electric railway from Tipton to Marion, Ind. Ezra N. Todd is interested.

The Madison & Janesville Traction Co. has been organized to construct an electric line from Beloit to Whitewater and from Janesville to Madison, Wis. Frank H. Weston, Madison, Wis., is interested.

Application for a charter has been made by the Fresno, Clovis & Academy Interurban Ry., to build a 24-mile electric railway between Fresno, Clovis and Academy, Cal. Capital stock authorized is \$500,000. The incorporators are: F. S. Granger, Fresno; F. M. Blanchard, Fresno; F. E. Buckman, Clovis; T. E. Allen, Clovis, and M. A. Zuccardi, New York.

Bids will be received by the board of public works, San Francisco, Cal., until May 4 for the construction of the Chestnut street branch of the municipal railway. Frederick J. Churchill is secretary of the board. An ordinance has been passed directing the board to prepare plans and specifications and contracts, and advertise for bids for constructing the roadbed extensions of the municipal street railway system as follows: Commencing at Market street, and Van Ness avenue, on Van Ness avenue to Chestnut street, on Chestnut street to Scott street, on Scott street to Greenwich street on Greenwich street to Steiner street, and on Steiner street to Union street.

The Frontier Electric Ry. which is surveying for an electric railway line between Buffalo and Niagara Falls, N. Y., and has completed part of the work of laying the track, will start construction, it is said, in the vicinity of Buffalo city line and North Tonawanda early in the spring. Almost all of the right of way has been secured. It will be a three-track line; two for passenger traffic and one for freight. James S. Simmons is vice-president.

Boston Elevated Ry. is contemplating an extension to suburbs of Boston, Mass., and lines will probably be built to Everett and Malden.

J. A. Steiner, Central City, Ky., has been appointed engineer in charge of preliminary plans for the construction of the Central City, Greenville & Drakesboro Ry. line between Central City and Greenville, Ky. Plans are being made to build a new steam-driven electric plant on Green river about two miles from Central City.

A corporation has been formed with a capital of \$1,000,000 to build two electric railway lines through Baraboo, Wis. One will extend from Cashton to Baraboo and Portage and the other line from Plain to Devils Lake, Baraboo and Kilbourn, making more than 100 miles of electric railway with Baraboo as the central quarters. Among those interested are T. Edward Mead, T. F. Risley and W. H. Marriott, all of Baraboo.

The Cumberland Valley Interurban Ry., which proposes to build a line from Nashville to Sparta, Tenn., has elected W. G. Baird, of Lebanon, Tenn., president in place of J. H. Cartwright, resigned. It is stated preliminary surveys have been completed and construction will be begun this year.

Former Senator Lorimer and Wilbur E. Crane, of Chicago, and John A. Hamilton, of Marissa, Ill., on March 6 were named as receivers for the Southern Traction Co. Federal Judge Wright named the receivers following a petition of Jared Y. Sanders, former Governor of Louisiana, and a heavy stockholder. Mr. Sanders said the road needed about \$20,000 to connect the tracks so that freight and passengers could be handled profitably. The Southern Traction system, which was projected to extend from St. Louis, Mo., to the Southern Illinois coal field, has a permit to enter St. Louis over the Municipal bridge, still uncompleted, and a fifty year franchise for a loop on the Missouri side of the bridge. A movement now is being agitated in St. Louis, Mo., to repeal the fifty-year loop franchise.

Foreign Railways.

Colombia.—The Colombian government is to make a preliminary survey for a railway from the Gulf of Darien (or Uraba) to Medellia, Colombia. On completion of the railway from Puerto Berrio, on the Magdalena river, to Medellin, if the department of Antioquia decides to construct the road to Uraba or Darien gulf, the national government will grant that department a subvention of \$25,000 per mile for the mileage constructed, and will also cede in the de-

partment mentioned, in the region through which the road may pass, 250 acres of public land for each kilometer (0.62 mile) constructed. The work may be commenced at either end of the line. Should the department of Antioquia not make use of this privilege the national government is authorized in conjunction with the department to make a contract with a company that may be formed therefor, in the least possible time, but this contract will require the further sanction of the national congress and the Antioquia assembly. If neither of these measures leads to the construction of the road, the national government will proceed to build it in the briefest time possible, for which it is authorized to obtain a loan, either national or foreign, but both contract and loan shall be approved by congress.

The same law makes the subvention applicable to the proposed line from Tunja to the Magdalena river, provided this line be constructed with a gage not less than a yard wide, and this law is thus made applicable to the department of Boyaca. A preliminary survey is being made now by the engineering firm of Wesselhoeft & Wisner, of Barranquilla, for Pineda Lopez & Co., who are supposed to represent the same British syndicate that built the Girardot railway, of a 100-mile line across the savannahs from Bogota to Tunja. The other line from Tunja to the Magdalena would probably pass near Bucaramanga and follow the surveys of the partly constructed Puerto Wilches railway. It is said that this line can be built on a maximum 2 per cent grade from the Magdalena river to Bogota.

Dominican Republic.—Work was begun in January on the railroad to be constructed from Barahona to the Haitian frontier, and also on the extension of the Sanchez Railroad from Moca to Salcedo. Charles MacFadzean, Sanchez, Dominican Republic, is manager of the Sanchez Railroad.

Ireland.—A bill for incorporating a company to construct railways and piers in the county of Galway, Ireland, has been introduced in Parliament. The only promoter named is Robert Worthing. The capital is to be \$15,000,000. The principal works proposed comprise two piers, costing \$6,865,000, which will form a harbor in Galway bay; also 4½ miles of railways to connect with the Galway and Clifden branch of the Midland Great Western of Ireland railway, which is empowered to subscribe \$1,216,000 toward the capital, with the right to nominate a director. Provision is also made to enable the county councils of Dublin, Kildare, Meath, Westmeath, Roscommon, Galway, and Mayo to guarantee 4 per cent on the ordinary capital of the company.

Italy.—The Società Ferrovie Nord Milano, of Italy, is to complete within two years, a double track of 10½ miles between Bovisio and Servesio San Pietro stations on the Milan-Bovisio-Incino-Erba line, and also to construct a third line for freight service between Bovisio and Affori, at an estimated cost of \$450,000. The company will also spend \$32,000 on locomotives and cars. The Società Ferrovie Nord is a private railway company, the head offices of which are at Milan.

Spain.—The Spanish ministry of commerce has ordered plans drawn for a standard gage railroad with double track from the French frontier to Madrid to insure direct and rapid communication between the Spanish capital and the north. It is calculated that the time occupied by the journey can be reduced from 13 hours to 7, and the journey from Paris to Madrid, which now takes 27½ hours by the fastest train, it is hoped will be reduced to 20 hours. The new road will also do away with the inconvenience of changing cars at the frontier. The official gage of the principal Spanish railroads has hitherto, for strategic reasons, been purposely kept different from that of France, and in consequence passengers are obliged to change cars at all frontier stations. It has been long recognized, however, that the strategic advantage was greatly offset by the grave hindrance of Spanish commerce. The new railroad will be operated solely by electricity. It will be state-owned.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Illinois Central R. R. has ordered 50 mikado (2-8-2) locomotives from the Baldwin Locomotive Works and 22 six-wheel (0-6-0) switching locomotives from the American Locomotive Co.

—The Chicago & Illinois Midland Ry. has ordered 2 mikado (2-8-2) locomotives from the American Locomotive Co. These will have 22x28 in. cylinders, driving wheels 51

ins. in diameter and a total weight in working order of 218,000 lbs.

—The Missouri, Kansas & Texas Ry. of Texas, as reported in our issue of March 7, has ordered 25 superheater mikado (2-8-2-S) freight locomotives from the American Locomotive Co. These engines will have 26½x30 in. cylinders, driving wheels 61 ins. in diameter and a total weight in working order of 285,000 lbs.

—The Detroit, Toledo & Ironton R. R. is expected to purchase some motive power equipment.

—The Arkansas Lumber Co., Warren, Ark. has ordered 1 ten-wheeled type (4-6-0) locomotive from the Baldwin Locomotive Works.

—The J. R. Buckwalter Lumber Co., Union, Miss., has ordered 1 prairie type (2-6-2) locomotive from the Baldwin Locomotive Works.

—The Union Pacific R. R., according to an unconfirmed report, is receiving bids on 58 locomotives.

Freight Cars.

—The Philadelphia & Reading Ry., according to report, has ordered 1000 steel hopper cars from the Cambria Steel Co.

—The Bangor & Aroostook R. R. has ordered 117 freight cars from the Standard Steel Car Co.

—The St. Louis Southwestern Ry., is reported as ordering 2000 freight cars from the American Car & Foundry Co.

—The Bessemer & Lake Erie R. R. is reported in the market for 3500 gondola and hopper cars.

—The Southern Railway has ordered 1250 box cars and 300 flat cars from the American Car & Foundry Co., and 500 box cars from the Mt. Vernon Car Manufacturing Co.

—The Lake Erie, Franklin & Clarion R. R. has ordered 100 hopper gondola cars from the Standard Steel Car Co.

Passenger Cars.

—The Nashville, Chattanooga & St. Louis Ry. is inquiring for 2 postal cars.

—The Atlanta & West Point R. R. and Western Ry. of Alabama recently ordered 4 steel passenger coaches from the American Car & Foundry Co.

—The Atlantic Coast Line R. R. has ordered 15 passenger cars from the American Car & Foundry Co.

Iron and Steel.

—The Pekin Kalgan Ry. has ordered 8500 tons of rails from the United States Steel Products Co.

—The Kansas City Southern Ry. has ordered 6,000 tons of rails from the United States Steel Corporation.

Bridges.

—The Lehigh Valley R. R. will erect a bridge at Weedsport, N. Y., requiring about 360 tons of steel.

—The Great Northern Ry. has awarded contracts to the Wisconsin Bridge & Iron Co. for about 1500 tons of bridge steel.

—The construction of a bridge for steam and electric railways, vehicles and pedestrians over the Mississippi river at New Orleans, La., is proposed. The guarantee of the State of Louisiana upon bonds to the amount of \$6,000,000 is desired. The idea is for the railroads to use the projected bridge under some arrangement to be made with the Belt Railroad commission and the board of port commissioners to whom control of the structure would be given.

—The Columbia, Newberry & Laurens R. R. contemplates building a steel bridge to cost \$25,000 in place of the present wooden bridge near Newberry, S. C.

—Contract for the steel superstructure of the proposed bridge for the Arkansas & Memphis Railway Bridge & Terminal Co. over the Mississippi river at Memphis, Tenn., has been awarded to the Pennsylvania Steel Co. The new bridge will be one of the longest cantilever spans in the world, will contain about 17,000 tons of steel and will cost \$3,000,000. The length of the main span is to be 790 feet. Ralph Modjeska, of Chicago, consulting engineer, designed the new structure.

—The Pennsylvania Railroad, according to report, has plans completed and has secured the right of way for the erection of a new steel and concrete bridge over the Schuylkill river at Phoenixville, Pa.

—The Pennsylvania Railroad has ordered about 1000 tons of structural material for catenary work of the McClintic-Marshall Co.

Buildings, Terminals, Etc.

—The shops of the Wabash Railroad at Moberly, Mo., burned March 9, entailing a loss of nearly \$200,000.

—President A. L. Mohler has been quoted as saying that the Denver Union Terminal Ry. would commence work on the new terminals in Denver, Colo., early in April.

—The Duluth, Missabe & Northern Ry., according to report, has ordered 1350 tons of steel to be used in coal dock extensions at Duluth, Minn.

—The Lehigh Valley R. R. is said to be taking bids on about 300 tons of steel for pier extensions at Brooklyn, N. Y.

—The Southern Railway, it is said, will erect a freight station at Richmond, Va., to cost about \$250,000.

—The St. Louis, Iron Mountain & Southern Ry. has prepared plans and will erect a new depot to replace the structure destroyed by fire last September. The estimated cost is \$60,000.

—The Missouri Pacific Ry. will erect a freight station at Carthage, Mo., to cost \$15,000 and will also enlarge its yards at that point.

—The Missouri, Kansas & Texas Ry., St. Louis & San Francisco R. R., and Missouri, Oklahoma & Gulf Ry., are reported as contemplating the erection of a union station to cost \$45,000 at Durant, Okla.

—The Baltimore & Ohio R. R. will build an additional steel pier for handling coal at Curtis bay, Baltimore, Md., which will double the capacity of the existing facilities there. The improvement will cost more than \$1,000,000.

—The elevator of the Connecting Terminal R. R., Buffalo, N. Y., was burned March 9. The loss is estimated at \$400,000.

—The Southern Railway, according to a press report from Birmingham, Ala., plans to use a part of the proceeds from recent financing in building extensive additions to its Coster shops, near Knoxville, Tenn. New shops will also be erected, it is said, at Birmingham.

—The Esquimalt & Nanaimo Ry. is receiving tenders for the construction of terminal facilities—round house passenger and freight stations, etc.—on a 20-acre site in Courtenay, B. C.

Patents on Railway Devices.

GRANTED BY THE UNITED STATES PATENT OFFICE MARCH 3, 1914.

Rail tie and fastener, 1,088,680—William Biery and Anatole Beaucoudray, Covington, La.

Extensive car step, 1,088,681—John P. Deimling, Clarion, Pa.
Electric fan for railway cars, 1,088,687—Ethan I. Dodds, Central Valley, N. Y., assignor to Kerner Manufacturing Co., Pittsburgh, Pa.

Railway crossing, 1,088,688—Robert A. Dryer, Jr., Auburn, N. Y.
Car construction, 1,088,739—Walter A. Stearns, Hammond, Ind., assignor to American Steel Foundries, New York, N. Y.

Freight car door, 1,088,774—Percy M. Elliott, Chicago, Ill.
Freight car door construction, 1,088,775—Percy M. Elliott, Chicago, Ill.

Railway tie, 1,088,802—Carl H. White, Greenfield, Mass.
Railway vehicle magnet and roadway therefor, 1,088,814—Austen H. Fox, New York, N. Y.

Signal cock, 1,088,817—Benjamin J. Graham, Beverly, Mass., assignor to Charles H. Sherburne, Boston, Mass.

Driving connection for railway odometers, 1,088,853—Curtis H. Veeder, Hartford, Conn.

Railroad tie, 1,088,904—David H. Hynds, Todd, Tex.
Flange lubricator, 1,088,928—David Reid, Globe, Ariz.

Track sander, 1,088,935—Walter B. Rogers, Knoxville, Tenn.
Railroad tie, 1,088,940—Wilmot N. Steuart, Brookfield, Ohio.

Guard rail, 1,088,975—Henry G. Elfborg, Chicago, Ill.
Anti-rail creeper, 1,088,976—Henry G. Elfborg, Chicago, Ill.

Vertical locking rail joints, 1,088,989—Gottlieb H. Hoelscher, Ilawarden, Iowa.

Piston packing ring, 1,089,026—Frank Van Der Cruyssen, Webster Groves, Mo.

Journal lubricating device, 1,089,031 and 1,089,032—Ernest Armstrong, Camden, N. J., assignor to General Lubricating Co., New York, N. Y.

Railway cross tie, 1,089,048—Charles W. Giles, Attleboro, Mass.
Rail joint, 1,089,058—John R. Keller, Pittsburgh, Pa., assignor to The Rail Joint Co., New York, N. Y.

Auxiliary steam generator for locomotive boilers, 1,089,076—Julius J. Plank, Kansas City, Mo.

Car step operating system, 1,089,106—Fred D. Blake, Charlotte, N. C., assignor to Blake Car Step Co., Charlotte, N. C.

Baggage check, 1,089,154—Thomas G. Portmore, South Framingham, Mass., assignor to Dennison Manufacturing Co., South Framingham, Mass.

Resilient driving connection for electric locomotives, 1,089,168—John E. Webster, Pittsburgh, Pa., assignor to Westinghouse Electric & Manufacturing Co., Pittsburgh, Pa.

Tube expanded, 1,089,170—Otto Wiedeke, Dayton, Ohio, assignor of one-half to Gustav Wiedeke, Dayton, Ohio.

Switch stand lock, 1,089,176 and 1,089,177—Charles Wood, Moulton, Iowa.

Train stopping device, 1,089,191—Joseph L. Eirich, Brooklyn, N. Y.

Rail bond, 1,089,202—Thomas C. Folsom, Tampa, Fla.

Tie plate, 1,089,207—William M. Grotfelty, Ohiopyle, Pa.

Railroad tie, 1,089,211—Henry Guderjahn, Westfield, Wis.

Pivot bearing for railway cars, 1,089,260—Harry E. Petty, Neodesha, Kans.

Boiler washing system, 1,089,272—William M. Saxton, Spokane, Wash., and Charles Clinton Hodge, Winnipeg, Manitoba, Canada.

Rail splice, 1,089,280—Warren Slater, Washington, D. C.

Reinforced concrete railway tie, 1,089,301—Harry Wilkins, Evansville, Ind.

Railway construction car, 1,089,306—William R. Bell, Logtown, Miss.

Rail tie, 1,089,309—Daniel C. Blose and Michael Shultz, Kaylor, Pa.

Piston valve, 1,089,357—Friedrich Becher, Landsberg-on-the-Warthe, Germany.

Vestibule trap door, 1,089,367—Harry H. Schroyer, Chicago, Ill., assignor to General Railway Supply Co., Chicago, Ill.



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REPRESENTATIVE IN EASTERN TERRITORY would handle out-of-town accounts for manufacturers of railway and contractors' supplies. Ten years' experience in this field. R., care Railway Review, 30 Church street, New York.

FOR SALE.

FOR SALE—1 second hand 8-in. x 8-in. Smith-Vail Triplex Double Acting Pump; capacity 500 gal. per min. Pump has only been in actual service two weeks. Will sell cheap. T. W. Snow Construction Co., 537 S. Dearborn St.

FOR SALE—300 REFRIGERATOR CARS. These cars range from three to seven years old. They can be delivered at once, ready for service, and at a DECIDED BARGAIN. Address: Refrigerator, care of Railway Review, Ellsworth building, Chicago.

FENCE BUILDING FOREMAN would accept a position, 18 years' railroad experience. 45 years of age. Strictly first-class. W. H. Raymond, 705 E. 16th, Des Moines, Iowa.

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JUSTICE COX, JR., & COMPANY,
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NEW AND RELAYING RAILS, NEW AND SECOND-HAND CARS AND LOCOMOTIVES.

Positions Wanted, Positions Vacant, Educational and
Directory of Attorneys on Advertising Page 17.

RAILWAY REVIEW

ESTABLISHED, JUNE, 1868

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No. 12.

MARCH 21, 1914.

Vol. 54.

Commissioner Harlan Becomes Chairman of the Interstate Commerce Commission.

The Interstate Commerce Commission on March 17, elected Commissioner James S. Harlan as chairman to succeed Commissioner Edgar E. Clark whose year of service in the capacity of chairman has expired. Commissioner Harlan's election was in pursuance of a policy adopted in 1911, that the term of office of chairman should be for one year, and that it should be filled by each commissioner in the order of seniority. Mr. Harlan was appointed from Illinois in 1906, was reappointed in 1911, and his present term will expire December 31, 1918. During his incumbency he has handled some of the most important cases brought to the commission. Just now he is in direct charge of the eastern advance rate case; the inquiry into the question of making a charge for spotting cars; the proposed elimination of allowances to industrial railways by the trunk lines; and proposed charges by the railroads for special service rendered to shippers.

Two-Cent Fare Contest in Kansas.

The injunction suits brought by railroads of Kansas in 1907 to prevent the enforcement of an order of the state railroad commission, providing for a 2-cent passenger fare, will be abandoned in the federal court at Topeka early in April, according to informal notice said to have been given members of the Kansas utilities commission recently by the railroads. Nebraska passed a 2-cent fare law several years ago whereupon the Kansas railroad commission ordered the railroads of that state to establish the same rate. The railroads agreed to give Kansas the same rate that prevailed in Nebraska where the rate question long held up by litigation. The Nebraska railroads recently abandoned their suits, making the 2-cent rate permanent. This development is thought to have brought about the decision of the Kansas roads to take similar action.

Federal Suit Against the Lehigh Valley.

Attorney General McReynolds on March 16, entered suit under the Sherman anti-trust law, against the Lehigh Valley R. R., with its allied interests, as being the dominant factor in a combination alleged to control the output of anthracite from Pennsylvania fields lying in and adjacent to its territory. Although suit was brought to break up an alleged monopoly, the attorney general charges that the Lehigh road, through the formation of a coal sales company two years ago, has escaped the supreme court decision under the commodities clause of the interstate rate act, which forbids the railroad to transport coal belonging to a corporation whose stock it owns and whose affairs have been commingled with its own. The further charge was made that the Lehigh has violated the provision of the Pennsylvania constitution prohibiting common carriers from engaging in mining or other business other than transportation. The usual injunction and decree of dissolution were asked.

Temperance Agitation on the Bessemer & Lake Erie R. R.

Employees of the Bessemer & Lake Erie R. R. shops at Greenville, Pa., found in their pay envelopes on March 16,

cards on which were shown the pictures of a beer keg and of a sack of flour and under them was the query—"Which do you buy?" Recently the company has laid off a number of trainmen who were known to be addicted to the drink habit and who frequented saloons. Several veteran conductors were discharged when they refused to obey the company's injunction against liquor. Officers of the company are said to be determined to completely eliminate drinking men from the company's employ.

Liquidation by the United States Express Co.

The board of directors of the United States Express Co. on March 16, as a result of unsatisfactory business conditions and agitation on the part of stockholders, voted to close out the business of the company as expeditiously as may be consistent in view of the various contracts and agreements under which the company is transacting business. Some of these contracts do not expire until 1917. The occasion for taking this action appears to be due in part to the inroads on the company's business by the parcel post, but more especially because of the recent express rate rulings by the Interstate Commerce Commission and by the utilities commissions of several of the states in which the company operates, which in the latter case, have frequently been even more radical than in the former. The company has 100,000 shares of stock outstanding among 1556 shareholders, the largest single block of stock being the 21,000 shares held by the E. H. Harriman estate. The interests representing the late Senator Platt of New York, for many years the leading figure in the affairs of this company, have been announced as holders of but 850 shares of the stock. The assets of the company other than stock are scheduled as being near \$8,000,000, which will probably enable the company to liquidate to its stockholders at about par. The company was organized in 1854. Its employees number about 15,000 and have been drawing an annual pay-roll of about \$6,000,000. The company operates on more than 32,000 miles of steam and electric lines in the United States and Canada and on more than 260,000 miles of sea and ocean lines. The principal railroads with which it has contracts are the Baltimore & Ohio, Rock Island, Lackawanna, Lehigh Valley, Central Railroad of New Jersey, Philadelphia & Reading, Pere Marquette, St. Louis & San Francisco, Chicago & Eastern Illinois, Cincinnati, Hamilton & Dayton and the Lake Shore and Michigan Southern. It is thought probable that the contracts will be transferred to one of the company's former competitors, probably Wells, Fargo & Co., in which the Harriman interests have large holdings.

Proposal for an Irrigation Scheme.

Col. Epes Randolph, president of the Southern Pacific R. R. of Mexico, is credited with a proposal to dam the Grand Canyon of the Colorado at a point in the state of Arizona, selected with reference to its suitability in an extensive irrigation scheme. The project would cost between \$40,000,000 and \$50,000,000, which Colonel Randolph and his associates offer to raise if the state and the federal government grant permission for the construction of the dam. Because of the tremendous possibilities for the generating of power, the proposal is interesting, from an industrial standpoint to the entire state of Arizona. It would be the means of providing electrical energy to all parts of the state where the current could be sold at a price that would permit of the irrigation of desert lands at not to exceed \$2.50 per acre per year, greatly enhancing the value of such lands.

Organization for Pensioners of the Union Pacific R. R.

The former employees of the Union Pacific R. R. who have been retired on pensions according to plans now under way, will gather in Omaha, Neb., early in April for the purpose of organizing the Union Pacific Pensioners' Association. It has been announced that the railroad will defray the ex-

penses and the pensioners will be the company's guests during the convention. There are about 200 pensioners on the payroll of this road and they are scattered over all parts of the United States. The company will send each transportation to and from Omaha. After the association is organized the company will give the men a banquet at one of the hotels. The first president will be an Omaha man, most probably the veteran baggagemaster, Andrew Traynor, one of the oldest employees in the service, but now retired. Vice-presidents will be selected to represent the principal cities embraced in the railroad system, beginning with the city of Council Bluffs, Iowa.

Railroad Presents Site for College.

Twenty acres of land in South Portland, Oregon, have been presented to the state by the Oregon-Washington Railroad & Navigation Co., as a site for buildings and campus for the medical college of the University of Oregon. The value of the lands is approximately \$100,000. President J. D. Farrell of the railroad, in making the announcement, said that, while the terms of the deed of gift stipulated that the college premises may be used for other public purposes, such as hospitals and for the furtherance of scientific research, investigation and teaching along more general lines are the purposes which the road seeks to support.

Wreck, Chicago, St. Paul, Minneapolis & Omaha Ry.

In a wreck on the Chicago, St. Paul, Minneapolis & Omaha Ry., at Mendota, Minn., on March 14, one person was killed and probably 50 were injured. The train consisted of an engine, a baggage car and eight coaches. After passing the station at Mendota, and while running at about 30 miles per hour, two coaches in the middle of the train suddenly left the rails and toppled over, one of them standing almost upright, throwing the passengers to the end of the coach. Both coaches were steel construction.

Western Rates Sustained.

The Interstate Commerce Commission on March 16, declined to reduce freight rates, via St. Louis, Mo., on shipments originating east of the Indiana-Illinois State line, in Central, Southeastern and Carolina freight association territories, to destinations west of St. Louis, of which Springfield, Mo., is typical. The commission held that existing rates were neither unreasonable nor discriminatory. The roads were given permission to continue to charge proportional class rates from St. Louis to Kansas City, via the Frisco lines, on eastern and southeastern traffic, which are lower than rates concurrently in effect on like traffic from St. Louis to Springfield, Mo.

Cost of the Full Train Crew Laws.

The special committee on relations of railway operation to legislation has issued Bulletin No. 57 regarding minimum (full) crews.

On October 17, Bulletin No. 55 was issued showing an analysis and text of the laws affecting the size of train or switching crews which have been enacted in the various states. To ascertain the number of trains affected and the cost of this legislation on railway operation, all roads were asked to furnish the necessary information. In response to its inquiry, your committee has received replies from 163 roads, having mileage of 202,369 miles. Of these, 65 roads, operating 31,673 miles, are not affected by this legislation. The other 98 roads report a total of 2,359,368 trains affected and a total estimated cost per annum of \$6,800,729.

The Pennsylvania Railroad last year paid out \$5,143.40 on account of accidents to passengers who tripped over other passengers' grips placed in the aisles on passenger trains.

That is one of the reasons why the Company instructs its trainmen not to permit luggage to remain in the aisles of passenger coaches.

William Benson Storey.

PRESIDENT, AMERICAN RAILWAY ENGINEERING ASSOCIATION.

Mr. W. B. Storey, vice-president Atchison, Topeka & Santa Fe Ry., and this week elected president of the American Railway Engineering Association, is a native of the Pacific coast, having been born in San Francisco, Nov. 17, 1857.



Photo by Moffett, Chicago

W. B. Storey, Vice-President, Atchison, Topeka & Santa Fe Ry., President, American Railway Engineering Association.

He entered railway service as an axman in 1877, and after a year of that work, entered college and graduated from the University of California in 1881. He re-entered railway service, immediately after graduation, with the Southern Pacific, and was successively rodman, levelman, transitman and assistant engineer. From 1893 to 1895 he was assistant engineer with the United States Hydraulic Commission. From 1895 to 1900, he was chief engineer of the San Francisco & San Joaquin Valley Ry. In 1900 he became chief engineer of the Atchison, Topeka & Santa Fe Ry., at Topeka, Kan., and from 1906 to 1909 was chief engineer of the entire system. In 1909 and 1910 he was vice-president in charge of construction, located at Chicago; and in 1910 was placed in charge both of construction and operation.

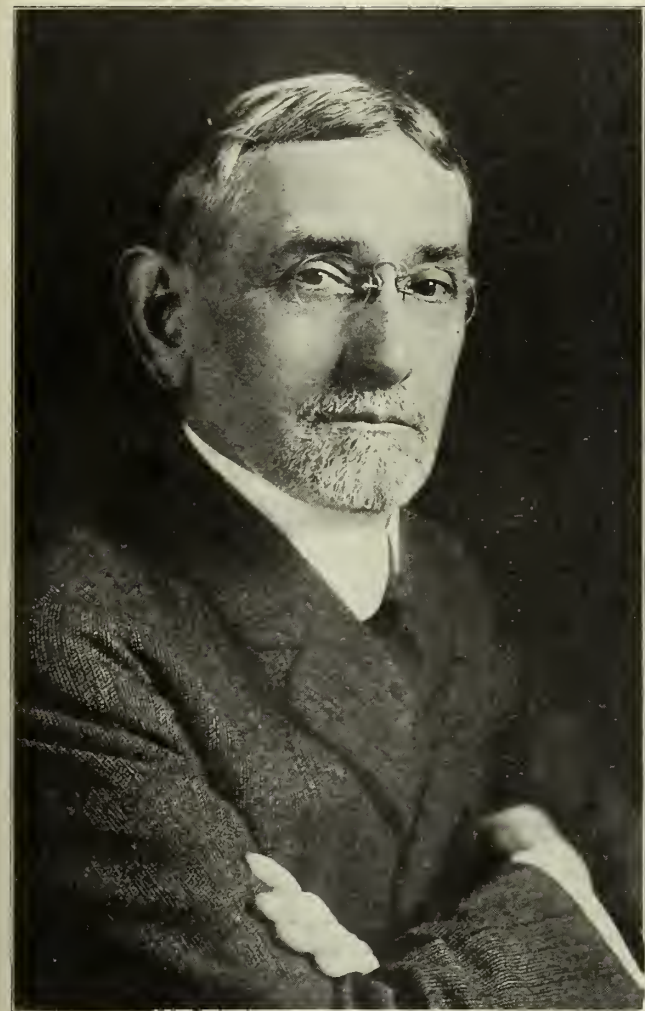


Photo by Matzene, Chicago.

Robert Trimble, Chief Engineer Maintenance of Way, Northwest System, Pennsylvania Lines West; First Vice-President American Railway Engineering Association.

While Mr. Storey's education and experience have been chiefly in civil engineering, he has given great attention to all of the problems, mechanical and electrical, which come before the operating head of a great railway system.

Railroads Extend Losses in January.

PRELIMINARY FIGURES COVERING PARTIAL MILEAGE SHOW SERIOUS INROADS ON NET DESPITE EASY OPERATING CONDITIONS.

To carry a total traffic \$8,995,000 smaller than in the corresponding period the year before, 143 of the largest railways of the United States during the first seven months of the current fiscal year have been obliged to pay out in operating expenses an increase of \$48,611,000. The resulting loss in net is \$57,606,000. This striking picture of the drastic effects on railway revenues of the relatively excessive rise in costs of operation, is derived by the Bureau of Railway News and Statistics from preliminary figures of the Interstate Commerce Commission for January. The returns reported to date cover an aggregate of 197,097 miles, or approximately 79 per cent of the total mileage of the country.

From July 1, 1913, to January 31, 1914, these railroads made the following showing, compared with the corresponding seven months a year ago.

	1914	1913	Loss
Gross	\$1,606,528,000	\$1,615,523,000	\$ 8,995,000
Expenses	1,126,565,000	1,077,954,000	*48,611,000
Net	479,963,000	537,669,000	57,606,000

*Increase.

The full effect of the disproportionate advance in expenses is seen in the ratio of operating expenses to operating revenue for the seven months this year, which is 70.1 per cent, against only 66.7 per cent in the same months last year. This is in the face of the fact that conditions for operation almost throughout the country were exceptionally favorable during the entire period, and emphasizes the seriousness which is involved in such additions to cost as the recent storms in the eastern states. Were the railroads compelled to face generally this year a hard winter of such drastic flood conditions as prevailed last year, even the present excessive expansion in costs of operating would be dwarfed, and the resulting loss in net far greater than the \$57,606,000 lost under favorable weather conditions.

Reduced to a per mile of line basis the 143 railroads this year earned \$8171 per mile, a loss of \$120. In the face of this expense incurred in handling the contracted business rose \$198 to \$5730, leaving for net \$2441, a loss of \$318.

January, opening the second half of the fiscal year, not only is the third successive month to bring a large loss in traffic, but from the preliminary figures now available has added the loss necessary to offset entirely the earlier gains of July, August and September. Whereas the total railway mileage to December



Photo by Matzene, Chicago.

A. S. Baldwin, Chief Engineer, Illinois Central R. R.; Second Vice-President, American Railway Engineering Association.

31 had succeeded in spite of the November and December losses in retaining some \$10,000,000 of the gross gains of the earlier three months, January's decrease in business, as already noted, puts the seven months on the partial mileage almost \$9,000,000 below the corresponding period a year ago. There was for the month a loss in gross of \$14,612,000, but expenses were capable of contraction only to the extent of \$5,614,000 so that a net loss of \$8,998,000 resulted.

The ratio of expenses to revenue in January was 76.8 per cent for the partial mileage covered against 74.3 per cent last year. With taxes added the ratio for January would have been over 80 per cent.

Pittsburgh Memorial to George Westinghouse.

A great public memorial is to be erected to the late George Westinghouse at Pittsburgh. About 100 of the foremost men of the city met in the Westinghouse building,

Herr, William McConway, John R. McCune and Joseph W. Marsh; Westinghouse Machine Company, H. M. Breckenridge, W. A. Bole, H. T. Herr, T. L. Brown, T. S. Grubbs, E. H. Sniffen; Westinghouse Air Brake Co., Cyrus S. Gray, Chas. McKnight, M. S. Rosenwald, Horace E. Andrews, A. L. Humphrey, Thos. Ross, James J. Donnell.

Official recognition by the city council of Pittsburgh was made in memory of Mr. Westinghouse on March 17, when the following resolutions were adopted by that body:

"Whereas, In the loss of that noble soul, George Westinghouse, who has passed into the valley of death, the city of Pittsburgh loses one of her greatest pioneers of industry who has been a potent influence in establishing her international prowess, and

"Whereas, His inventive genius has been productive of infinite good to this municipality by giving scores of its citizens an opportunity to earn their livelihood in the manufacture of his creations, and

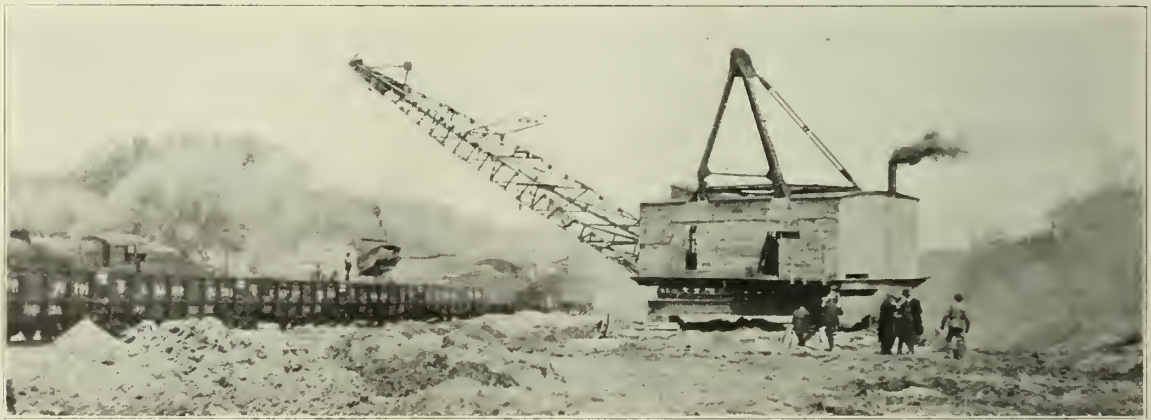


Fig. 1—Drag-Line Scraper in Gravel Pit Near Sabula, Iowa, C., M. & St. P. Ry.



Fig. 2—Excavating with Grading Machine, Second Track Work, C., M. & St. P. Ry.

March 16th, and organized the movement. Tentative plans were drawn and arrangements made for other meetings. Among the old associates of Mr. Westinghouse who were active in promoting the memorial idea and who were elected officers of the Westinghouse Memorial Association, were: H. G. Prout, president; J. R. McGinly and John F. Miller, vice-presidents; W. D. Uptegraff, treasurer; H. C. Tener, secretary. A large number of business men were appointed on a general committee to carry forward the purposes of the association. Subscription to the fund for the erection of a memorial will be open to the public of Pittsburgh and it is presumed hundreds will be glad of the opportunity to contribute. The following men from the Westinghouse companies were elected to the general committee: Westinghouse Electric & Manfg. Co., G. E. Tripp, J. D. Callery, E. M.

Whereas, The life and love of this heavenly-inspired spirit are immortal gifts which communities are fortunate in having and knowing, therefore be it

Resolved, That the council of the city of Pittsburgh, assembled, record its expression of sadness and sorrow and sympathy for the man who has helped blaze Pittsburgh's path, who assisted in her construction, who added his great share to her glory."

His memory was also honored by the twenty-five thousand men employed in the various Westinghouse industries in the Turtle Creek valley, east of Pittsburgh, when on March 13, these several plants were closed and remained so until after the funeral.

The directors of the Union Switch & Signal Co., the Westinghouse Air Brake Co., and the Westinghouse Machine Co.

have also, at recent meetings, passed resolutions of condolence to the bereaved members of the Westinghouse family, and as official memorials in the records of these respective companies. The regular weekly luncheon of the

Jovian Order held at the Fort Pitt Hotel on Thursday, March 19, was devoted to memorial proceedings in honor of Mr. Westinghouse, who was an honorary member of the organization. Elbert Hubbard delivered the eulogy.

Double-Tracking the Chicago and Council Bluffs Division of the C. M. & St. P. Ry. in Iowa

Extension of second track of the Chicago, Milwaukee & St. Paul Ry. through Iowa, on the Chicago and Council Bluffs division. The line is being straightened, grades are being reduced and timber trestles are being replaced with concrete. In some sections the road is being entirely relocated, deviating a mile or more from the original alignment. Work has been pretty well distributed and has progressed simultaneously all along a route 274 miles long.

For nearly two years the Chicago, Milwaukee & St. Paul Ry. has been engaged in building a second track on the

Chicago and Council Bluffs division, in Iowa, and, as is usually done on improvements of this character, parts of the original line have been and are being relocated and rebuilt, in order to reduce grades and curvature and, wherever practicable, eliminate undulations. Of this division of the C. M. & St. P. Ry., from Chicago to Council Bluffs and Omaha, 347 miles lie in the State of Iowa. The improvements at present under consideration were started at end of double track, at Green Island, and will be carried to Manilla, a distance of 271.4 miles.



Fig. 3—Fill Across Flat at Browns, Ia., $\frac{3}{4}$ Mile Long, Second Track Work, C., M. & St. P. Ry.



Fig. 4—Rock Cut Near Browns, Ia., Maximum Depth 55 ft.

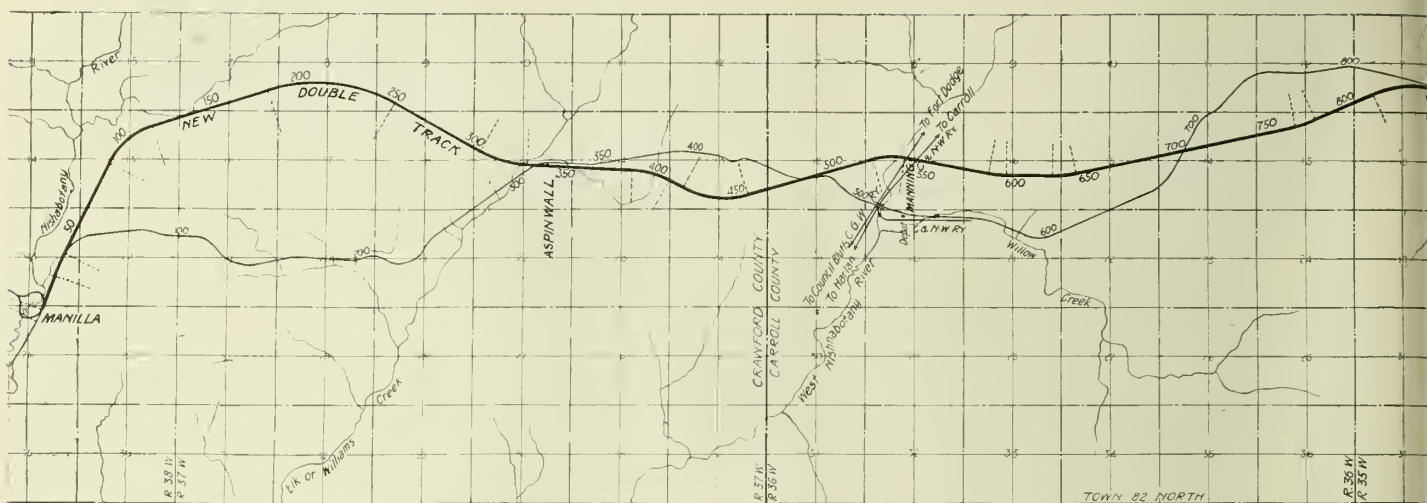


Fig. 6—Map of Existing and Relocated Lines Between



Fig. 5—Unloading Concrete Pipe Near Delmar Jct., Second Track Work, C., M. & St. P. Ry.

As a statement of the progress already made it may be said that on 80.6 miles, from Lost Nation to Elberon, and from Capron to Coon Rapids, 86 miles more, the second track is completed and in operation. On 31.9 miles from Green Island to Lost Nation the grading is completed and the track nearly all laid; such is likewise the state of progress on 40.3 miles of line between Capron and Elberon. On the 32.1 miles lying between Coon Rapids and Manilla the grading is 90 per cent completed and the track is being laid.

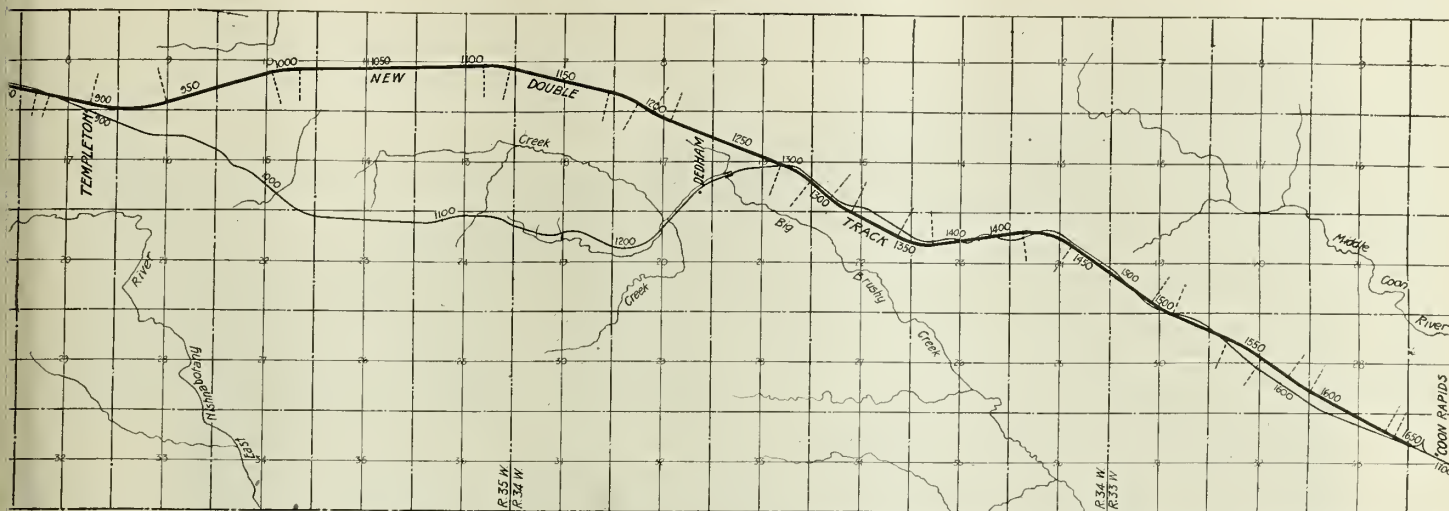
The work is of great magnitude, and all of it has been and is being carried out without interruption to the traffic. The grading, involving 15,750,000 cu. yds. of earth moved, was let on competitive bids to thirteen different general contractors, some of whom sublet the work to others. The



Fig. 7—Highway Under Crossing (in Foreground) and Overhead Crossing of Operated Line Beyond.



Fig. 8—Subway Construction 2 Miles East of Manning, with Contractor's Train Passing Over, C., M. & St. P., Second Track Work.



Coon Rapids and Manilla, Ia., C., M. & St. P. Ry.

track laying and ballasting was done by the railway company's forces under the direction of the division superintendents. In the construction of bridges, culverts and trestles 143,000 cu. yds. of masonry has been built and 12,400 tons of steel has been used in new bridges.

The revision of grades and curvature has brought about important changes from the standpoint of operation. Between Green Island and Marion the grades have been reduced from 0.67 maximum to 0.50 per cent maximum, and between Marion and Manilla from 1.00 per cent maximum to 0.66 per cent maximum. The work of grade revision has resulted in the elimination of about 1000 ft. of rise and fall.

The curvature has been reduced from a maximum of 4 deg. to $1\frac{1}{2}$ deg., and all the new curves have transition ends, the form of easement used being the cubic parabola. The accompanying tabulation is a statement in detail of the improvement in curvature on various sections of the line. The total figures show that out of 274 curves on the old line, 119 have been eliminated, and 6184 deg. 23 min. of curvature on the old line has been reduced to 3079 deg. 39 min., a saving of 3104 deg. 44 min., or almost 9 complete circles. All told, there has been a saving of $3\frac{1}{2}$ miles in distance. At one time there were engaged on the work simultaneously 60 steam shovels, 100 locomotives, 1300 cars, 600 scrapers, 50 grading machines, four drag line scrapers, with hundreds of horses and wagons and thousands of men.

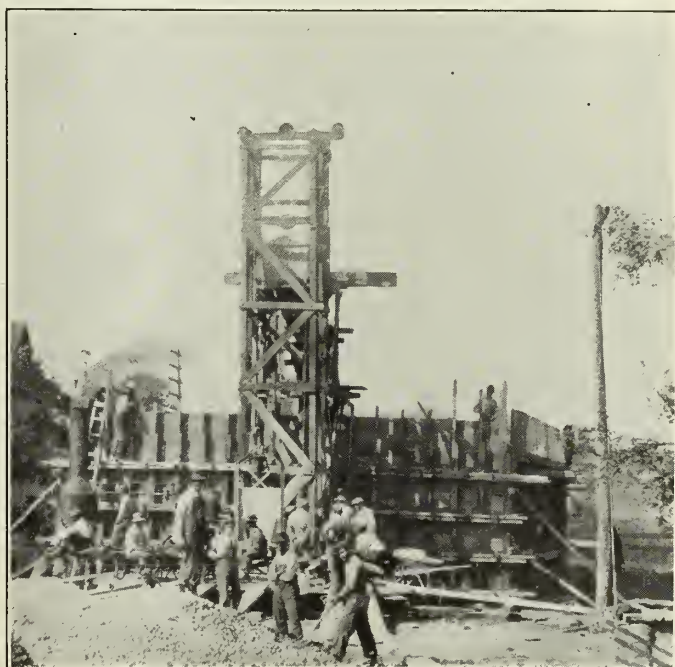


Fig. 12—Tower for Hoisting Concrete.

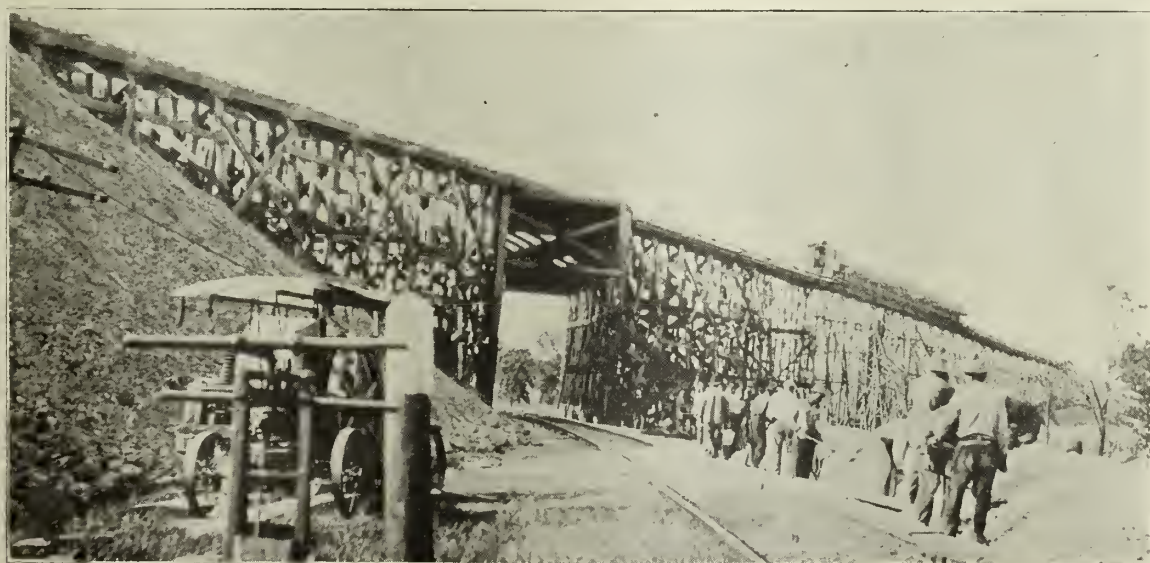


Fig. 9—Temporary Trestle for Marshall Fill, Near Riggs, Ia.; New Line Crossing Old One.

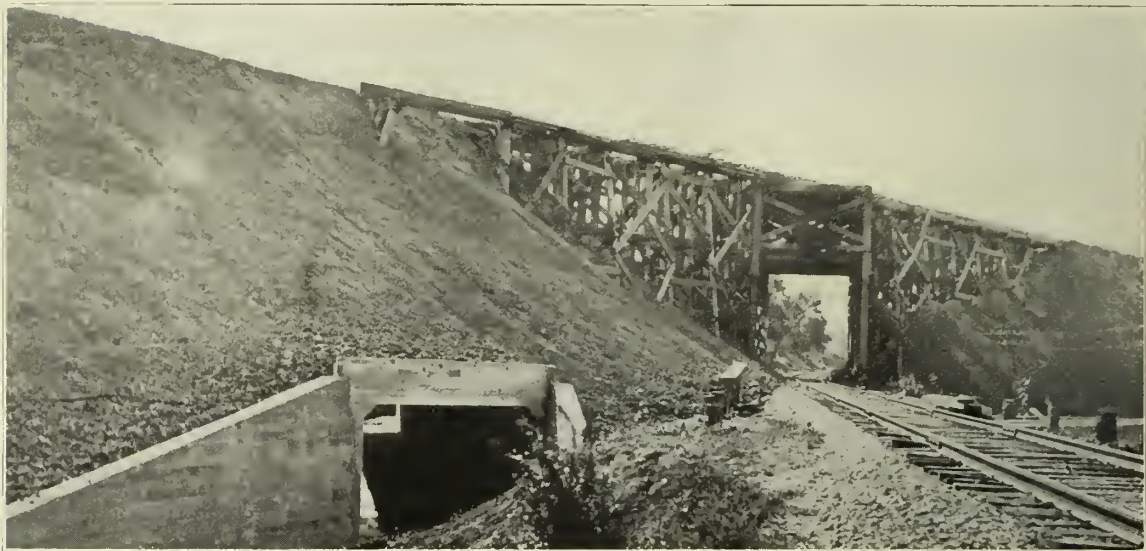


Fig. 10—Temporary Trestle for Crossing Over Old Main Line; 15x12-ft. Concrete Culvert for Waterway and for Farmer's Private Use.

Location—	REVISION OF CURVATURE.			—No. of Curves—		
	—Degrees of Curvature—			New	Old	Diff.
	New	Old	Diff.			
Gr. Island to Oxford Jct.....	739° 36'	1139° 36'	400° 0'	23	41	18
Oxford Jct. to Martelle	303° 30'	340° 47'	37° 17'	9	13	4
Marion to Elberon 377° 35'	406° 56'	29° 21'	29° 21'	30	33	3
Elberon to Capron 568° 21'	590° 47'	22° 26'	22° 26'	27	32	5
Capron to Madrid. 405° 54'	1008° 44'	602° 50'	602° 50'	26	49	23
Madrid to Coon Rapids	165° 29'	950° 49'	785° 20'	16	43	27
Coon Rapids to Manilla	519° 14'	1746° 44'	1227° 30'	24	63	39
Totals.....	3079° 39'	6184° 23'	3104° 44'	155	274	119

For purposes of construction the line was divided into districts, the first extending from Green Island to Oxford Jct. For 4.35 miles west of Green Island the new track was built adjacent to or lying alongside the old one. On this stretch most of the grading was done with drag line excavators, a view of one of these in operation being seen in Fig. 1. On this district 153 ft. of rise and fall has been eliminated, and all of the undulations in the line have been taken out except one. Between Green Island and Browns there has been but little change of line, but west of Browns there has been con-

siderable, so that on the whole residency, 47 per cent of the original line has been relocated. Wherever the second track has been built at the side of the old one bridges and culverts have been extended. On this district the highest fill, at a point east of Riggs, has been 55 ft. Across the flat at Browns there was a fill 25 ft. high and ¾ mile long (Fig. 3). Between Browns and Riggs there is a cut 60 ft. deep. The total earthwork on this district was 2,033,417 cu. yds. Some of the concrete arch culverts are as large as 30 ft. span. Ten concrete trestles and 18 box culverts, the latter ranging from 6 x 6 ft. to double 15 x 10 ft., have been built, and 11 existing culverts have been extended. Five highway under crossings, ranging from openings of 20 x 14 ft. to double 20 x 14 ft., and including one 20 x 16 ft., and one double 15 x 12 ft., have been built. Two overhead concrete highway bridges, 13 arch culverts of 5 to 30 ft. span, four plate girder bridges, and one truss bridge have been built. Altogether, 18,500 cu. yds. of concrete masonry was built on this district, the work being done between April 1, 1913, and Jan. 1, 1914.

Milwaukee concrete batch mixers were used. A typical



Fig. 11—Standard 20x16-ft. Highway Under Crossing.

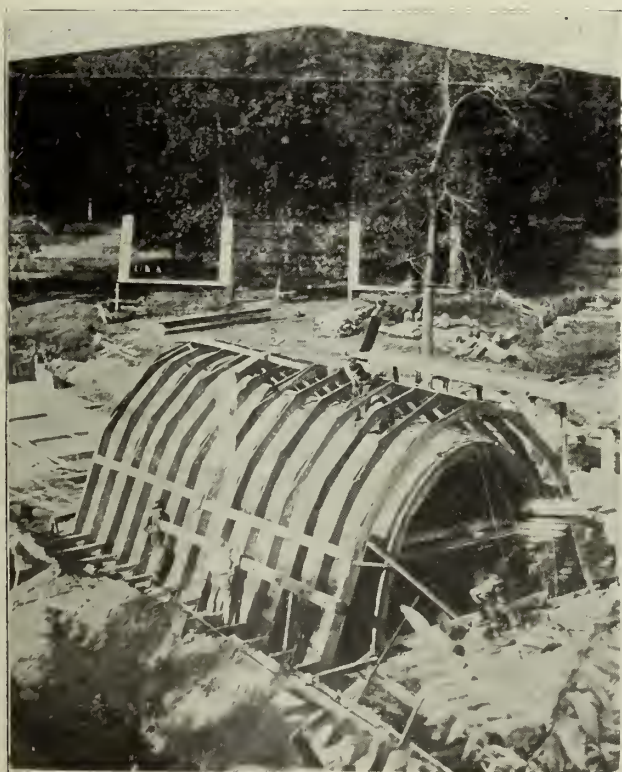
Fig. 13—Trestle for Marshall Fill, $\frac{3}{4}$ Mile West of Madrid, Iowa.Fig. 14—Reinforced Concrete 16x12½-ft. Arch Culvert $\frac{3}{4}$ Mile West of Madrid, Iowa.

Fig. 15—Forms for Culvert Shown in Fig. 14.

plant in operation is seen in Fig. 12. The material was dumped from the mixer into buckets and the latter hoisted by engine power and dumped into chutes for distributing about the forms. In the concrete trestle construction the piles were molded at the company's plant at Tomah, Wis., and transported to the work. Where the section of track was built alongside the old one the concrete slabs for these trestles were molded at a distance, at some convenient plant, transported to the site and set off with a derrick. Where both tracks were built on new location, the slabs were molded in place, in forms. Where the foundation was good, concrete piers (Figs. 32 and 33) were used to support the slabs, but on soft ground concrete piles, driven with a jet, were used to support the concrete slab deck.

The work on the district from Green Island to Oxford Jct. was in charge of Mr. F. H. Haskell; from Oxford Jct. to Elberon, Mr. J. F. Young had charge; from Elberon to Madrid, Mr. E. L. Sinclair was the engineer in charge; from Madrid to Coon Rapids it was in charge of Mr. G. S. Stayman and from Coon Rapids to Manilla, Mr. D. C. Fenstermaker. After July 1, 1913, Mr. J. Osmond was assistant engineer in place of Mr. Sinclair. Mr. W. E. Wood was the division engineer in supervision of the whole work. Mr. C. F. Loweth, in Chicago, is the chief engineer of the C. M. & St. P. Ry. under whose general supervision all of the work has been planned and built.

(To be continued.)

The work of electrifying the railway between Tokyo and Yokohama, Japan, is making steady progress. The roadbed is being widened to allow of four tracks—two for electric



Fig. 16—Forms for 36-ft. Concrete Arch at Aspinwall.

trains and two for steam trains. The power station which will supply the current is being established at Kamata. The motive power will be gas engines.

Extent of Excavations in the Anthracite Industry.

Excavations equal to the entire amount necessary to build the Panama canal have been made in the anthracite coal fields of Pennsylvania every year since the Panama canal was begun. The average number of net tons of coal produced from the anthracite mines during the years of 1904 to 1913 inclusive was approximately 81,000,000. Each long ton of this coal measured

at least one cubic yard in the vein. A long ton of 2240 pounds is over ten per cent more than a net ton of 2000 pounds.

The tonnage of coal therefore accounts for at least 90,000,000 of the 195,323,000 cubic yards of excavation originally necessary for the Panama canal. Add to this the fact that more rock and refuse than coal is hoisted out of the anthracite mines, and this accounts for another 100,000,000 cubic yards. Finally the gigantic strippings estimated by one contractor at 12,000,000 cubic yards a year, and the miles of drainage tunnels cut through the solid rock easily bring up the total annual cubic yardage of excavation to a total equal to, if not greater than, the total yardage of the Panama canal.

Convention of the American Railway Engineering Association

The fifteenth annual meeting of the American Railway Engineering Association was convened at the Congress hotel, in Chicago, at 9:45 a. m., Tuesday, March 17, by President Edwin F. Wendt, member of the engineering board, division of valuation, Interstate Commerce Commission. The attendance was large, even at the opening session. The address of the president in opening the meeting is published elsewhere in the Railway Review.

Secretary Fritch next read his annual report, in which it was shown that the membership at the beginning of this year was 1147, an increase of 81 during the past year. The excess of receipts over expenditures during the year was \$3531.48, and the balance on hand, Jan. 1, 1914, was \$14,276.74.

RULES AND ORGANIZATION.

Next in order was the presentation of the reports of standing committees, and the first taken up was that of Committee No. 12, on Rules and Organization. Mr. G. D. Brooks, superintendent, B. & O. R. R., chairman of the committee, presented the report. The report was taken up, rule by rule, and discussed, and the following revisions of the existing rules were passed:

Add to Rule 4 of "General Notice" the words: "They must familiarize themselves with the safety regulations of the road," making the rule to read: "Employees must exercise care and watchfulness to prevent injury to themselves, other employees and the public, and to prevent damage to property. In case of doubt they must take the safe course. They must know that all tools and appliances are in safe condition

before using. They must move away from tracks upon approach and during passage of trains, and, so far as practicable, prevent the public from walking on tracks or otherwise trespassing on the right of way. They must familiarize themselves with the safety regulations."

Revise Rule 13 under Rules Governing Track Supervisors, Supervisors of Structures and Signal Supervisors, as follows:

Present Rule: "They must know that foremen are provided with the rules, circulars, forms and special instructions per-



Fig. 17—Reinforcing Bars in Concrete Arch, C., M. & St. P. Ry.

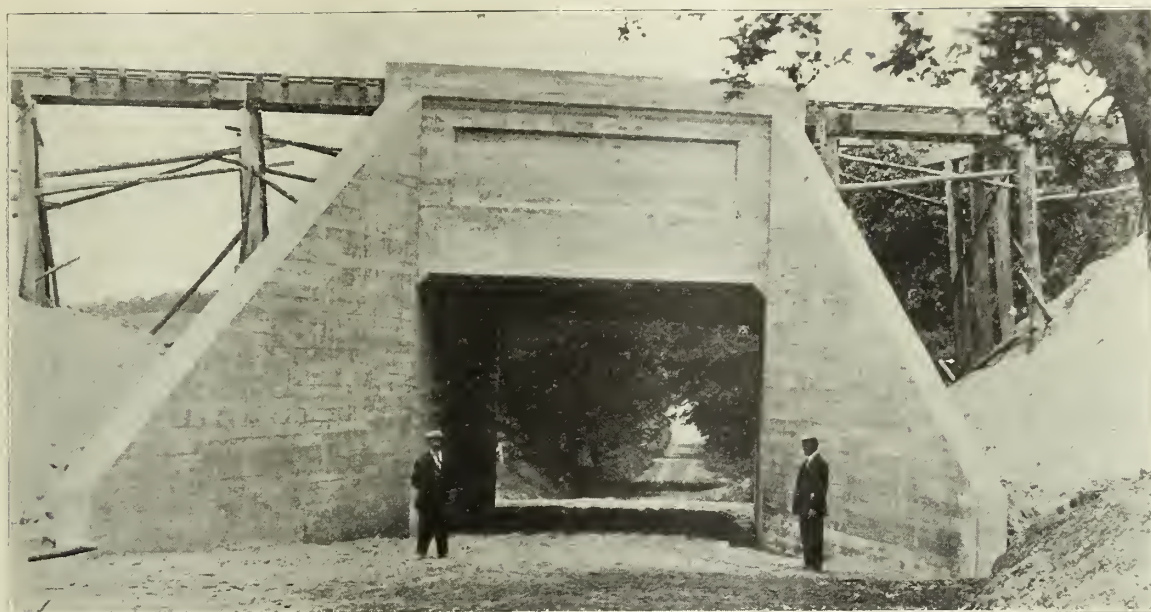


Fig. 18—Under Crossing, 20x16 ft., Near Cambridge.

taining to their duties, and that they fully understand and comply with them."

Proposed Rule: "They must know that foremen are provided with the rules, circulars, forms, special instructions and safety regulations pertaining to their duties, and that they fully understand and comply with them."

Add a rule under Rules Governing Foremen, to be under Track Foremen No. 18, Bridge and Building Foremen No. 11 and Signal Foremen No. 12, to read: "They must thoroughly understand the rules, circulars, forms, special instructions and safety regulations pertaining to their duties, and see that they are complied with."

Add to Rule 17 under Track Foremen: "They must give special attention to drainage through interlocking plants and where track circuits are used," making it read: "They must keep all interlocking pipe lines and trunking free from grass and weeds, and all switches, frogs and movable parts of interlocking plants free from snow, ice and other obstructions. They must give special attention to drainage through interlocking plants and where track circuits are used."

The following general rules, covering construction work, were presented with the recommendation that they be printed in the Manual, and were adopted.

General Notice.

(1) To enter or remain in the service is an assurance of willingness to obey the rules.

(2) The service demands the faithful, intelligent and courteous discharge of duty.

(3) Obedience to the rules is essential to the safety of passengers and employees, and to the protection of property.

(4) Employees must exercise care and watchfulness to prevent injury to themselves, other employees and the public, and to prevent damage to property. In case of doubt they must take the safe course. They must know that all tools and appliances are in safe condition before using. They must move away from tracks upon approach and during passage of trains, and, so far as practicable, prevent the public from walking on tracks or otherwise trespassing on the right of way. They must familiarize themselves with the safety regulations.

(5) Employees must do all in their power to prevent accidents, even though in so doing they occasionally perform the duties of others.

(6) Co-operation is required between all employees whose work or duties may be jointly affected.

(7) Anything that interferes with the safe passage of trains at full speed is an obstruction.

(8) Employees in accepting employment assume its risks.

(9) To obtain promotion, capacity must be shown for greater responsibility.

(10) Employees must not absent themselves from duty,



Fig. 19—Under Crossing on May Street, Manning, Ia., C., M. & St. P. Ry.



Fig. 20—Double 20x14 Highway Under Crossing, Main Street, Delmar Jct., Iowa.

exchange duties with others or engage substitutes without permission.

(11) Employees must conduct themselves properly at all times. They will be courteous to fellow-employees and the public.

Organization.

- (1) The Construction Department in each..... (Title)
(District or etc.).....is in charge of the.....

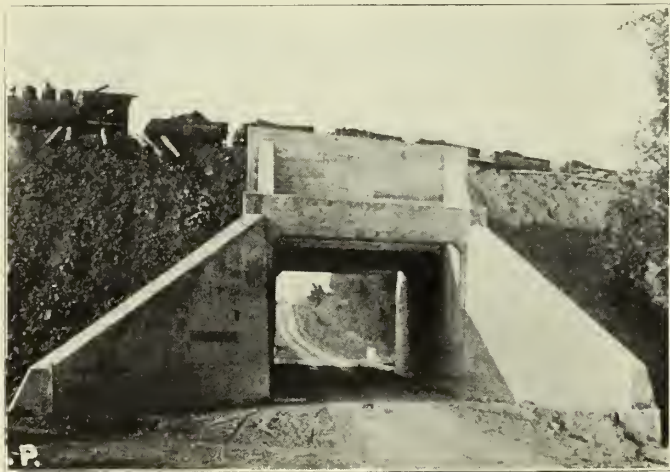


Fig. 23—Highway Under Crossing at Manning, Ia.

.....who will report to and receive instructions from the (Title)

(2) The work of the department will be sub-divided under the following heads:

- Preliminary Surveys, Chief of Party..... (or Title)
- Location Surveys, Chief of Party..... (or Title)
- Construction, Resident Engineer..... (or Title)

Rules Governing Chiefs of Party on Preliminary and Location Surveys and Resident Engineers.

- (1) Chiefs of Party } will report to and receive in-
Resident Engineers } (Title)

structions from the.....

(2) They are responsible for the prosecution of the work in accordance with the general rules and special instructions, and will make such reports as are required.

(3) They shall keep their parties up to the required strength and report any prospective vacancies to the..... (Title)

(4) They are responsible for the proper conduct of the members of their parties and must know that each man is competent to do the work required of him.

(5) They shall conform to the prescribed instructions, standards and plans in the execution of work under their charge.

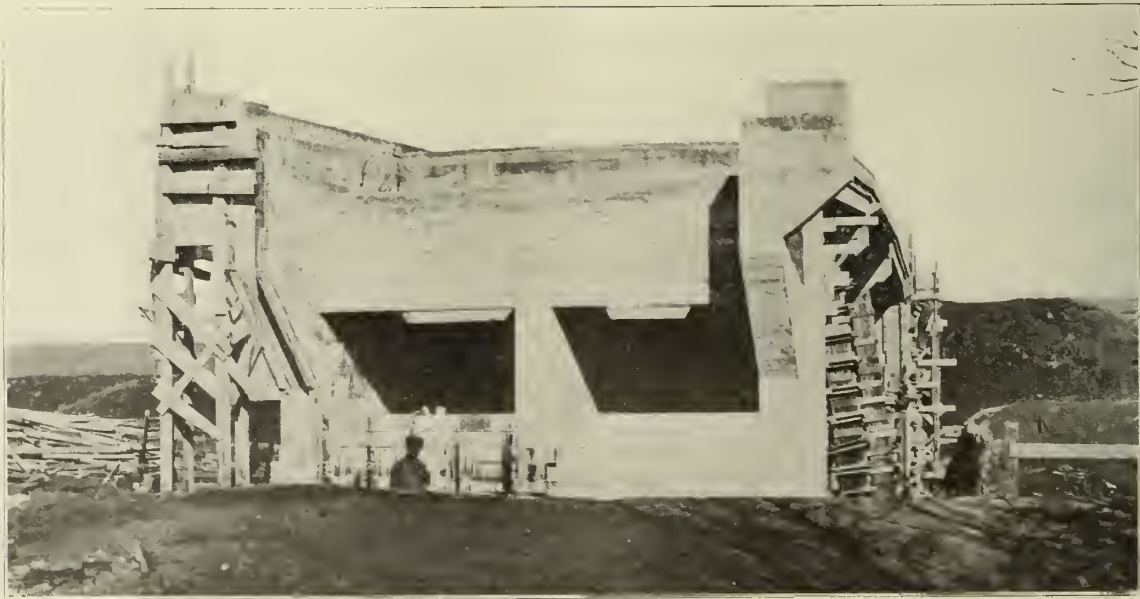


Fig. 21—Standard U-Abutment, Overhead Highway Bridge, Near Delmar, Iowa.

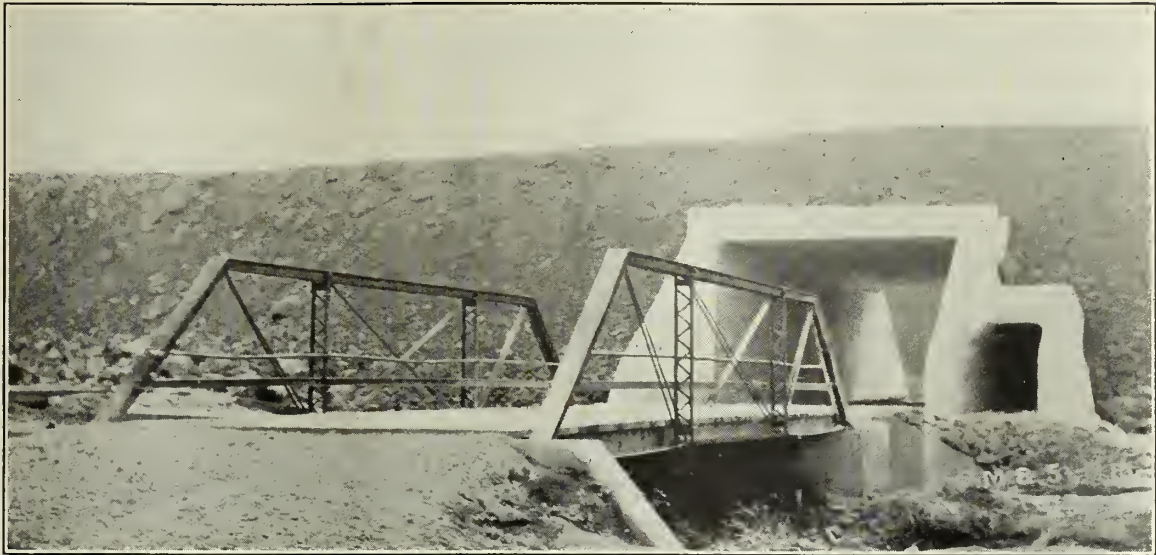


Fig. 22—Highway Under Crossing (20x14 ft.) and 5x6 ft. Cattle Pass Under 25 ft. Fill, Browns, Ia.

(6) They must keep their parties supplied with the instruments and materials necessary for the efficient performance of their work, and see that these are properly cared for and used.

(7) They must know that instruments are kept in proper adjustment and that the prescribed accuracy is attained in all their work.

(8) They must not give out information as to the object or character of their work and must refer all inquiries to the (Title)

(9) They shall keep themselves informed in regard to the work of other survey parties operating in their districts and
(Title)

report to the.....anything that will have an
influence on their work.

the rules, standards, circulars, forms, special instructions and safety regulations pertaining to their work, and that they are fully understood by the men to whom they apply.

(11) They shall keep a daily journal of the movements of their parties and the work done, and will enter therein current items of information of which it is advisable to keep record.

The committee reported progress in the study of the science of organization, and stated that a report had been made to the board of direction.

SIGNALS AND INTERLOCKING.

The report of the Committee on Signals and Interlocking was presented by the vice-chairman, Mr. C. C. Anthony, of the Pennsylvania R. R. A progress report was submitted on the subject of economics of labor in signal maintenance.

On the subject of requirements for switch indicators the



Fig. 24—Highway Over Crossing, State Street, Madrid, Iowa.

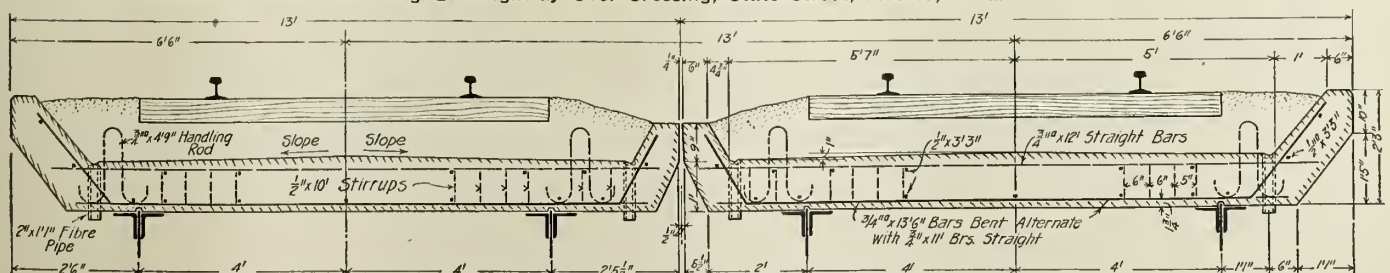


Fig. 26—Standard Concrete Deck for Double Track on Plate Girders, C., M. & St. P. Ry.

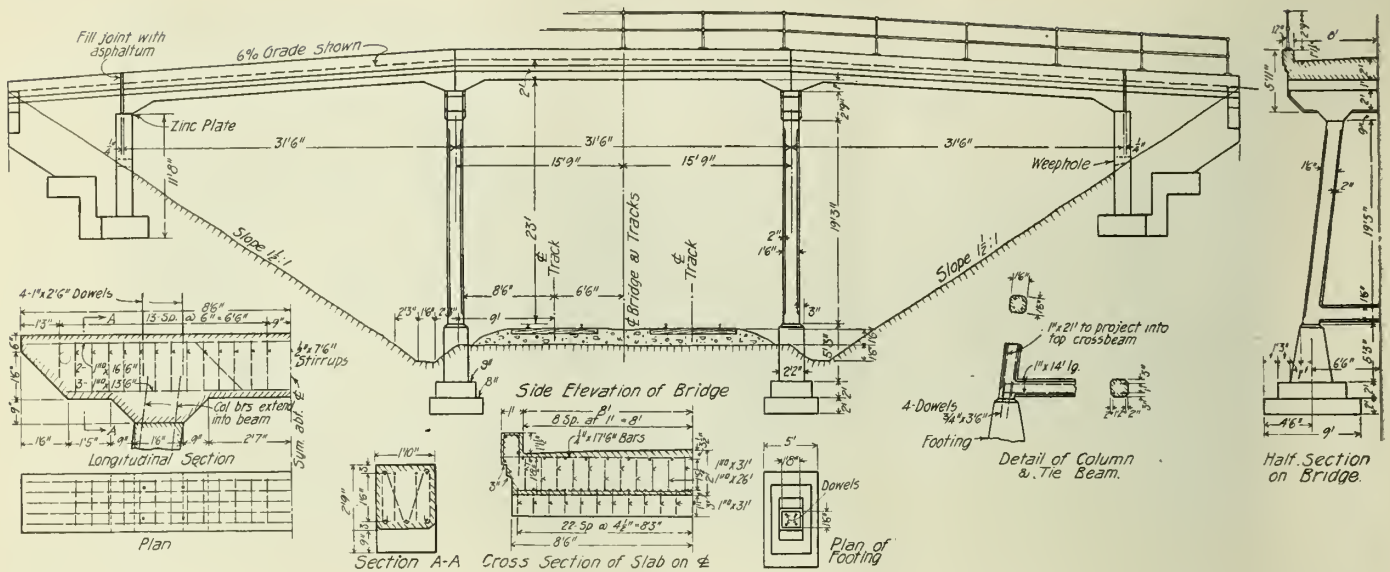


Fig. 25—General Plan of Typical Reinforced Concrete Overhead Highway Bridge, 16 ft. Roadway, C., M & St. P. Ry.

committee reported progress and asked that the subject be continued.

On the subject of automatic train control, which had been assigned to the committee, the following report was made:

"Because the American Railway Association has appointed a committee consisting of some of the ablest men in the engineering, transportation and mechanical departments to consider this question, the committee deems it inadvisable for this Association to undertake work in connection with this subject until report is made by the American Railway Association."

Proposed changes in symbols now shown in the Manual for signal and interlocking, in accordance with the symbols of the Railway Signal Association, were submitted and adapted, with the understanding that conference be had with the committee on records, reports and accounts in order to have the symbols of the two committees harmonize.

The States of Wisconsin, Illinois, Indiana and Minnesota having adopted certain rules with reference to the construction, maintenance and operation of interlocking plants, and these rules having also been adopted by the States of Missouri and Iowa, they were presented by the committee as information, with the understanding that they be published in the literature of the association, but not included in the Manual.

Suggestions were made by Mr. J. B. Jenkins and others that for next year's work the committee appoint a sub-committee to confer with a sub-committee of the committee on track, to consider the subject of economies in labor, with special reference to combining the labor of the two departments in the maintenance of signals.

YARDS AND TERMINALS.

The report of the committee on yards and terminals was presented by Mr. E. B. Temple, vice chairman. On the subject of typical situation plans of passenger stations, Mr. B. H. Mann, of the committee, stated that work on this subject had been industriously prosecuted by the members of a sub-committee. Arrangements are being completed for putting in use the diagrams submitted by the committee in its last report in some of our large terminals. This had not been carried to the extent which would allow a report to be made at this time. The committee, therefore, desired that the subject be carried over until its next report and called attention to an article on "The Traffic Capacity of Terminus Stations for Urban and Suburban Traffic," by G. Brecht, Berlin, published in *Elektrische Kraftbetriebe und Bahnen*, and re-

printed in Bulletin of the International Railway Congress, for November, 1913.

The subject of Developments in the Handling of Freight by Mechanical Means, with which the Committee had to deal, was divided into three classes: (1) the mechanical handling of freight at freight houses; (2) the mechanical handling of freight in general, at warehouses, piers, etc.; (3) the mechanical handling of railway baggage, mail and express matter. These three divisions of the subject are covered in the report, which was submitted as information without recommendation.

Mr. E. H. Lee, chief engineer of the Western Indiana R. R., responding to an invitation of the president to discuss the question of the mechanical handling of freight, said, among other things, that the extra handling required in applying some of the mechanical devices gotten up for this purpose was a matter that required very careful consideration. The rehandling in loading goods onto and off of trucks often eats up all of the expected saving.

Mr. A. Montzheimer reported for the sub-committee on

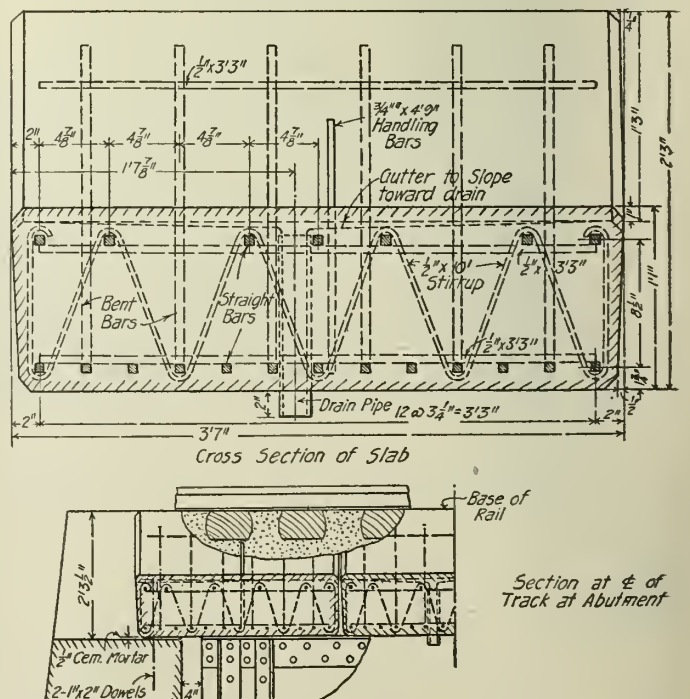


Fig. 27—Sections of Slabs in Concrete Deck for Plate Girders, C., M. & St. P. Ry.

hump yards. The yard selected for description in detail was that recently completed by the Canadian Pacific Ry., at Winnipeg. This sub-committee also submitted a list of 95 hump yards in service and under construction in the United States and Canada.

The report of the committee as a whole was submitted without recommendations and was received as information.

ROADWAY.

The report of the committee on roadway was introduced by Mr. W. M. Dawley, the chairman. One of the subjects assigned the committee was that of unit pressures allowable on roadbed of different materials, and on this a sub-committee reported that, to be able to make any definite recommendations as to allowable unit pressures on roadbed the following points or facts must be determined:

standard-length ties at points where the area of subgrade covered by the ballast is insufficient to support the present or a proposed increase in weight of rolling stock.

(b) The detection and possible elimination of unnecessary and indeterminate stresses in the rail due to variations in the supporting power of the subgrade soil.

(c) The reduction of maintenance charges by a better understanding of the causes of irregular depression of the track superstructure under traffic.

(d) In new locations the engineer knowing the bearing power of the soils encountered may compare a longer line with low maintenance with a shorter line over soils of less bearing power and consequent higher maintenance charges.

"The principal benefits to be derived are an increase in safety of operation and a decrease in cost of maintenance.

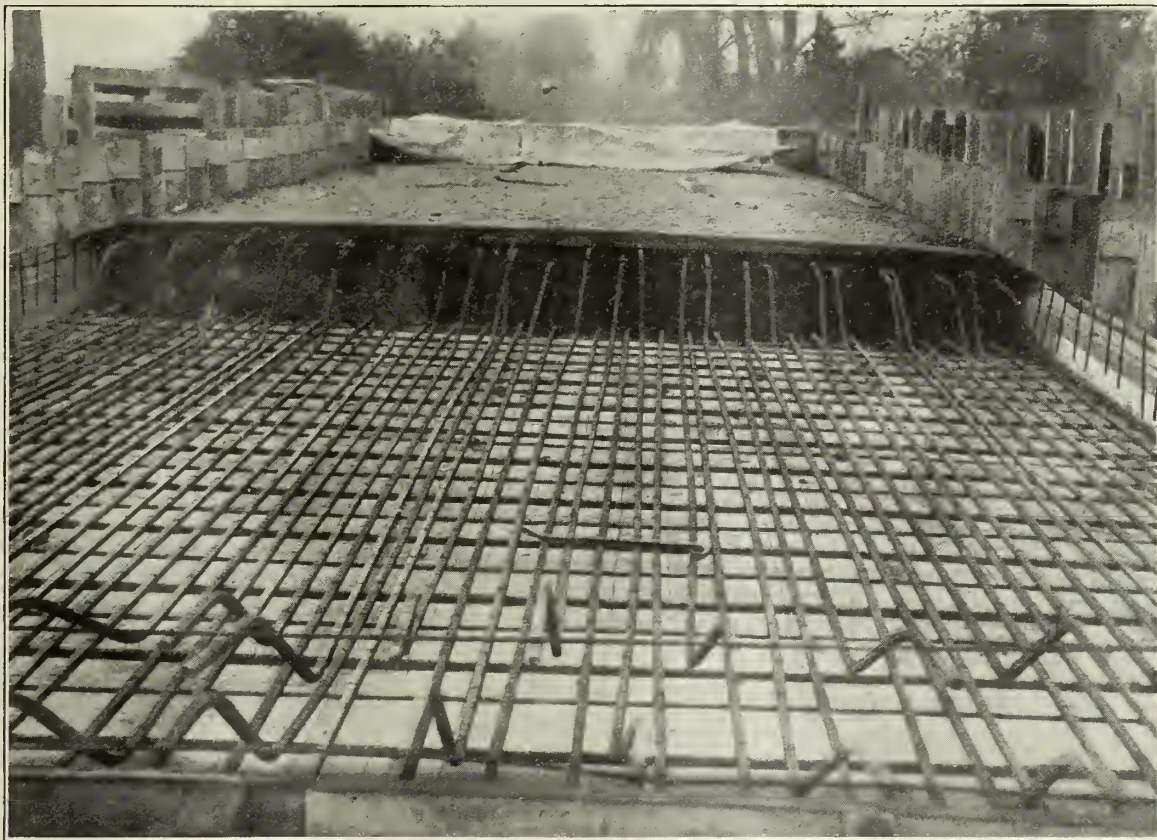


Fig. 28—Method of Placing Reinforcing Bars in Floor of Overhead Highway Bridges.

(a) The distribution of the wheel load and impact among the several ties and its variations due to different weights of rail, tie lengths and spacing.

(b) The distribution and variation of this load throughout the ballast from the bottom of the tie to the subgrade for various kinds and depths of ballast.

(c) The ability of subgrade soils of various physical characteristics to withstand the load imposed by the ballast.

(d) A classification of subgrade soils or such minute and detailed description of each kind that they may be readily identified.

(e) A determination, experimentally, of the mechanics of the problem of supporting a load on a soil plane, such as the ballast on the subgrade or an embankment on a level plane.

The objects to be obtained by determining the allowable unit pressures on roadbed are:

(a) A more rational design of track superstructure based upon a definite knowledge of the value and distribution of the forces involved, such for instance as determining the proper length and section of metal ties to replace the present

"Sufficient preliminary discussion has been had to determine that nothing further can be done toward defining allowable unit pressures on roadbed till experiments under actual traffic conditions have been made.

"A special committee has been appointed and arrangements made for a fund sufficient to start the experimental work. (See American Railway Engineering Association Bulletin 161, Association Affairs, page 3.) In case these funds should prove insufficient due to an enlargement of the scope of the investigation, it is the sense of this committee that a prorata assessment on a mileage basis be made against the railways represented in this association. This levy would at the rate of four-tenths of one cent (\$0.004) per mile for each thousand dollars (\$1,000) additional required, amount to only \$70 for the largest system represented."

The discussion brought out various ideas as to the practical value of the results of the proposed experiments. Several thought that the most effective use of data to be had in this way might possibly be to influence railway managements to authorize a more liberal supply of ballast. Mr. J. D. Sullivan (Canadian Pacific Ry.) said that he doubted

whether any data from such experiments would be of educational value to engineers, however valuable they might be as the basis of argument with managing officials in striving to get sufficient ballast for the track.

On tunnel construction and ventilation the committee submitted the following conclusions:

(1) Railway tunnels, as ordinarily constructed in the United States, are more economically built by driving first the heading entirely through, but such method usually requires a greater length of time for completion of the tunnel;

(2) For material requiring support, the top heading should be usually driven.

(3) It is economical and expedient to use an electric shovel or an air-shovel, for the removal of the bench where the section of the tunnel permits the safe operation of the same; and where the material does not require support there are advantages in low cost and quick removal of the bench in driving the heading at the subgrade line.

(4) Where the time limit is of value, the heading and bench should be excavated at the same time, the heading being kept about 50 ft. in advance of the bench. Where the material of roof is not self-supporting and timbering is to

WOODEN BRIDGES AND TRESTLES.

The report of the committee on Wooden Bridges and Trestles was presented by the chairman, Mr. E. A. Frink, bridge engineer of the Seaboard Air Line R. R. The committee offered as recommendations the following amendments of conclusions in the Manual, which, after a good deal of discussion on the subject of the necessity of inner guard rails on bridges, were adopted.

(1) Amend conclusions 2, as adopted at the last annual meeting, to read as follows: "It is recommended as good practice, in the installation of inner guard rails, to extend them beyond the ends of the bridges for such distance as is required by local conditions, but that this distance, in any case, be not less than 50 ft.; that guard rails be fully spiked to every tie, and spliced at every joint; that the guard rails be some form of metal section; and that the ends be beveled, bent down, or otherwise protected against direct impact with parts of moving equipment."

(2) Adopt conclusion 5 to read as follows: "It is recommended as good practice to use inner guard rails on all open-floor, and on the outside tracks of all solid-floor,



Fig. 29—Concrete Slabs on Deck Plate Girders for Ballasted Floor, C., M. & St. P. Ry.

be resorted to, the bench should not be removed until the wall-plates are laid and the arch ribs (or centering) safely put up.

(5) Opposing grades should not meet between the portals of a tunnel, so as to put a summit in the tunnel, and where practicable, the alignment and ascending grades in the tunnel should be in the same direction as the prevailing winds.

(6) The attached drawings, Plates I, II and III (not here shown), are representative of American practice in single-track tunnel construction, where the time limit is of value.

Tunnel Ventilation.

The most practicable, effective and economical artificial ventilation for tunnels carrying steam-power traffic is to be obtained by blowing a current of air into one end of the tunnel for the purpose of removing, or of diluting and removing, the smoke and combustion gases at the opposite end. As practiced in America, this way of procuring ventilation partakes of two methods:

(a) To blow a current of air in the direction the train is moving and with sufficient velocity to remove the smoke and combustion gases ahead of the engine:

(b) To blow a current of air against the direction of the train with velocity and volume sufficient to dilute the smoke and combustion gases to such an extent as not to be uncomfortable to the operating crews and to clear the tunnel entirely within the minimum time limit for following trains.

The principal discussion was on the question of broken grades in tunnels, and the consensus of opinion was decidedly opposed to having summits come within tunnels.

bridges and similar structures longer than 20 ft. in main-line tracks, and on similar bridges and structures in branch-line tracks on which the speed of trains is 20 miles per hour or more."

IRON AND STEEL STRUCTURES.

The report of the committee on Iron and Steel Structures was introduced by the chairman, Mr. A. J. Himes, valuation engineer of the New York, Chicago & St. Louis R. R. The matter submitted in the report relates to the following subjects:

Methods of Protection of Iron and Steel Structures Against Corrosion.

Column Tests.

Secondary Stresses.

Requirements for the Protection of Traffic at Movable Bridges.

Bridge Clearance Diagram.

The following requirements for the protection of traffic at movable bridges were submitted for approval and inclusion in the Manual:

"The protective appliances at drawbridges consist in devices for insuring that the bridge is in proper position, and the track in condition for the passage of trains over draw, or for reduction to a minimum of the damage in case of trains not stopping when track is not in condition for passage of same over draw; also the usual devices for protection against damage in case of derailment.

"The protective devices may be classified under the headings:

"(A) Interlocking power and bridge devices.

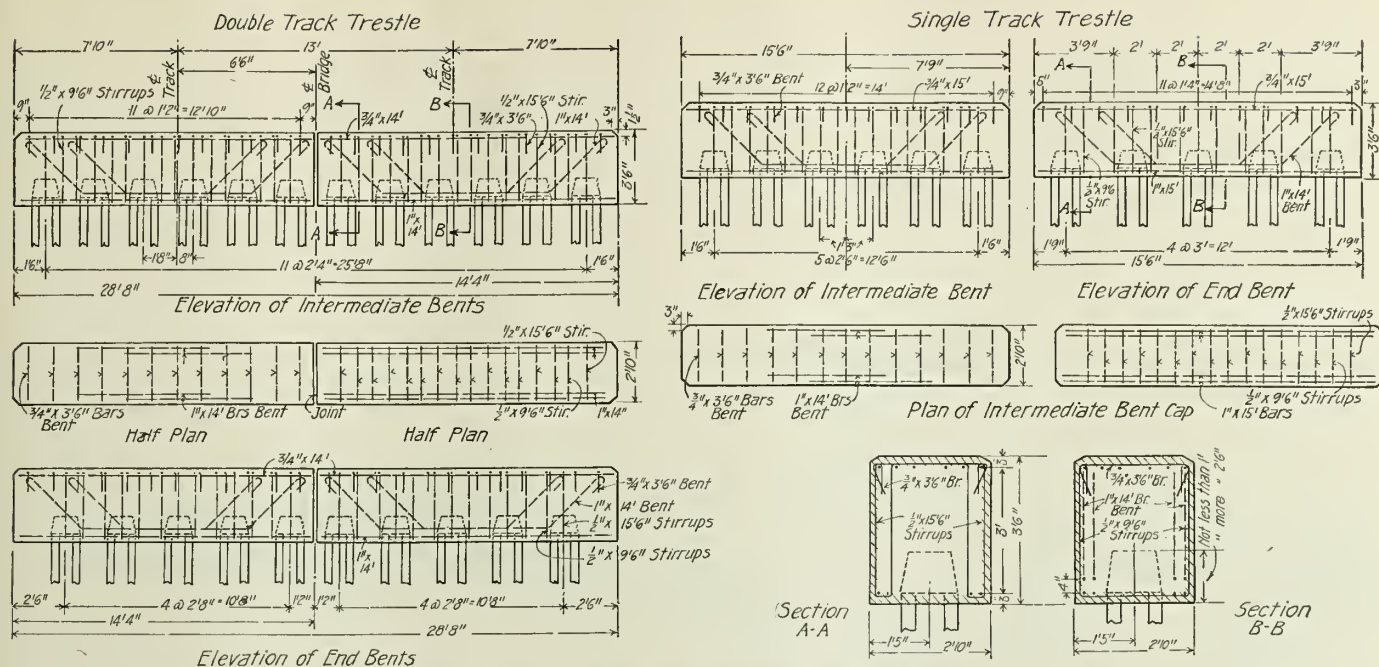


Fig. 30—General Plans of Standard Reinforced Concrete Pile Trestle Bents, C., M. & St. P. Ry.

- “(B) Bridge surfacing, aligning and fastening devices.
- “(C) Rail end connections.
- “(D) Signaling and interlocking.
- “(E) Guard rails.

“(A) Interlocking Power and Bridge Devices.—Interlocking the drawbridge devices so that their movements must follow in a predetermined order to protect the drawbridge machinery.

“(B) Bridge Surfacing, Aligning and Fastening Devices.—Drawbridges should be equipped with proper mechanism to surface and align them accurately and fasten them securely in position. This condition can be secured by the use of efficient end lifts in case of swing bridges, and by proper end locks in case of lift bridges.

“(C) Rail End Connections.—Rail ends should be connected by sliding sleeve or joint bars, or by easer rails to carry the wheels over the opening between the end of bridge and approach rails.

“(D) Signaling and Interlocking.—If trains are to proceed over drawbridges which are in service, without first stopping,

interlocking should be installed which will provide that the draw span, tracks and switches within the limits of the plant are locked in the proper position. This will require:

- “(1) Locking drawbridge devices.
- “(2) Locking providing for the proper order of operation of signaling devices, such as signals, switches and derails.

“This interlocking will require the following order of operation:

Before Opening a Drawbridge.

1. Display stop signals.
 2. Unlock rail and bridge devices.
- Before Operating Trains Over Drawbridge.
1. Lock bridge and rail devices.
 2. Display clear signals.

“Since there are various types and designs of drawbridges and various drawbridge devices for each of the types, and also various designs and types of signaling devices, as well as various locations from which they all may be interlocked and operated, a typical example only of the detail order of

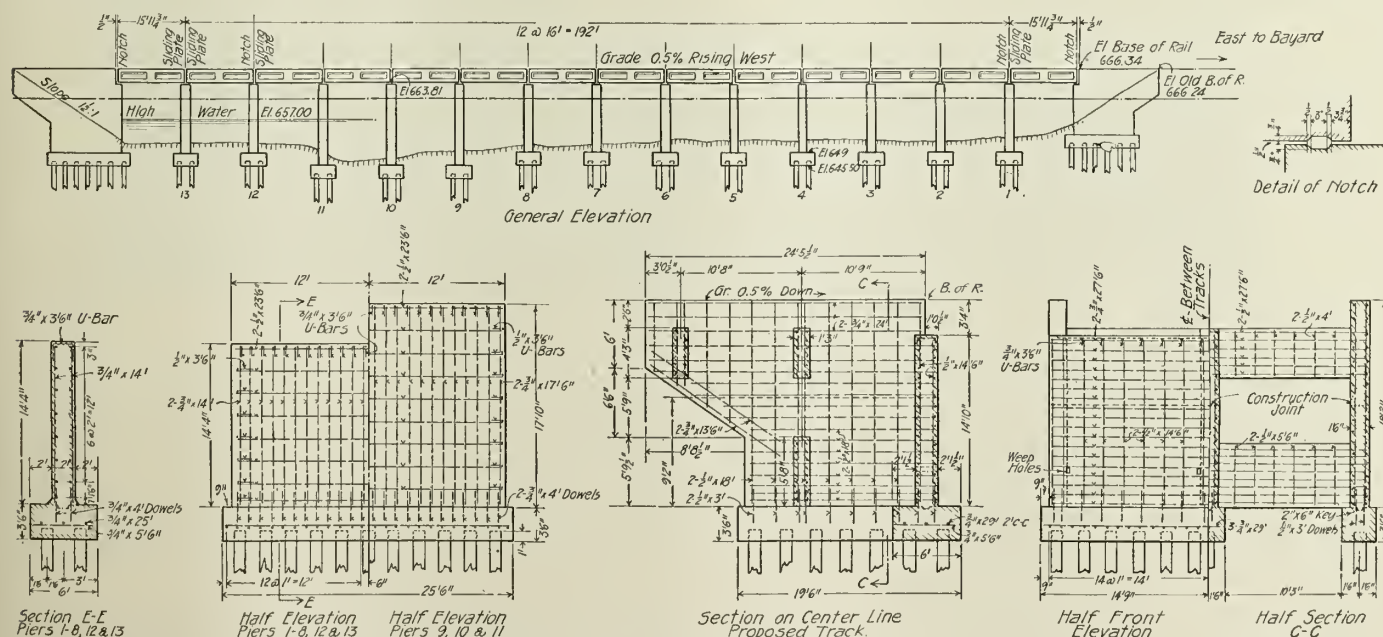


Fig. 31—Reinforced Concrete Double-Track Trestle, Fourteen 16-Foot Spans, 2 1/4 Miles West of Bayard, Ia., C., M. & St. P. Ry.

operations is given; viz., a swing bridge with all its devices operated from one location on the draw span, having home and distant signals, derails, etc.

To Open Drawbridge.

1. Display stop signals.
2. Unlock derails.
3. Open derails.
4. Uncouple interlocking connections.
5. Unlock rail end connections.
6. Unlock bridge surfacing, aligning and fastening devices.
7. Withdraw rail end connections.

should be constructed in accordance with Railway Signal Association's standards, and the various bridge devices should be so designed that standard interlocking apparatus may be used.

"Insulation of Rails and Attachments.—The rails and attachments should be separated from the metallic structure so track circuits may be successfully operated the entire length of the bridge."

There was a good deal of discussion of Paragraph (c), in which the committee had recommended square-cut ends and had excluded any approval of the miter-end rail. Mr. A. H. Rudd, Pennsylvania R. R.; Mr. G. J. Ray, Delaware, Lacka-



Fig. 32—Type of Concrete Trestle, with Ballasted Deck, C., M. & St. P. Ry.

8. Withdraw bridge surfacing, aligning and fastening devices.

9. Open bridge.

To Pass Trains Over Drawbridge.

1. Close bridge.
2. Insert bridge surfacing, aligning and fastening devices.
3. Insert rail end connections.
4. Lock bridge surfacing, aligning and fastening devices.
5. Lock rail end connections.
6. Couple interlocking connections.
7. Close derails.
8. Lock derails.
9. Display clear signals.

"Derails.—The above example of order of operation includes derailing switches, but their use is not recommended in all cases. Each situation must be given special study with respect to (a) the use of derails, smash boards or similar devices; (b) their location with respect to draw span, and (c) the use and length of guard rails.

"(E) Guard Rails.—There should be two lines of guard rails of rail section, placed between the running rails, which should extend from the approaches continuously over the bridge, except for the necessary breaks at the ends of the draw span. The top of the guard rails should preferably be level with the top of the main rail and not in any case more than one inch below it. There should be a clear space of ten inches between the head of the guard rail and the gage side of the main rail. The guard rails should be full spliced and bolted and be fastened at the same intervals and by the same methods as the main rail. Obstructions to derailed wheels which are guided by the guard rails should be reduced to a minimum. The guard rails should be brought together at a point not less than 75 feet beyond the ends of the bridge, the ends of the rails to be beveled or otherwise effectively formed so that dragging objects will be deflected. When traffic is in one direction, the guard rails should be extended as described on the approaching end of the bridge only.

"Electric and Time Locking.—Electric and time locking are regarded as adjuncts.

"Railway Signal Association's Standards.—The interlocking

wanna R. R.; Mr. C. H. Stein, Central R. R. of New Jersey and others spoke emphatically of satisfactory experience with miter-end rails for movable bridges and of their preference for this type of rail end over the square end. It was pointed out that with proper interlocking there was no danger that signals could be cleared to permit traffic over a bridge where the lifted rails had failed to return to their seats. After discussion, the meeting voted for an amendment by Mr. Rudd, which left the paragraph in the above amended form, wherein either square-end or mitered rails are permitted.

Paragraph (E), on Guard Rails, being unsatisfactory to several members, an amendment was offered by Mr. A. W. Carpenter, whereupon the committee requested that the whole subject of requirements for the protection of traffic at movable bridges be referred back to the committee for reconsideration; and this request was granted by vote of the convention.

The following revisions of the Manual were adopted by the convention:

Paragraph 23 of "Instructions for the Inspection of the Fabrication of Steel Bridges," page 88, of Volume 14 of the Proceedings, amended to read as follows:

"23. Have the assembling of trusses and girder spans required by the specifications carefully done and in any case insure the accuracy of field connections. If a large number of duplicate parts are to be made the number of parts to be assembled should be governed by the workmanship. If errors are found, a sufficient number of parts should be assembled to make it reasonably certain that such errors have been eliminated."

The following additional clauses for the inspection of the fabrication of steel bridges:

"1. Check every finished member against the drawings for its general dimensions and for the section of each piece of material forming a component part of the member.

"2. Attend the weighing of material whenever practicable, especially that purchased on weight basis. Check the accuracy of the scales with test weights or by other sufficient means."

MASONRY.

The report of the Committee No. 8, on masonry was presented by the chairman, Mr. G. H. Tinker, bridge engineer of

the New York, Chicago & St. Louis Ry. The following conclusions on water-tight concrete construction were offered for adoption:

(1) Water tight concrete may be obtained by proper design, reinforcing the concrete against cracks due to expansion and contraction, using the proper proportions of cement and graded aggregates to secure the filling of voids and employing proper workmanship and close supervision.

(2) Membrane waterproofing, of either asphalt or pure coal-tar pitch in connection with felts and burlaps, with proper number of layers, good materials and workmanship and good working conditions, is recommended as good practice for waterproofing masonry, concrete and bridge floors.

(3) Permanent and direct drainage of bridge floors is essential to secure good results in waterproofing.

(4) Integral methods of waterproofing concrete have given some good results. Special care is required to properly proportion the concrete, mix thoroughly and deposit properly so as to have the void-filling compounds do the required duty; if this is neglected, the value of the compounds is lost and their waterproofing effect destroyed. Careful tests should be made to ascertain the proper proportions and effectiveness of such compounds.

Integral compounds should be used with caution, ascertaining their chemical action on the concrete as well as their effect on its strength; as a general rule, integral compounds are not recommended, since the same results as to water-tightness can be obtained by adding a small percentage of cement and properly grading the aggregate.

(1) Surface coating, such as cement mortar, asphalt or bituminous mastic, if properly applied to masonry reinforced against cracks produced by settlement, expansion and contraction, may be successfully used for waterproofing arches, abutments, retaining walls, reservoirs and similar structures; for important work under high pressure of water these cannot be recommended for all conditions.

(6) Surface brush coatings, such as oil paints and varnishes, are not considered reliable or lasting for waterproofing of masonry.

As the result of a discussion by Mr. Maurice Coburn, wherein

(3) Cinders should not be used for concrete in which reinforcing metal is embedded.

(4) Reinforcing metal should not be painted, but should be thoroughly covered and protected with concrete when in place.

TRACK.

The report of Committee No. 5, on Track, was presented by the chairman, Mr. J. B. Jenkins, of the Baltimore & Ohio R. R.

The committee presented typical plans (Nos. 8, 11 and 16) for crossovers, as representing good practice, and those were adopted.

Five diagrams of the speed of trains through curves and level turnouts, presented for inclusion in the Manual, were adopted.

The following table, showing relative speeds through level turnouts, to give the equivalent riding condition to track elevated three inches less than theoretically required, was adopted:

Turnout		Speed
Frog Number	Length of Switch	Miles per Hour
4	11	9
5	11	12
6	11	13
7	16.5	17
8-10	16.5	20
11-14	22	27
15	33	37
16-24	33	40

Corrections to the table of Theoretical and Practical Switch Leads were adopted for revision of the Manual.

The following items were, by request of the committee, received as information:

(1) Typical plans of Nos. 8, 11 and 16 double-slip crossings.

(2) Cleveland, Cincinnati, Chicago & St. Louis R. R. plan of standard No. 8 double-slip switch.

(3) The report on "Speeds of Trains on Curves and Turnouts."

The committee recommended receiving as a progress report the report on Economics of Track Labor and for recommitment for further study: (1) Typical plans for double-slip crossings, double crossovers and guard rails; (2) Relation between worn flanges and worn switch-points; (3) Economics of Track Labor, and the recommendation was adopted.

Mr. E. R. Lewis, assistant to general manager, Duluth, South



Fig. 33—Concrete Trestle and Deck Plate Girders, with Concrete Slab Floors, C., M. & St. P. Ry.

a number of objections were raised against Conclusion 2, that conclusion was withdrawn.

The following conclusions in reference to disintegration of concrete and corrosion of reinforced metal were offered and adopted:

(1) Concrete to be exposed to the action of sea water or alkali waters or gases containing sulphur, or in which reinforcing metal is embedded, should be dense, rich in Portland cement and allowed to harden under favorable conditions before such exposure.

(2) Concrete to be in contact with alkali waters should be made with aggregates inert to the alkalis in the water.

Shore & Atlantic Ry., speaking of the committee's progress report on economics of track labor, expressed some misgivings on the proposition of combining the work of several departments in maintenance of way, unless some radically different system of selection of section foremen was adopted. Mr. E. T. Howson, President Wendt and Hunter McDonald spoke approvingly of the proposal of the committee to take up the question of recommending a change in the beginning of the fiscal year from July 1 to January 1.

ELECTRICITY.

The report of the committee on electricity was presented by Mr. G. A. Harwood, of the New York Central & Hudson River

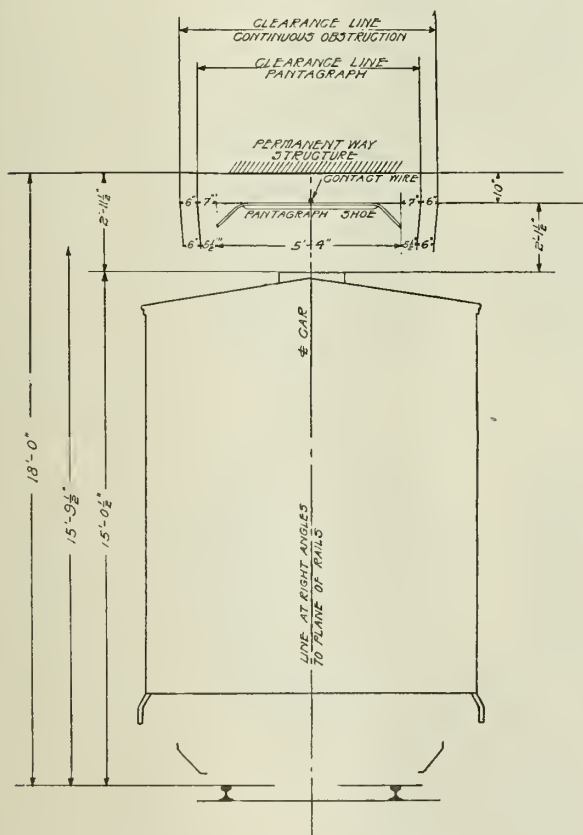
The following conclusions as to methods of accurately determining the absorption of creosote oil were adopted for the Manual:

(1) At railroad plants the absorption should be based on the treatment which will give the most complete penetration for each class or kind of timber, specifying complete penetration of the sapwood and as much of the heart as possible for the particular species or charge; payment to be based on the amount of oil used, plus operating and other charges.

(2) Where railroads have their work done by contract, gallons should be specified for ties, posts, cross-arms and other material of uniform size, and pounds per cubic foot for other material; the same requirements as to sap and heart penetration to be applied as in the above.

GRADING OF LUMBER.

The special committee on Grading of Lumber, through Dr. Hermann Von Schrenk, chairman, made a progress report.



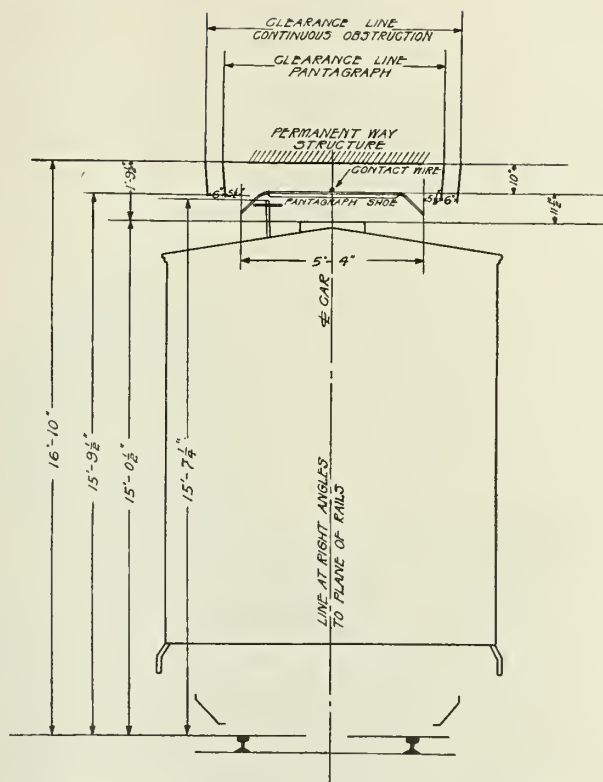
CASE NO. 3—NORMAL MINIMUM CLEARANCE WITHOUT TRAINMAN ON CARS.

ASSUMPTION.

Normal distance car running board to wire. 2 ft. 1½ in.

He explained that during the past year the committee had been engaged in trying to formulate additional grading rules for such classes of lumber as have not yet been standardized. The work had unfortunately been retarded, owing to the fact that many of the rules for such timbers, particularly hemlock and western timbers, were still in a process of development. It was, therefore, not thought advisable to force the formulation of such rules by the committee, but to await their definite adoption by the associations manufacturing such classes of lumber. It was anticipated that the rules for hemlock and some of the Pacific Coast timbers will be in shape for presentation at the next convention.

The committee reported progress in general acceptance of rules already in the Manual. A recent communication was received from one of the largest associations manufacturing lumber, advising that the changes made in the rules as adopted by this Association last year were very slight. The committee would therefore urge all members to use these rules in the purchase of maintenance of way lumber.



CASE No. 4—SPECIAL MINIMUM CLEARANCE WITHOUT TRAINMAN ON CARS.

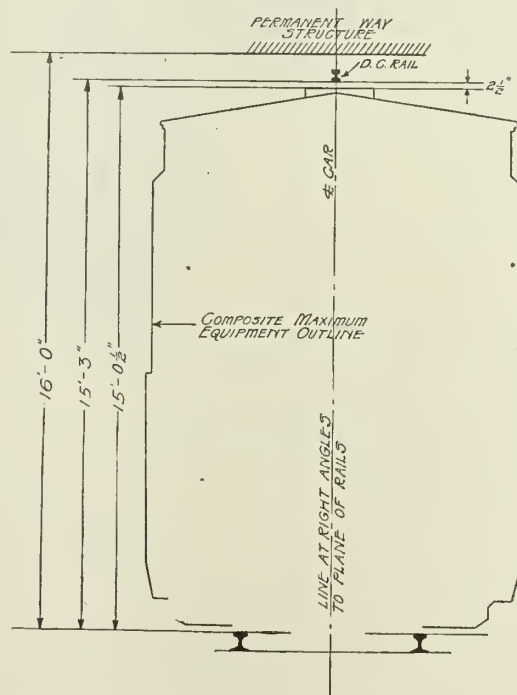
ASSUMPTION

Minimum distance car running board to wire.....0 ft 11½ in.

WATER SERVICE.

The report of the committee on Water Service was presented by the chairman, Mr. A. F. Dorley, engineer of water service, Missouri Pacific Ry. The matter submitted was intended for information only, and covered the subject of "Water Treatment and Result of Study being made of Water Softeners from An Operating Standpoint." The report on this subject was divided into three sub-headings:

(1) Economy of water treatment.



CASE NO. 5—MINIMUM CLEARANCE D. C. OVERHEAD.

ASSUMPTION

Minimum distance car running board to rail.....0 ft. 2½ in.



John F. Wallace.

George W. Kittredge.

Hunter McDonald.

Howard G. Kelley.

A. W. Johnston.

Walter G. Berg.

William McNab.

L. C. Fritch.

W. C. Cushing.

Chas. S. Churchill.

Past Presidents of American Railway Engineering Association—
From Bulletin of the Association for March.

(2) Present situation as to water treatment on railroads.

(3) General rules for the installation and operation of water softeners, and the use of treated water, based on a study of water softeners from an operating standpoint.

BUILDINGS.

The report of Committee No. 6, on Buildings, was presented by the chairman, Mr. Maurice Coburn, of the Vandalia R. R. Reports were presented on "Principles Covering Design of Inbound and Outbound Freight Houses" and on "The Advantages and Disadvantages of the various Designs of Freight House and Shop Floors." The report first named was approved for publication in the Manual, and the other was received as information.

A statement summarizing some of the important points in the report on Roofing, pages 839 to 878, Vol. 14, of the Proceedings, was made, and was accepted to replace the present conclusions regarding that subject in the Manual.

RAIL.

The report of Committee No. 4, on Rail, was presented by Mr. J. A. Atwood, chief engineer of the Pittsburgh & Lake Erie R. R. A sub-committee, through Mr. R. Trimble, made a progress report on sections. He explained that the committee had met with some difficulty in finding definite information on the merits of the two series of sections ("A" and "B") of the American Railway Association. Only a few roads had made experiments in this direction and as the reports, all told, were somewhat conflicting, the formulation of conclusions from the data at hand was not easy. The sub-committee had observed an unfortunate tendency in railways to vary in slight details from standard sections, from which there was a prospect that, unless this sort of thing was stopped, the situation with rail sections was liable to become as chaotic as it was before the adoption of the Am. Soc. C. E. sections.

Mr. W. B. Storey, A., T. & S. F. Ry., said that his road had modified the base width of one of the A. R. A. sections, in order to adapt the new rail to tie plates already in the track which had been used with a rail of different section.

Mr. W. H. Courtenay, chief engineer of the Louisville & Nashville R. R., spoke at some length on the failure of rails by transverse fissures. He was of the opinion that the explanation of failures of this class by lack of strength of the rail was not sufficient. He had found, for illustration, that 70-lb. rails rolled in the same mills with, and of the same metal as, 80-lb. rails, were used without development of transverse fissures, whereas the heavier rails had, under locomotives of the same weight and under conditions otherwise similar, did fail by such fissures. The committee stated that it had the subject of transverse fissures under investigation.

The report included a revision of the specifications for carbon steel rails, and these were approved for printing in the Manual. A revised form (M. W. 408), for "Statement of Rail Failures," was presented and adopted for use and substitution in the Manual for the present standard forms M. W. 408 and 411.

Recommended drilling of 4-hole and 6-hole angle bars, shown on page 157 of the report, was adopted as standard.

The election of officers for 1914-15 resulted as follows:

President, W. B. Storey, vice-president, A., T. & S. F. Ry.; Vice-President, A. S. Baldwin, Illinois Central R. R.; Secretary (re-elected), E. H. Fritch; Treasurer, (re-elected), Geo. H. Bremner, assistant district engineer, Interstate Commerce Commission.

Directors: Earl Stimson, B. & O. R. R.; C. Dougherty, C. N. O. & T. P. Ry.; G. J. Ray, D. L. & W. R. R.

Nominating Committee: C. Frank Allen, John V. Hanna, Maurice Coburn, J. B. Jenkins, and C. C. Anthony.

TIES.

The report of Committee No. 3, on Ties, was presented by the chairman, Mr. L. A. Downs, superintendent with the Illinois Central R. R. The committee reported on three of the four subjects assigned to it. On the question of "The Effect of the Design of Tie Plates and Spikes on the Durability of Ties," the committee had collected a good deal of data from actual experience, and the consensus of opinion seemed to support certain ideas, which the committee reported as follows:

(a) Plates with deep ribs or claws cut the tie so as to admit moisture and decay. The deep ribs or claws are not necessary to hold the plate in position and are undesirable.

(b) Flat-bottom plates used with cut spikes become loose and the looseness results in mechanical wear of the tie. They are satisfactory when used with screw spikes.

(c) Plates with cross-ribs not over $\frac{1}{8}$ in. deep or other independent fastenings that will hold them to the tie, do



Photo by Matzene, Chicago.

J. A. Atwood, Chief Engineer, Pittsburgh & Lake Erie R. R.; Director American Railway Engineering Association.

not seriously damage the tie and at the same time do not become loose and cause mechanical wear when used with ordinary cut spikes.

(d) The width of the tie plate is an element to determine the mechanical wear of the tie, less than 7 in. wide, for use with softwood ties cut into the tie sufficiently in some cases to determine the life of the tie.

(e) The plates should be of sufficient thickness to avoid cupping on either side of rail. This thickness depends on the projection beyond the rail, the amount of traffic, the kind of tie and the rate of deterioration from rust, etc.

(f) Screw spikes prolong the life of ties over that obtained with cut spikes.

(g) Where treated ties are used, all boring should preferably be done previous to treatment.

(h) Ordinary driven cut spikes, by breaking down the structure of the wood for an inch or so around the spike, facilitate decay at that point where greatest strength of the tie is required. In the case of treated ties, this introduction of decay below the treatment may defeat the purpose of treatment.

(i) The breaking down of the structure of the wood, with the use of cut spikes, is, to a considerable extent, avoided

where the spike is driven in a bored hole. Spikes so driven have at least the same holding power as spikes driven without boring. Where spike holes are to be bored and cut spikes used, the diamond-pointed cut spike is preferable, because of the greater ease with which it follows the hole.

A long discussion followed on the relative merits of drive and screw spikes as affecting the life of ties. Mr. R. Trimble, chief engineer maintenance of way, Pennsylvania Lines West, said that experiments with screw spikes under very heavy traffic, that he had observed, were not promising of better results than were usually had with drive spikes. Final conclusions as to this, however, have not been drawn. Other experiments where screw spikes have been tried under lighter traffic have shown better results with that device.

Mr. G. J. Ray, chief engineer, Delaware, Lackwanna & Western R. R., gave a good account of experiments with screw spikes on his road, and his estimate of the worth of the screw spike was quite favorable. A particular point which he made was that he had found it a far superior device to the drive spike when used in ties far along in decay. He said there was no question but that the life of ties was longer with screw spikes than with drive spikes. Mr. C. E. Lindsay (New York Central R. R.) and Mr. W. B. Storey (A. T. & S. F. Ry.) and others gave important information from their experience with screw spikes and tie plates.

The report on this question, as well as on that of the use of metal, composite and concrete ties, was accepted as one of progress.

SIGNS, FENCES AND CROSSINGS.

The report of Committee No. 9, on Signs, Fences and Crossings, was presented by the chairman, Mr. C. H. Stein, superintendent with the Central R. R. of New Jersey. The committee presented for adoption specifications and a plan for a standard highway crossing sign. It is of the usual form of crossed boards, on a post standing 4 ft. in the ground and 16 ft. high above ground, painted with creosote from 6 ins. above ground to the bottom. Mr. Hunter McDonald recommended that the whole post should be creosoted by impregnation, but the committee explained that creosoted posts cannot be painted and maintained in painted condition successfully. As a result it was voted that all reference to creosote in the specifications be omitted. There were numerous suggestions as to the wording of the sign, all of which were impertinent, inasmuch as this is usually a matter covered by local legislation. The final result was the acceptance of the design recommended by the committee.

A second recommendation of the committee was the plan and specifications for a public trespass sign, consisting of a cast iron plate $2\frac{1}{2} \times 1\frac{1}{2}$ ft. in size, on a $2\frac{1}{2}$ -in. wrought iron pipe, set in a concrete base $2\frac{1}{2}$ ft. high and 18 ins. in diameter. The convention voted to accept this recommendation. One member suggested that steel plate was better than cast iron for the sign panel, in view of the high-power rifles of hunters who use such signs for targets. Another member said he was using steel plate for that reason.

CONSERVATION OF NATURAL RESOURCES.

The report of Committee No. 19, on Conservation of Natural Resources, was presented by the chairman, Mr. W. McNab, of the Grand Trunk Ry. The chairman, in introducing the report, said that this committee had kept in touch with the work of two great organizations, viz., the National Conservation Congress and the Commission of Conservation for the Dominion of Canada, and it had been able to secure a mass of valuable data touching forests, timber preservation, water powers, fuels (including oil), etc. They were unable, however, as yet, to obtain certain details in order to make the statement sufficiently comprehensive, and as this report was merely one noting progress, it had been deemed advisable to defer publishing such data until it could be correlated in order to represent the whole continent. The report was therefore offered as information, and, by vote of the convention, it was accepted as such.

ECONOMICS OF RAILWAY LOCATION.

The report of Committee No. 16, on Economics of Railway Location, was presented by the vice-chairman, Mr. C. P. Howard. There were two reports—majority and minority. According to the views of the majority, it was thought that, in order to be of definite value, the work of the committee should be performed by men who can give up their time to investigations, and with that in view, the chairman requested that the work of the committee on Economics of Railway Location be performed under the direction of the present chairman (Mr. R. N. Begien), or of some one who shall be selected in his place, by a force of men who can give their undivided attention to the work for a space of six months, at least. The intention is that these men report to the committee as a whole, and either revise their work in accordance with the criticism of the committee, or secure the approval of the committee, if the work is suitable. The chairman had, therefore, asked the board of direction to furnish authority and funds to conduct the work in that manner.

The minority reported that it did not think this a good time to ask for an appropriation. Should such be made, however, salaried employees should work under the general directions of the committee through its chairman; but in no case should they be employed until sufficient data were on hand ready for analysis.

It had been its opinion that this year's work should have been a continuation of the investigations of last year—an analysis of maintenance expenses to determine the proportionate costs of passenger and freight tonnage, and the relative damage to track per ton of engine and cars. Also, that one member should have been assigned to the study of the locomotive superheater so as to provide suitable corrections for tables 2 and 4 on pp. 429 and 431 of the Manual. The question of damage to track by some of the present high locomotives was also a very live one.

It did not, therefore, concur in the report of the chairman and other members; and recommended that for the ensuing year investigations be continued along the lines indicated in 1913, "report to determine the relative expense of maintenance due to passenger, freight and engine tonnage."

RECORDS AND ACCOUNTS.

The report of committee No. 11, on Records and Accounts, was presented by the chairman, Mr. W. A. Christian, of the Chicago Great Western Ry. The following conclusions for revision of the Manual were adopted:

(1) Eliminate the Foreman's Diary (form M. W. 1101), for the reason that the information given on the form should be shown on the Time Rolls (forms M. W. 1104, 1105), a space in each being provided for the purpose.

(2) Amend heading of form M. W. 701, Bridge Department Tool Report, to read, "Maintenance of Way Department Tool Report."

(3) Form M. W. 2100 "Estimate for Track," to be made uniform with form M. W. 2201, "Estimate for Buildings, Bridges and Water Service," by revising form M. W. 2100 accordingly.

As to conventional signs or symbols, the committee called attention to the fact that in the specifications for maps and profiles, prescribed by the Interstate Commerce Commission, to be furnished by railway companies under the act of congress providing for the physical valuation of railway properties, the conventional signs or symbols of the American Railway Engineering Association have been specified to be used as far as they are applicable. To make these conventional signs or symbols as complete and consistent as possible, the committee carefully revised those now in the Manual and submitted a revision of the symbols for approval. By vote of the convention they were approved.

On the subject of economical management of store supplies the committee, after careful study of the report made last year, which was received as information, had no additional recom-

mendations to make, and resubmitted the conclusions presented last year for adoption as information, and they were so adopted.

The report on sub-divisions of the Interstate Commerce Commissions account No. 6 was referred back to the committee for further consideration.

As to reports required by federal and state railway commissions the committee reported progress.

UNIFORM GENERAL CONTRACT FORMS.

The report of the special committee on Uniform General Contract Forms was presented by the vice-chairman, Mr. C. A. Wilson. The committee recommended the insertion of the words "losses and" in line 1, clause 15, after the word "against," making this clause read, "The contractor shall indemnify and save harmless the company from and against all losses and all claims, demands, etc." The recommendation was accepted.

The committee also presented a form of proposals which was adopted.

BALLAST.

The report of committee No. 2, on Ballast, was presented by the chairman, Mr. H. E. Hale, engineer maintenance of way of the Missouri Pacific Ry. The committee submitted, as information, a composite drawing of many superimposed ballast sections obtained from answers to letters of inquiry, and also a series of proposed ballast sections, worked out from their studies. These sections have a roadbed width of 26 ft. for single track and 39 ft. for double track, and they conform closely to the standard ballast sections of the Baltimore & Ohio R. R.

A particularly interesting part of the committee's report is a description, in detail, of work of cleaning stone ballast by means of screens, written by Mr. W. I. Trench, division engineer of the Baltimore & Ohio R. R.

The following conclusions were presented and adopted:

(1) The following changes and additions to the Manual:

(a) Under "Cleaning Foul Ballast," change "Clean with ballast forks," to read, "Clean with ballast forks or screens."

(b) Change "Clean center ditch of double track to sub-grade," to read, "Clean space between tracks to depth of 6 in. or more below the bottom of ties."

(c) Add, "Clean the berm to bottom of ballast, preferably not less than 12 in."

(d) Add, "Clean cross-ditches between ties approximately every rail length, or 33 ft. Cross ditches should not be under rail joints."

(e) Add, "Tests fully described in report of Committee on Ballast for 1914 indicate stone ballast can be cleaned by use of screens for approximately one-half cost of cleaning stone ballast with forks. (For diagram showing detail of collapsible screens see 1914 report.)"

On the question of proper depth of ballast of various kinds to insure uniform distribution of loads on the roadway, the committee recommended that the test outlined in its 1913 report be made under regular traffic. It further recommended that several railroads be asked to make the test at their own expense, as approved by the board of direction, and that the test be made under the direction of the committee on ballast, preferably on a road on which a member of the committee on ballast is located.

No action was taken on these recommendations.

The usual resolutions of thanks to the retiring president, to the speakers at the banquet, to the National Railway Appliances Association for its exhibit, to the technical press, the committee of arrangements, etc., were passed.

The attendance at this convention exceeded that of any previous convention, the registration being 500 members and 255 visitors. The convention adjourned at 3:20 p. m., Thursday, March 19.

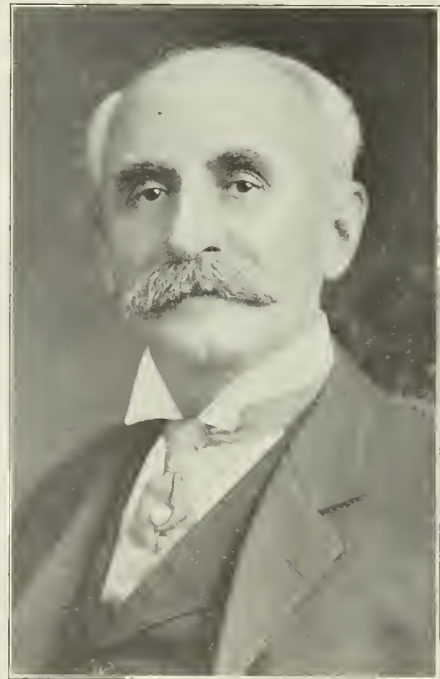
In order to provide greater mail facilities at the Grand Central Terminal, New York, and to take care of the increased

business due to the parcel post, the government has leased 12,350 square feet of additional space in the station from the New York Central and New Haven roads. It is also considering a proposal to lease a small room in the concourse, adjacent to the telephone room, to be used as a sub-station for the convenience of travelers.

The Annual Banquet.

The Gold Room of Congress Hotel was filled to its capacity Wednesday night at the annual dinner of the American Railway Engineering Association, about 400 people being seated at the tables. There were many ladies in the balcony; and instrumental and vocal music of a high order was provided. The usual congregational singing added to the zest of the occasion, if not to the production of real harmony.

It was rather expected that former Interstate Commerce Commissioner Chas. A. Prouty, now director of the Division of Valuation, I. C. C., would speak somewhat seriously



Col. J. M. Schoonmaker.

of the impending valuation work. This assumption was not warranted, as Judge Prouty has some excellent ideas of the "eternal fitness of things" and knows what "after dinner" means. Not that he did not have a serious strain, for he eulogized the engineering profession, not in high-flown adulation, but seriously and justly. The work of valuation is partly economics, partly law, and partly engineering. Of all that has been written on "valuation," the papers and discussions of the engineers have been by far the most valuable. The work of the engineer in valuation is of supreme importance just as it is in all modern life.

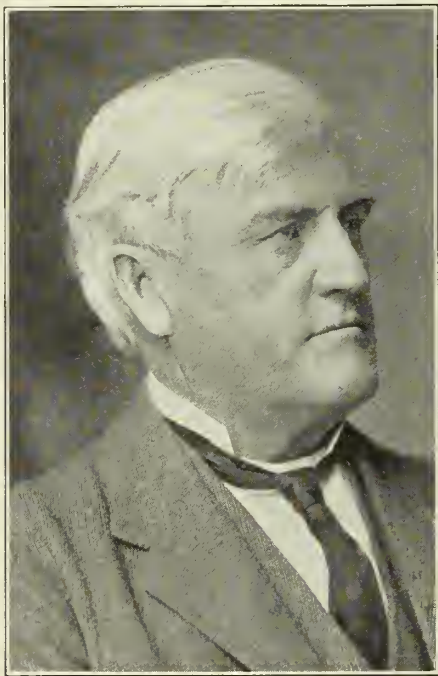
Hon. Charles Marcell, M. P., ex-speaker of the Canadian House of Commons, spoke intelligently and interestingly of the close and cordial relations and mutuality of interest between the United States and Canada. His remarks evoked frequent applause. His address bristled with facts and figures interwoven with good rhetoric in such a way as to be both entertaining and effective.

The last speaker, Col. J. M. Schoonmaker, vice-president Pittsburgh & Lake Erie Rd., spoke quite informally and in a chatty manner. He mentioned some early experiences, in

the far west, and appreciated the work of the engineer colloquially and most justly.

Hon. Charles Marcil.

Hon. Charles Marcil, LL. D., who was one of the speakers at the dinner, Wednesday evening, was born at St. Scholastique, Que., July 1, 1860. Mr. Marcil is one of the ninth generation of the Marcil family who have lived in the Province of Quebec, the ten generations extending over three centuries. He was educated in the common schools and Ottawa College. The University of Ottawa conferred upon him the honorary degree of LL. D., June 18, 1908. He has been connected with the Mon-



Hon. Charles Marcil.

trepreneur since 1880. He was returned to Commons for Bonaventure in 1900, and re-elected in 1904, 1908 and 1911. He was elected deputy speaker of the House of Commons, Jan. 16, 1905, and speaker, Jan. 20, 1909, and filled that office during the eleventh Parliament up to Nov. 15, 1911, on the meeting of Parliament, subsequent to the dissolution and general election of that year. He was appointed a member of the King's Privy Council for the Dominion of Canada, Oct. 6, 1911. He is a member of the Advisory Council of the American Society for judicial settlement of International Disputes. Was created a Knight of the Legion of Honor of France January, 1911. Has several times addressed Canadian and United States societies.

Besides being a journalist, Mr. Marcil is vice-president of the Marcil Trust Co., Limited, of Montreal. In politics he is a liberal.

Rail Inspection on the Southern Ry.

The Southern Railway inaugurated over two years ago what is believed to be the most rigid and effective inspection of every rail in the 7036 miles of track composing its lines which it is practical to effect. This inspection, under the general direction of the roadmaster of the division and the engineer maintenance of way of the district is performed by the supervisor in charge of sub-divisions of track maintenance in company with the section foremen of the respective sections, and is conducted annually, requiring the major portion of their time for from four to six months.

The method is for the section foreman to inspect one line

of rail and his supervisor the other, each and every rail being most closely scrutinized and examined by them while on hands and knees, with the eyes close enough to the exposed surfaces to detect even the slightest discoverable tendency toward weakness or failure. Road crossings are torn up, platforms removed, screenings or cinder walkways raked off, and rails swept with brooms wherever it may be necessary to afford a clean surface for minute inspection of conditions in each and every rail in the track, which are then reported on individually by number and location. The instructions and the practice are to remove immediately any rail showing the slightest tendency toward failure before proceeding further with the inspection.

The reports on condition of each individual rail are gone over and carefully noted and listed by the roadmaster of the division, and further checked and analyzed by the engineer maintenance of way of the district, after which they are forwarded to the Washington office where they are filed for record, thus necessitating a new report on each individual rail in track at the next inspection.

A list is kept indicating by number and location all rails removed on account of failure, or tendency toward failure, and a special detailed report is made in addition to the general report, covering the nature of the defect as well as its location in the rail removed, together with its scope and size.

While it is impossible, of course, to form any idea of the number of derailments which may have been prevented by reason of this inspection, and while breakage of rails must still occur to considerable extent, due to defects in the interior structure of the rail which are entirely hidden from view in spite of the most careful scrutiny, it is, nevertheless, felt by the management that every possible step toward safety and precaution in this regard has been taken by means of this rigid inspection of every rail over which the Company's traffic moves.

Edwin Frederick Wendt.

EX-PRESIDENT AMERICAN RAILWAY ENGINEERING ASSOCIATION.

Mr. Wendt was born in New Brighton, Beaver County, Pa., May 12, 1869. His father was a physician. His maternal grandfather came from Scotland and was associate judge of Beaver county, Pa., and his paternal grandfather came from Hanover, Germany, and was a pioneer in starting the glass industry of Pittsburgh. He attended the public schools of his native town from 1874 to 1883, entered Geneva College, Beaver Falls, Pa., in 1883, graduating in 1888 with highest honors. He passed preliminary examination and was registered as a student of law in Beaver county, Pa.

He entered the service of the Pittsburgh & Lake Erie Railroad Co., in the fall of 1888, and after ten years on the engineering corps, as axeman, chainman, rodman, levelman, transitman and office assistant in the construction department, was advanced in 1898, to the position of assistant engineer, under John A. Atwood, chief engineer, in charge of the construction and maintenance of way departments. Mr. Atwood and Mr. Wendt were associated together for 24 years. As assistant engineer, Mr. Wendt was in charge of maintenance and construction forces and equipment; had charge of contract work and all inspectors and engineers connected therewith, and supervised the engineering accounting work of the chief engineer's department.

During Mr. Wendt's service on the P. & L. E. R. R., the road was reconstructed and developed from a single to a four-track line and fully equipped with classification and terminal yards, new bridges, artistic stations, roundhouses, turntables, shops, powerhouses, water and fuel stations, signal and interlocking plants. The Pittsburgh passenger terminals and McKees Rocks locomotive and car shops are modern and extensive and



Edwin F. Wendt, Board of Engineers, Division of Valuation,
Interstate Commerce Commission, Ex-President,
American Railway Engineering Association.

notable. Mr. Wendt was also in charge of the construction work of the Lake Erie & Eastern R. R., between Struthers and Girard, Ohio, with office at Youngstown, Ohio.

He was a member of New York Central Lines maintenance of way committee, from 1905 to 1912.

He was a charter member of the American Railway Engineering Association, in 1899, chairman of its committee on engineering records and accounts, 1900-1906, and member of committee on signals and interlocking, 1907-1913. He became a director of American Railway Engineering Association in 1908; vice-president 1911-1912; and was elected president at annual convention in March, 1913.

He is a member of the board of trustees of Geneva college; of the American Society of Civil Engineers, and the Engineers' Society of Western Pennsylvania.

He is now a member of board of engineers of the Interstate Commerce Commission, Division of Valuation, and at present located at the headquarters of the Commission in Washington, D. C.

The board of trustees of Geneva college, Beaver Falls, Pa., at its annual meeting held in May, 1913, conferred upon Mr. Wendt the honorary degree of Doctor of Science.

Frank Percy Patenall.

Ex-PRESIDENT RAILWAY SIGNAL ASSOCIATION.

Mr. F. P. Patenall, signal engineer of the Baltimore & Ohio R. R., was president of the Railway Signal Association for the

term 1913-14. He is a native of Northamptonshire, England, where he was born in 1864. His first railway service was as bill clerk in the signal department of the Lancashire & Yorkshire Ry., in 1881; after which he was material clerk and draftsman on the same road. From 1883 to 1885 he was with Stevens & Sons, signal contractors. In 1885 he came to the Union Switch & Signal Co. and remained with that company as assistant foreman and foreman until 1888, when he became signal supervisor of the Baltimore & Ohio. In 1891 he was made superintendent of signals, and since 1898 has remained as signal engineer of the same company.

American Locomotive Co.

The special committee of inquiry which has been investigating the charges made against the management of the American Locomotive Co., in a rather sensational manner, has made its report. The committee consisted of J. W. Griggs, former attorney general; Thomas Thacher and Albert H. Wiggin, president of the Chase National Bank. The report is concurred in by an advisory committee consisting of William R. Wilcox and Dr. L. Clarke Seelye. Mr. Cate's charges, which were contained in pamphlets sent to all the stockholders, were severe. In answer the inquiry committee was appointed. In the report on the charges sent out by W. H. Marshall, president of the company, to all stockholders, John Havron, who was retained as the committee's expert, says:



F. P. Patenall, Signal Engineer, Baltimore & Ohio R. R., Ex-President, Railway Signal Association.

"It is only proper to state that after over three months' investigation, during which time a careful scrutiny of bids, bills and correspondence covering the entire period of the company's existence was made, not a bit of evidence of corrupt practice on the part of the company's officials was found."

As Mr. Cate's principal criticisms were against President Marshall, the committee says: "We believe that Mr. Marshall has been actuated during the whole course of his official service with the company by a faithful and loyal spirit of devotion to its interests; that no personal interests have at any time conflicted with the full discharge of his duty to the company."

They also find that, although some of the officers of the locomotive company have been directors in other companies from which it purchased supplies, no evidence was elicited confirming charges that the company had suffered by such relationship. However, to remove any grounds for suspicions these relationships have been discontinued.

The committee recommends that the board consider the question of manufacturing several articles which it purchases from other companies, and also questions whether some salaries may not be reduced and other plant expenses curtailed. The criticisms made by the committee are being considered by the directors. A letter accompanying the committee's report sent to stockholders advises them of this, and says:

"As the criticisms of the company and its management may have left uncertainty in the minds of some stockholders as to the value of their investments, we call attention to the

fact that in the fiscal year 1913 net profits were \$6,185,305, and we now state that in the first six months of the present fiscal year (July 1 to Dec. 31, 1913) the company earned net over all charges \$2,631,687, or sufficient to pay the fixed charges for the remainder of the year and the preferred dividend for the entire fiscal year.

"What the earnings may be for the remaining six months of the year, it is difficult to predict. In fact, the present volume of business is so small that if there is no improvement, your company may not do more than earn its operating expenses during the last half of the year. Nevertheless, your company is in a strong position, its plants are in excellent condition and its strength financially is indicated by the fact that \$2,000,000 gold notes maturing Oct. 1, 1913, have been paid off since the last annual report, and its quick assets, as of March 1, 1914, are a total of \$21,400,000, of which \$4,150,000 is in materials and work in process of construction, \$8,250,000 in bills and accounts receivable and \$9,000,000 in cash. The total accounts payable was only \$950,000 on March 1.

"There has been purchased and are now being held in the treasury \$1,000,000 (leaving \$5,800,000 outstanding) of the company's notes not yet due. Your directors would have preferred to use a larger part of the cash on hand to purchase the company's outstanding notes, but could not obtain them on favorable terms. As an alternative several millions have been invested in warrants of the city of New York and the city of Newark and bank certificates of deposit, all maturing in six months or less."

Convention of the Railway Signal Association

The regular spring meeting of the Railway Signal Association was held in the Congress Hotel, Chicago, on Monday, March 16. Mr. F. P. Patenall, signal engineer of the Baltimore & Ohio R. R., and president of the association, conducted the proceedings.

The chairmen of various committees made reports of progress. Mr. W. H. Elliott, chairman of Committee No. 9, reported on the progress with specifications on galvanized steel signal wire. These specifications will be ready for the June meeting. The committee on this subject has decided to omit the bending test for this kind of wire, as the galvanizing is bound to flake off in such a test over a mandril of a size that would be suitable for other kinds of wire.

The report of Committee No. 4, on Automatic Block, was presented by its chairman, Mr. A. G. Shaver, signal engineer of the Chicago, Rock Island & Pacific Ry. The report presented covers specifications for the following items: Wooden pole line brackets, pole line washers, caustic soda primary battery (revised), and copper sulphate (revised).

The committee asked for discussion on the question of using metal tops for relays. Mr. Elliott said he had been using thousands of the Bakelite tops for his relays, with good satisfaction. He said such material greatly simplified the matter of insulation. He had had experience with porcelain, but it had proven to be too brittle. Other speakers, however, considered porcelain the best material for this purpose. Mr. Lavarack said he had used Bakelite tops, but they had cracked and proven unsatisfactory. Mr. W. N. Manuel said he thought an insulating top for relays was very desirable, and it was voted, as a resolution, that the committee should recommend that relay tops should be made of an insulating material. Mr. Trout proposed, as an amendment, that the said insulating material should be porcelain, but, after discussion, in which several members spoke well of their experience with porcelain, the amendment was withdrawn.

Mr. A. R. Fugina read a letter that had been sent the committee discussing, at length, various details of design of relays. It is found to be desirable that manufacturers try to standardize their relay parts, so that such things as screws, bolts and other minor parts may be interchangeable on instruments of different manufacturers. The committee has requested manufacturers to get together on the question.

Mr. Shaver, speaking of tests of relay ventilation, said he had found no benefit from such instruments ventilated by a hole in the bottom. He had observed that relays so ventilated will sweat as badly as those tightly enclosed. The committee expressed a desire that members who have ideas on the subject give the committee the benefit of the same.

The specifications submitted on the five subjects above enumerated were then discussed in detail. Mr. C. J. Kelloway said he thought the specifications for wooden pole line brackets were too elaborate, and that a standard drawing, with a few general requirements noted thereon, should be sufficient. The specifications submitted by the committee were those of the Western Union Telegraph Company, revised to suit the signaling service. Some of the members thought that the Western Union specifications should be adopted without change.

The discussion brought out some suggestions for the committee's consideration in revising its report for the June meeting. Mr. J. A. Peabody moved that the drawing offered by the committee be adopted for report, together with a statement that the pins of the cross arms be in accordance with Western Union specifications. The motion was amended by Mr. C. C. Anthony to the effect that such portions of the Western Union specifications as were adopted by the committee be made identical in language, and that where there were differences it should be so stated in a note. The amendment carried.

In reference to pole line washers it was moved and carried that all the requirements be indicated on the standard

drawing, that written specifications be omitted, and that the same principle should be applied to other minor parts or devices reported upon by the committee.

The specifications for caustic soda primary battery and for copper sulphate were discussed and various suggestions were offered for the guidance of the committee. In reference to the latter subject the committee agreed to a proposal that the specifications be withdrawn.

The report of Committee No. 5, on Manual Block, was presented by the chairman, Mr. Geo. S. Pfisterer, of the Nashville, Chattanooga & St. Louis Ry. The work taken up by the committee was rules for the maintenance and operation of interlocking plants and block signals, and in this connection a resolution recommending changes in present American Railway Association rules for signalmen and trainmen, as follows:

"Whereas, This association recognizes the value of a caution card as a means of moving a train past an interlocking signal at stop where such stop is brought about by an interruption in the signal apparatus, and

"Whereas, A number of railroads have adopted this practice.

"Therefore be it Resolved, That this association recommends to the American Railway Association the following as alternatives to rules 629, 630 and 663 of the standard code:

Signalmen—Proposed Alternatives.

629 (a). Signalmen must have the proper appliances for hand signaling ready for immediate use. Hand signals must not be used when proper indication can be displayed by the interlocking signals. The use of hand signals as authority to pass interlocking signals at stop is prohibited. Such movements must be made only under authority of a caution card, form..... This must be signed by the signalman and handed to the engineer as authority to proceed only after examination has shown the routes to be properly lined up and safe for train movements.

Note—Hand signaling includes the use of lamps, flags, torpedoes, and fuse signals.

630 (a). If necessary to discontinue the use of any interlocking signal, train movements shall be made in accordance with rule 629 (a) and..... notified.

Enginemen and Trainmen—Proposed Alternative.

663 (a). Enginemen and trainmen must not proceed against interlocking signals until they are fully informed of the situation and know that they are protected. Train movements shall be made in accordance with rule 629 (a). Trainmen must not give proceed hand signals which will conflict with interlocking signals.

Discussion on the resolution, which provides for the use of caution cards, was along the same lines that were considered at the annual meeting of the Signal Association at Nashville last fall. The majority of the speakers agreed that the use of caution cards at interlockings was desirable, but not all were satisfied with the form of the rule as expressed in the resolution.

Mr. C. C. Denney moved that the rules in question be not submitted to the American Railway Association, and the motion carried. Mr. Denney then moved it to be the sense of the meeting that it approved of the use of the caution card as a means of passing a stop signal at an interlocking tower, and that the A. R. A. be notified of such action. The motion carried.

Mr. Denney and Mr. Rudd, in explanation of this action, said they did not approve of making rules for the A. R. A. They thought it was sufficient for that association to know what the sentiment of the Railway Signal Association was on any question under consideration. With this information the A. R. A. might, if it so desired, work out, in its own way, any changes that might seem to it to be necessary.

By motion it was voted that the rules for signal supervisors (701 to 719, inclusive), submitted, be referred back to the committee.

The report of the special committee on "Method of Recording Signal Performance," was presented by the chairman, Mr. W. N. Manuel. The conductor's or engineman's telegraphic report (Form R. S. A. 1.) blank was criticised for not including a space to be filled out in case of a false clear failure and for the inclusion of a space for reporting "train in block." A motion to have the line for the last-named item stricken from the report was lost. Opinion seemed to be divided on the question of providing a regular space for reporting false clear indications. A motion to have a line inserted to provide for such a report was lost.

Several members, including Mr. Denny and Mr. Kelloway, said they had at one time arranged their report blanks to include such information, and they had found that, inadvertently, enginemen had more or less frequently filled in such lines (with a cross "X") when no failure of the kind really existed. Men would be sent out to hunt up the source of the trouble, and when it could not be found, an attempt would then be made to hunt up the engineman, only to find that he had so reported by mistake. There seemed to be no doubt but that all false clear indications would be promptly reported by telegraph, by special report, wherever such failures were observed. Several members stated that in cases where the day indication of the signal can be seen, it is the practice of their roads to not require trains to stop by reason of "light out."

Committee No. 10, on Storage Battery and Charging Equipment, under Chairman Mr. A. B. Ellsworth, made a progress report as to storage battery, jars, sand trays and covers. The standard drawing for Storage Battery Connection Bolt (R. S. A. 1340), was adopted for presentation at the next annual meeting. Other drawings adopted for the same purpose were R. S. A. 1341, Storage Battery Separator; and R. S. A. 1241, Lead Elements. A report on jelly electrolyte, to be published later, as information, was brought to the attention of the meeting and criticisms were invited. This report was as follows:

Jelly Electrolyte.

"The committee was instructed to investigate the use of Jelly electrolyte in connection with portable lead type storage battery. After considerable correspondence and conversation with various representatives of manufacturers and several of the railroads who have used the jelly electrolyte, the following is submitted to the association as information:

"Jelly electrolyte consists of silicate of soda 1800 specific gravity at 70 degrees Fahr. and chemically pure sulphuric acid 1400 specific gravity at 70 degrees Fahr. mixed in equal parts. The mixture is then poured into the battery before hardening.

"The reason for the use of jelly electrolyte is the convenience in handling cells after the solution has hardened and the prevention of loss of solution in case of cracked jar.

"To offset this advantage it is claimed there is a loss of about 25 per cent in capacity, due to the fact that the acid will not enter plates to give proper chemical action as well as will sulphuric acid in liquid form. Only voltage reading can be taken of battery.

"It is necessary to add sulphuric acid of about 1080 specific gravity at 70 degrees Fahr. when the battery is re-charged. The battery should be taken apart, cleaned and charged with sulphuric acid about every two years and the jelly electrolyte renewed.

"One of the western roads has adopted this electrolyte as its standard and report it as giving good satisfaction. Another western road reports that they have discontinued its use, claiming that sulphuric acid will give better service on account of inability to test jelly solution after it is placed in jar.

"Several of the battery manufacturers' representatives have

advised that after making laboratory tests they do not recommend its use and do not care to furnish this electrolyte unless requested to do so. The use of jelly electrolyte is not recommended by this committee."

The chairman stated that the reason the committee had reported in this manner was because of lack of information as to any advantage in using such electrolyte.

Specifications for electrolyte for lead type storage battery were accepted, after revision, for action at the annual meeting.

Specifications for concrete storage battery box, including drawings 1342 and 1343, were, with revisions, accepted for presentation to the annual meeting. Specifications for Edison storage battery, taken largely from the manufacturer's catalogue, were revised slightly and accepted for further discussion and adoption at the annual meeting.

The drawings R. S. A. 1345, Single Throw Switches; and R. S. A. 1344, Knife Switches and Clips, were accepted for presentation at the annual meeting.

The report of Committee No. 1, Signaling Practice, was presented by the vice-chairman, Mr. C. C. Anthony. The committee submitted information on tests of creosote used in treating ties; on electrical tests of ties so treated; and on economies of labor. The subject last named refers to the plan of combining signal maintenance with that of the track department. Mr. Vandersluis, of the Illinois Central R. R., was called upon and said that he had 43 miles of road protected by Hall gas signals that are being maintained by the track section crews. Good results, so far as maintenance is concerned, have been secured thus far, but the plan has not been in operation long enough to demonstrate the economy of the scheme from the standpoint of cost. Mr. McKeen, of the Union Pacific R. R., said that on his road, where signal and track maintenance have been combined, either the roadmaster or the assistant roadmaster on each division is a man of signaling experience. No conclusions as to economy in cost of maintenance by this plan have yet been reached.

The report of Committee No. 6, on Standard Designs, was presented by the chairman, Mr. J. C. Mock. As part of its work the committee submitted five exhibits to show variety of front and lock rod fittings for interlocked switches. By vote of the meeting it was decided that Exhibits 1, 2 and 3A were the preferable ones for submission to the association, and therefore, Exhibits 3b, 4 and 5 were rejected. One point of discussion on these designs was the question of cut gage plates. Some members preferred these to insulated continuous plates, while others cited instances where the rails could not be held to gage with cut plates, and they had experienced no particular difficulty in maintaining insulation on solid or continuous plates. After a long discussion the committee agreed to present the exhibits as information, and take longer time to consider the designs before formal adoption. It was suggested that, in the meantime, members experiment with the different front and lock rod designs shown in the report.

The following standard plans submitted by the committee were, after suggested revisions, accepted for presentation at the annual meeting:

Drawing 1049—Details and Assembly of Adjustable Lamp Bracket.

Drawing 1070—Binding Post (Supersedes Previous Issue).

Drawing 1094—One-Inch Pipe Line Insulation (Supersedes Issue 1901).

Drawing 1231—Vertical Type One-Way Pipe Compensator.

Drawing 1236—Two-Way (Single Lamp) Signal.

Drawing 1238—Details and Assembly of Marker Lights.

Mr. J. M. Waldron, chairman of the special committee on signaling requirements of electric railways, presented the report of that committee. The committee submitted, as information, a set of aspects and rules which have been adopted by the Amer-

ican Electric Railway Association. Mr. Denney made a motion that this part of the report be accepted as information and that the board of direction be instructed to take steps to have the two associations co-operate on a joint committee report on the same subject. The motion carried.

Erie R. R. Moves Car Dumping Machine.

The Erie Railroad recently completed a difficult piece of engineering in the moving of an 800-ton car dumping machine, 214 feet up the Cuyahoga river at Cleveland, Ohio, without interfering with the operations of the machine. The method by which the task was accomplished was decidedly out of the ordinary. W. W. Drinker, assistant engineer, designed the work, and had charge of its execution.

The difficulties were many. The car dumper superstructure is 116 feet high, the boiler-stack 111 feet high. The engines and machinery weigh about 140 tons; and the boilers and their brickwork encasement, about 200 tons. These, together with the coal pockets, the engine houses, and the necessary supports for moving, made a structure, practically 40 feet wide, 108 feet long, and 116 feet high, weighing 800 tons, which had to be moved 214 feet.

On the morning of February 17, the structure was ready to move. The motive power consisted of two winches with a team of horses on each winch. To each winch was fastened a cable with two blocks rigged 5 and 5, in turn attached to the grillage on which the car-dumper rested.

By noon the structure had been moved 44 feet. Levels taken on the grillage showed a sinking of one-eighth of an inch, no doubt due to compression of the timbers.

By 4 p. m. 120 feet had been covered, the rate of moving under full power being about eight inches per minute. The dock and grillage received practically the full weight of the structure on the night of February 17th. No work was done during that night, although prior to that time work had been pursued night and day.

On the morning of the 18th a settlement of the grillage of one-quarter of an inch showed under the level. On the 18th a turn was made on account of an angle in the dock, and the structure was moved 44 feet, making the total distance, so far, 164 feet.

No further settlement was observed. By 11:30 a. m., February 19, 214 feet had been covered, and the structure was in a position to precisely engage the bolts of the new foundation. The jack screws were then placed under the structure, as they had been placed for the raising: rollers, runways, and cribs were taken out, and the structure was lowered to proper position and bearing, by noon, February 25.

Coaling Station of the C. B. & Q. R. R., at Wray, Colo.

The Chicago, Burlington & Quincy R. R. has put into operation within the present month, a locomotive coaling station, at Wray, Colo., which embraces certain features somewhat out of the ordinary in design of facilities of this character. This part of the road is located in the lignite district; and in erecting this plant it was desired to coal all freight trains going west with lignite, and passenger trains westbound and all trains eastbound, with bituminous coal.

To fulfill this purpose a structure was designed and erected by the Ogle Construction Co., 332 South Michigan Ave., Chicago, in which design the tank is divided in half by a partition passing in a vertical plane, transverse to the track, through the center. The partition is stayed so that either compartment may be filled while the other is empty, and one side is used for lignite and the other for bituminous coal. There are four deliv-

ery spouts: one to each of two tracks, from each compartment. These are so arranged that coal from either compartment may be taken from either track.

There is a deflector gate in the inlet chute that can be controlled from the ground so that the operator can put the coal in either compartment as hoisted.

The tank is 24 ft. in diameter and has a capacity of 200 tons. In shape it is an oblique circular cone, having its apex in line with one pair of the supporting columns. This shape is such that all the coal moves when either spout is used; this prevents spontaneous combustion and makes the design especially desirable where lignite or other low grade fuel is used, as in this instance. The shell is made of 5/16-in. plate, reinforced at the roof and bottom cone connections with $5 \times 3\frac{1}{2} \times \frac{3}{8}$ -in. angles. The partition in the tank is constructed of $\frac{1}{4}$ -in. plate, reinforced with 6-in., 10½-lb. channels vertically, and 15-in., 33-lb. channels horizontally. The shell acts as a girder and is carried on four columns of which three are built up of 12-in., 20½-lb.

nel girts at every stair landing to support the stair flights. The top of the hoisting tower is housed in with No. 22 galvanized corrugated siding, so that the precipitation and severe weather of winter can not clog the turnouts and sheaves with ice. This house is accessible from an easy stair, coming up from below, which eliminates the necessity of doors at the top of the tower. The stair flights are made of two 6-in., 10½-lb. channels with treads of $1\frac{1}{4} \times 5/16$ -in. bars spaced 1 in. between. The landing platforms are also made of $1\frac{1}{4} \times 5/16$ -in. bars held together by ½-in. rods and cast iron spacers. This type of tread does not become slippery in winter; and setting the bars on edge avoids accumulation of dust and prevents corrosion and deterioration from rust. The hand rail is of 1-in. solid bar, this being desirable to prevent early weakening from rust, as would be the case with pipe.

There is a shed constructed of steel angles, channels and galvanized iron siding, over the hopper, to protect the workmen as much as practicable from severe weather and the sun.

To one of the columns, between the main tracks, is attached a sand storage tank which has a capacity of 5 cubic yards. The sand is delivered to the locomotives by two Ogle sand delivery spouts so constructed that they are at all times protected from the elements, insuring a dry condition of the sand.

The machinery house, seen in the foreground in the illustration herewith, is constructed of concrete. In it are the hoisting machine, an air compressor run by the oil engine, a sand dryer, sand drum and an air receiver. The sand is dried and put into the drum, and thence forced through a 4-in. pipe by compressed air, up into the storage tank.

The hoisting apparatus consists of two alternating buckets of 1 ton capacity each, actuated by a Fairbanks-Morse type N oil engine and an Ogle automatic reversing hoist. The hoist is so constructed that when started it elevates one bucket to a dumping position, and while this bucket is discharging its load the other is receiving a measured load from an Ogle automatic measuring loader. After a sufficient length of time for the bucket to discharge at the top, and for the one at the bottom to receive its load, the hoist automatically reverses, and continues this operation until it is made to stop.

These buckets are turned at the top of hatchway by curved runways, to empty their loads, and are self-righting on their return. The loaders are operated by the buckets on the downward movement, which operates one to cut off and deliver an amount of coal equal to the capacity of the bucket and the other one to a filling position.

If the operator desires to have the hoist stop after reaching either limit, he simply inserts a pin which locks the reversing apparatus, and the hoist does not reverse when the load reaches the top and is discharged. If it is desired to stop while the load is being hoisted, the operator releases the clutch and sets the band brake to hold the load, and the hoist will not reverse. The reversing apparatus operates only when the hoist reaches the limit of its travel, that is, when one or the other bucket has reached the top. The hoist is also provided with latch pawls which work in such relation to the clutches that when one of the clutches is thrown in to hoist a load the corresponding pawl is set so that it acts to prevent a back travel of the drum in case of a power failure during the time the load is being hoisted. When the hoist reverses, this pawl is thrown back to clear, and another pawl is set from the opposite side to act while the drum is running in the other direction.

The hoisting capacity of this installation at Wray is 60 tons per hour, and the man is free during all this time to place cars over the hopper, dump them, or any other work of the kind. It is possible for one man to handle a station of this type where the consumption of coal is as much as 400 tons a day, providing no breaking of the coal is required. At this station, however, it is necessary to break the coal over bars spaced 6 in. clear between, with separators spaced 12 in. apart. Two or three men would be required to break the coal through these bars fast enough to keep the hoist running regularly.



Coaling Station of the C., B. & Q. R. R., at Wray, Colo., Handling Two Kinds of Coal.

channels, latticed, and the fourth, the one supporting the sand tank, of 12-in. 25-lb. channels.

The four outlet spouts are attached at the apex by one special connection having an opening elliptical in cross section, $3\frac{1}{2}$ by 8 ft. in dimensions. The coal spouts are the Ogle patent, with flexible apron so that the coal can be distributed lengthwise of the tender. This type of spout makes it possible to coal without accurately spotting the tender, and it renders it unnecessary to move or re-spot in order to coal the full length of large tenders.

The hoisting tower is constructed of $4 \times 4 \times \frac{1}{2}$ -in. steel angle posts and $3 \times 3 \times 5/16$ -in. angle braces and girts, with 6-in. chan-

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A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, MARCH 21, 1914.

There is an undercurrent of vitality in the iron and steel industry which manifests itself despite frequent trade prophecies to the contrary. The strongest recent factor is the rather liberal orders of railroads. Much more business is in sight from the same prolific source. Leaders in the steel industry are thoroughly familiar with the plans of the railroad interests. The Eastern railroads are quietly discounting the pending decision as to freight rates. Structural and plate are leading all other products, and they will maintain this lead indefinitely. In the lesser finished products a marked improvement in activity is apparent. Steel ingot capacity is expanding. Shaded quotations continue only where very large orders are concerned.

The house committee on interstate and foreign commerce at Washington, after considering various phases of federal control of railway finances, has decided against the indorsement of the Sims bill, which provided for strict regulation of railroad capitalization by the commission, and instead, a publicity bill will take its place in the antitrust program. The purpose of the latter measure is to provide full publicity concerning the inside financial operations of railroad companies in the hopes that there will thereby be effected a cure

for the domination and destruction of railroad properties by Wall street operators. The proposed bill provides that all moneys borrowed, paid, earned and spent shall be accounted for to the Interstate Commerce Commission and that the commission may regularly make public the facts procured from the reports by the roads.

In deciding on this course of action, the committee worked upon the theory that the regulation of securities would, at least in effect, place upon the commission the duty of directing the financial operations of the common carriers, and that many abuses and impractical situations might arise as a result of such a system. Much of the inspiration for the substitute measure is said to have been gotten from the report of the commission which recently investigated issues of railroad stocks and bonds. A series of hearings probably will be held upon the new bill before it is formally acted upon by the committee. The bill provides in great detail, the manner in which the railroads shall prepare annual and other reports of their financial conditions with special reference to the issuance of new securities. Respecting the annual reports, the bill provides that:

"Such annual reports shall show in detail the amount of capital stock issued, the amount paid therefor, and the manner of payment for the same; the dividends paid, the surplus fund, if any, and the number of stockholders; the funded and floating debts and the interest paid thereon; the cost and value of the carrier's property, franchises and equipments; the number of employees and the salaries paid each class; the accidents to passengers, employees and other persons, and the causes thereof; the amounts expended for improvements each year, how expended and the character of such improvements; the earnings and receipts from each branch of business and from all sources; the operating and other expenses; the balance of profit and loss; and a complete exhibit of the financial operations of the carrier each year, including an annual balance sheet.

"Such reports shall also contain such information in relation to rates or regulations concerning fares or freights, or agreements, arrangements or contracts affecting the same as the commission may require, and the commission may, in its discretion, for the purpose of enabling it the better to carry out the purpose of this act, prescribe a period of time within which all common carriers subject to the provisions of this act shall have, as near as may be, a uniform system of accounts, and the manner in which such accounts shall be kept."

"Railway Misrule?"

"Railway Misrule" is the not very happy title of a book which has just appeared, by Edward Dudley Kenna, a lawyer by profession and formerly a vice-president of the Atchison, Topeka & Santa Fe Rail-

way. Reading the book does not make clear whether the author considers the "misrule" to be by the railways or of the railways. Mr. Kenna is more clear in his text than in his title. He writes well and his statement of the present situation, puts the case pretty fairly; although he is rather pessimistic regarding the ultimate success of government regulation. He shows that a large portion of the "diseases" of the system today, are due to diversified ownership, which results in competitive waste. We do not agree with him that consolidation of ownership would result in decreasing average rates; and that the great need of the country is cheaper rail transportation. Judge Prouty says that railway transportation is the cheapest thing in the country today. Solidified ownership would result in adjustments which would give the entire country better and safer facilities—and some sections would be helped at the expense of others and to the general benefit of the whole.

It is not true that because the Lake Shore for instance, now makes large profits, the region which it serves is entitled to lower rates. No section is entitled to any lower rates than all sections. The densely populated district always pay for the development of the remote and less favored sections; and they profit by doing it. Any large system has its profitable division and its unprofitable lines. The stronger carry the weak, under existing conditions. Solidified ownership would extend this principle and help the weak. But the government seems now bent upon disintegration, which means driving many weak roads and the country they serve to the wall.

Mr. Kenna thinks there is possible a "middle course between private ownership and government ownership; which is preferable to either as a whole." He says: "It would be quite feasible to devise a method whereby advantages of the Government's superior credit could be secured as a basis for low rate-making and at the same time retain those advantages that arise from the expectation of individual profits." This method he calls "compulsory unification with a controlling government interest."

His diagnosis is not bad; but his remedy is not proven very satisfactorily. It is surprising that the author should hold to the belief that lower rates are needed for the proper development and prosperity of the country. Equitable comparative rates are needed and the final abolition of unfair preferences and discriminations—and that we are coming to rapidly. It is folly to demand lower average rates when they would have no appreciable effect on final prices to consumers; and in a country which already has the lowest rates in the world.

Mr. Kenna has been abroad and has studied railway transportation there. His treatment of government ownership is not broad or accurate. In its financial results and the service it affords it is only successful in two countries and those are absolute monarchies. On what would happen to our demo-

cratic government under government ownership, he is surprisingly optimistic. His idea seems to be that he would like to see us stop short of government ownership but that after all if we can't do that government ownership is not so bad. The suggestion of the stopping point, which he makes, is not new; and we may come to something of that kind sometime. But if we do, it will be because the American people have not the brains and temper to work out the idea of private ownership and operation under fair public control. We believe that they have this ability and that such adjustment will come in time.

Meantime, considering the difficulties inherent in the case and looking back at the progress already made, there is no "railway misrule." That is a bogey, like the carnival king who bears that title in mardigras festivities. We have evils to remedy both ways and always will have; but they are no greater than those involved in the general idea of property. They are to be met patiently and adjusted step by step. There will be over-regulation and resistance to any regulation—currents too strong and back water—but on the whole they are only the growing pains of a world of change and a free people.

And now comes B. F. Yoakum, who has been on the grill on account of the affairs of the St. Louis & San Francisco R. R., and advocates what he calls profit-sharing or co-operation between the government and the railways. He cites the case of the Chicago city railways, under which the city receives 55 per cent of the net revenues. He thinks the profit-sharing plan would lead to cheaper money for railway requirements, as government approval of a security "would in effect endorse it and such a bond would consequently sell at the lowest rate of interest current for gilt-edge securities, thereby reducing the cost of transportation."

Profit-sharing would necessarily involve loss sharing, for it is not probable that private investors would give the government the lion's share of profits and themselves assume all risk of loss—a loss inevitable on new roads for some years. The government endorsement would therefore have to be on the bonds, rather than in the shape of mere approval, if any lower rate of interest is to be secured. There is a limited demand for securities, even of the government, which bear a very low rate of interest. Part of that demand is enforced by the national banking laws. If the government backed railway bonds, a lower interest rate would probably be secured, but by no means as low a rate as the government now pays on its own securities. The market for low interest bearing bonds would be overstocked.

The real outcome would be a real partnership between the government and private owners. This would give rise to an infinite number of problems arising from divided responsibilities. If the government realized large profit, the disposition of these earnings would constitute another political issue. Sec-

tional interests and influences would complicate the situation. There would be a great demand that what the government made on railways, it should sink in useless waterways and in other extravagance.

The Railway Engineering Convention.

The attendance at the convention of the American Railway Engineering Association, held in Chicago, this week, was larger than that of any previous one, being upwards of 500 members, besides more than 250 visitors, the majority of the latter being railway officials or employees, not members of the association, who were in attendance by invitation. The report of the secretary showed a gratifying increase in membership, which is now between 1100 and 1200, and the finances of the association are in good condition. Reports were received from nineteen standing committees and two special committees, most of which presented definite recommendations for adoption by the association. The hearing of these committees and the discussions upon their reports occupied all of the time, very busily, for three days, two sessions each day. The transaction of all this business in the time stated, without undue haste or neglect, reflects credit upon President Wendt for the systematic procedure.

The fourth day of the convention was set aside to give members opportunity to visit the exhibits of the National Railway Appliance Association, held in the Coliseum. These exhibits were fully up to those of previous years in number, if not more numerous, and they were generally criticised as being better arranged and containing more new devices than the exhibits of any previous year.

A brief review of the proceedings, mentioning some of the topics of most timely interest, may be desirable. The committee on signals reported in favor of postponing consideration of the subject of automatic train control until after some definite status shall be given to the question by the American Railway Association, which now has a committee working on the subject.

The committee on track has under consideration the subject of economics of labor, with special reference to combining the labor of maintaining the track and signal departments. It was suggested that the committee on signaling appoint a sub-committee to work jointly with a sub-committee of the committee on track for investigating and reporting on this question.

An interesting discussion in connection with the report of the committee on yards and terminals was in reference to the question of mechanical handling of freight in large railway terminals. A few plants equipped for such work are now in existence, and much study has been given to the subject. It has been observed, however, that a great deal of time is lost and much extra labor expended in rehandling goods in course of transportation about buildings on trucks or other devices, so much so that in some instances no real economy is effected by the mechanical devices

over the prevailing method of trucking by hand. The impression which might be taken from this discussion is that engineers should proceed cautiously in adopting suggested systems of handling less-than-carload freight by mechanical means. Appliances readily applicable to large manufacturing establishments for handling a uniform product from point to point about the premises, may not with equal economy be installed to take care of articles of such miscellaneous classes as are found in railway freight shipments.

The committee on wood preservation brought up for consideration a set of conclusions in respect to the mixing of coal tar with creosote for treatment of railway ties. The committee took exception to the term "adulteration," by which some members characterized the mixture of tar and creosote. It matters not, however, whether such a mixture be called an "adulteration" or a "solution," so long as the character of the mixture is well understood. In order that no misunderstanding might be had regarding the committee's appreciation of first-class creosoting work, it was recommended that Grade 1 coal-tar creosote, which, according to the association's standard is known as the first-class material of this kind, should not, under any circumstances, be mixed with coal tar. The market being unable to supply a sufficient quantity of creosote of this grade to meet the demands of the railway companies, there has come into practice quite largely, for reasons of expediency, the mixing of coal tar with such lower grades of creosote as are unsatisfactory for work of treatment by reason of the tendency to quickly evaporate from the timber. It is believed, or, at any rate claimed, that by mixing refined coal tar with these lower grades of creosote the tar will go into solution and assist in holding the mixed material in the timber. Recognizing that this work is extensively practiced, even if it cannot be considered first class, the committee found it advisable to formulate certain precautions which should be followed in order to obtain the best results possible from the use of such a mixture, and it therefore reported six rules covering the work, which were accepted as information.

The matter of perhaps chief importance in the report of the committee on rail was that of standard sections. On this the committee made only a progress report. The committee had given principal attention to the two series of sections of the American Railway Association, but had not been able to get sufficient data pertaining to the use of these sections ("A" and "B"), in comparison with the standard sections of the American Society of Civil Engineers, to form conclusions. The promulgation of the A. R. A. sections a few years ago, being prompted by dissatisfaction with the A. S. C. E. sections in some quarters, "let down the bars," so to speak, since when quite a number of railway engineers have gone about to design sections of their own, and no little annoyance to the manufacturers has already resulted by demand for many different sections only slightly modified from well recognized stan-

dards, but, nevertheless, requiring the making of new rolls. It is also to be noted that a large number of railway managements are withholding judgment in the matter, still retaining the A. S. C. E. sections as standard, and hesitating to make a change until more definite results are to be known concerning the use of the A. R. A. sections.

The committee on ties reported, as progress, a set of nine principles or ideas pertaining to "the effect of the design of tie plates and spikes on the durability of ties." As these ideas were accepted only as a report of progress they have no definite standing, so far as the association is concerned, and were allowed to pass unchanged. A discussion of some length was given to this part of the report, and exceptions were taken to certain ideas expressed, especially in reference to statements to the effect that flat-bottom tie plates are satisfactory when used with screw spikes; and that "screw spikes prolong the life of ties over that obtained with cut spikes." The remarks of Mr. Trimble, speaking of experiments which have been conducted on the Pennsylvania Lines, were rather discouraging of the use of screw spikes; while the remarks of Mr. Ray concerning the use of screw spikes on the Delaware, Lackawanna & Western R. R., where the screw spike is now the standard rail fastening, were entirely favorable to the use of that device.

A long discussion resulted upon the presentation of a standard wooden crossing sign by the committee on signs, fences and crossings. For one thing, the committee had reported on creosoting only the bottom part of the post. Several members wanted the whole post creosoted, only to have it pointed out to them in the end that paint will not stick any considerable length of time to creosoted lumber. The committee had no recommendation as to specific wording of crossing signs, but the discussion brought out numerous suggestions in this direction, with the idea that the association should try to lead legislation in this regard. The laws of different states require various wordings of crossing signs, some of which are so lengthy that it is impossible to get the inscription on a board or panel of reasonable length, in letters of sufficient size to be read at a desirable distance.

In the report of the committee on economics of railway location there was a division of the committee, the majority thinking that it was not worth while to continue the work of the committee further without employing experts to give their whole time to the investigations, and this, of course, would require an appropriation of money. The minority thought that the work of the committee might be continued somewhat further before specially employed experts should be called in.

The committee on ballast made a progress report on standard sections for roadbed and ballast, the former to be 26 ft. wide for single track, with a reserve width of 2 ft. 9 ins. of embankment shoulder outside the toe of the ballast slope. There was some criticism of this

width as being extreme or, at least, out of reach of practical construction, but it was explained by the committee that several railways were working toward such an increased width of roadbed, at least on paper, it being considered as essential to the desired stability of the earthwork. The committee renewed its recommendation of last year that special tests be conducted to determine the depth of ballast necessary to properly distribute the pressure of moving loads over the roadbed. The question of authorizing such experiments will be considered by the board of direction.

President's Address.*

BY EDWIN F. WENDT, PRESIDENT AMERICAN RAILWAY ENGINEERING ASSOCIATION.

The American Railway Engineering Association continues to grow in membership and usefulness. The past year, 1913, has been characterized by the loyal devotion and conscientious work of members, committees and board of direction. Conservatism prevails at all times in the conduct of the affairs of the association. The committee are endeavoring primarily to accomplish work of quality without reference to its quantity. The membership is awake to the situation, and is working to increase our numbers and influence.

Fifteen years have passed since the organization of our association. The men who gathered at the first convention, held in Steinway hall, Chicago, on March 14, 1900, probably had a vision of the future; but the success of our efforts has exceeded even the fondest hopes of those who organized the association. They certainly heard a voice, saying, "It doth not yet appear what we shall be." And we hear the same voice today, but the question now is, not one of success, but how strong and useful may the association become.

The fiscal year of our association is the same as the calendar year. During 1913 the revenues were \$25,888, and the expenditures, \$22,263. Therefore, the surplus for the year was \$3,625. These figures show that the Association is fairly prosperous; but in order to draw safe deduction, consideration should be given to the relation of revenues to expenses for a period of five years. It will be necessary to reprint the manual in the near future, at an expense of about \$3500, and the conservative policy of the board of direction with reference to the authorization of money for experimental purposes will no doubt prevail until such time as there is a larger revenue.

The progress of the work of the association is reflected in the increase of the text of the proceedings from 200 pages in 1900 to about 2000 pages in 1914.

Past president Mr. John F. Wallace, in his address, March 14, 1900, stated that "The establishment of certain recognized principles as the result of our investigations and discussions will materially assist our managements in adopting a policy that will lead to the truest and highest economy." The manual is an expression of these "recognized principles," and the edition of 1911 contains 450 pages of text. The association should recognize its responsibility for guarding the quality of the work which supports our recommended practice.

The loyal devotion and business-like methods of the members of committees have merited the approbation of all well-informed observers of the work of national engineering societies.

The growth of the membership in fifteen years has been gradual and consistent. The constitution definitely defines the

*Delivered at the 15th annual convention, March 17, 1914, Congress hotel, Chicago.

qualifications of members and the standard requirements for entrance result in the selection only of men who possess large education and experience. From about 200 in 1900, the membership has increased to about 1200 in 1914. It is confidently expected that within ten years the total enrollment will be 2000. Some of our members feel that it would be safe and profitable to admit to full membership certain classes of engineers who are not connected in an official capacity with railway corporations. The merits of this proposition will no doubt receive attention during the next few years. An increase in membership is greatly to be desired, in order that the revenues of the association may be increased. However, the question of money is secondary to that of the qualifications of those who are admitted to full membership.

The Telegraph and Telephone.

The work of the association should be broadened to include the consideration of all elements entering into the fixed physical property. The increasing importance of the telephone in the railway business suggests the advisability of opening our membership to engineers who are expert in the design and construction of telegraph and telephone lines. When a sufficient number of these men join the association, a special committee on this branch of railroading should be appointed.

Rails.

The work of our committee is now recognized by all steam railway carriers, all state governments and all federal governments in America. The improvement of the quality of rails is one of first importance. It is necessary to prosecute the work continuously, and during the past five years the association has had the practical assistance of the American Railway Association. In order to make more rapid progress in the investigation of the rail problem, the Special Engineer who has been working under the direction of the Rail Committee will be furnished with one expert assistant.

Special Committee on Stresses in Track.

The board of direction has appointed a special committee to co-operate with a similar committee from the American Society of Civil Engineers to conduct a series of tests to determine stresses in track. The sum of \$10,000 has been tendered to the American Railway Engineering Association by the United States Steel Corporation to aid in defraying the cost of experiments which will be undertaken. The personnel of our special committee is as follows: A. N. Talbot, chairman, W. M. Dawley, vice-chairman, A. S. Baldwin, J. B. Berry, G. H. Bremner, H. E. Hale, John Brunner, W. J. Burton, C. S. Churchill, W. C. Cushing, Dr. P. H. Dudley, Emil Gerber, J. B. Jenkins, Geo. W. Kittredge, P. M. LaBach, Wm. McNab, G. J. Ray, F. E. Turneure, J. E. Willoughby. The committee from the A. S. C. E. is the same with the exception of Messrs. Dawley, Hale, LaBach, Dudley and Jenkins.

The civil engineering departments of railways generally include mechanical as well as civil engineers. Our constitution states that "a member shall be either a civil engineer, a mechanical engineer, an electrical engineer, etc., etc." Special effort on the part of our members will result in many mechanical engineers making application for admittance, and the work of the Association will be strengthened and broadened by the selection of a special committee to consider the mechanical features connection with the first physical property.

Records and Accounts.

The Committee on Records and Accounts during the next five years will consider many important subjects relating to valuation. Greater uniformity of practice in connection with the preparation of engineering records is likely to result

from the extension of the powers of the Federal Commission. Our committee will find it profitable to review the entire question of fundamental records and to determine the forms and methods which make for uniformity.

The work of the committee should be extended into the field of engineering accounting. The entire series of classifications of accounts of the Interstate Commerce Commission should be carefully studied with reference to both form and principle, and the association should take a leading part in the discussion of any future changes in these classifications. Engineers have been very backward in taking up the study of cost accounting, but the time has now arrived when the exigencies of the situation demand that engineers in charge of construction and maintenance shall perfect their knowledge of the principles which underlie this important subject.

Organization.

The board of direction last year requested the Committee on Rules and Organization to begin the study of the science of organization, and report to the board of direction how this study can be made profitable to the association. The committee has presented to the board a most excellent report, which will probably be printed in the April bulletin and distributed to the members. The initial report of the committee justifies the hope of the board that this subject can be considered profitably from the standpoint of principle with the greatest benefit to the association. Efficiency and economy presuppose correct organization. Scientific management is nothing more than the application of correct principles to the management of business, and the study of the principles of organization will be of pronounced educational value to our members.

Conservation of Natural Resources.

During the year the association was invited to send representatives to the Fifth National Conservation Congress, Washington, D. C., and the following members were appointed as delegates: Messrs. C. H. Fisk (chairman), Earl Stimson, A. W. Carpenter, R. C. Young, and S. B. Rice.

Safety.

An invitation was also received to attend the National Conference on Safety and Sanitation, in New York city, and the following members were appointed as delegates: Messrs. C. H. Stein (chairman), Earl Stimson, and H. S. Balliet.

Signals.

At the beginning of the twentieth century the efforts of signal experts to establish the economy of signal installations were rewarded. Signals were found to safeguard and facilitate traffic. Each year more and more progress has been made, until today signalling is recognized as a prominent factor in successful operation. The number of automatic block signals and interlocking levers has increased by leaps and bounds, and will continue to increase for many years to come. The mileage of manual block has increased from about 24,000 to 64,553 miles, and that of automatic block from 2300 to 22,200. Power interlocking has supplanted mechanical machines at nearly all large plants, and the successful operation of such terminals as the Pennsylvania and New York Central at New York, the joint terminals at Boston, St. Louis, and Washington, and that of the Northwestern Railway at Chicago, are due very largely to the development of power interlocking. Three-position signals, electric route-locking, annunciators, electric detector locking as a substitute for detector bars, illuminated track models, and signals working in the upper quadrant, are among the many important improvements which have become indispensable during the life of our association.

Probably the most interesting development during the past fifteen years has been the use of alternating current for

automatic block signaling. Automatic control of trains has received in the past a large amount of attention by the railways of this association. The St. Paul had test installations in service when our association was founded. Any review of the progress and science of signaling would be incomplete without mention of the earnest and valuable work of Committee No. X on signaling and interlocking in their effort to determine a uniform system of signals. For several years the committee was divided in its opinion, but the members were big enough and broad enough to put aside their individual preference, adopting for their guidance the motto, "Unity in essentials, liberty in non-essentials, charity in all things." Working only for the common good of the profession, they were able last year to present a system which can be universally used, and which has already been adopted on many thousand miles of railway. This system is based on "evolution and not revolution." The adoption of the report of Committee No. X on uniform signaling by our association in 1913 marked an epoch in the progress of the railway.

Track.

The American Railway Association has requested our association to co-operate jointly with the Master Mechanics' Association and the Association of Chilled Car Wheel Manufacturers to determine the question of proper throat clearance for frogs, guard rails and crossings. The work has been assigned to the Committee on Track. Standards of track design, construction and maintenance have been greatly developed during the past 15 years and the work of our association is today regarded as the standard American practice.

The Alaska Railway.

Alaska comprises an area equal to one-fifth of that of the United States. Congress has decided to build not exceeding 1000 miles of modern railway at an expense not to exceed \$35,000,000. The act of congress permits the president either to operate the road when completed, or to lease it to a private company. The release of the natural resources of Alaska now owned by the government and the encouragement of private enterprise in the employment of these resources under conditions of governmental regulation which shall fully safeguard the public interests constitutes one of our greatest national problems. The consideration of this new railway marks an epoch in the history of our country in respect to the construction and operation of railways by the government, but conditions are favorable for the experiment and the results will show whether the new policy of public instead of private ownership is best.

Federal Regulation of Railways.

The marvelous development of the system of steam railway transportation has deeply affected the economic and social life of the American people, and has contributed in large measure to the development of the country. Distance is now measured in hours rather than miles. When George Stevenson built and drove the "Rocket" over the Liverpool & Manchester Railway in 1830, the traveler from London to Rome consumed as much time as the courier of Julius Caesar. The Conestoga wagon in 1790 made the trip from Philadelphia to Pittsburgh in twenty days. The stage coach made the same trip in 1818 in six days. After the construction of the Pennsylvania State Railroad, the train covered the same distance in 1834 in three and one-half days. At present, in 1914, standard passenger trains make the same journey in eight hours. The industrial expansion of the United States, together with the rapid construction and development of railways in all parts of the country, has had a marked effect on the social conditions of the people.

Economics has been defined as the social science of business and the engineer should study the railway business as a problem in economics.

After a public discussion which extended over the years from 1870 to 1885, congress began the consideration of a law for the regulation of common carriers. Public opinion, both in America and Europe, demanded that an industry which so vitally affects the comfort and prosperity of the whole people should be subject to public regulation. On February 4, 1887, congress passed the "Act to Regulate Commerce," which authorized the creation of the Interstate Commerce Commission. This Act contains the following provisions:

- 1. Discriminations are prohibited.
- 2. Railway rates must be reasonable.
- 3. Rates must be published.
- 4. The rate for a short haul must not exceed the rate for a long haul under similar circumstances.
- 5. Polling contracts are prohibited.

The amendment of 1891 empowered the commission to subpoena witnesses and require testimony. The law was amended in 1903 by the passage of the Elkins Act; in 1906 by the passage of the Hepburn Act; and in 1910 by the Mann-Elkins Act. These amendments enlarged the powers of the commission as follows:

- 1. Uniform accounts must be kept by all common carriers in accordance with the orders of the commission.
- 2. Carriers and shippers alike are subject to the penalty of fine and imprisonment for granting discriminatory rates.
- 3. The commission is authorized to secure injunctions against railroads violating the law.
- 4. Carriers cannot change their rates except on 30 days' notice to the commission, and the commission has power to suspend new rates for 10 months, if necessary, until the reasonableness of the proposed rates is determined.
- 5. The commission has power to prescribe what is a reasonable rate.

Valuation of Common Carriers.

On March 1, 1913, congress passed the Valuation Act, which is Section 19a of the "Act to Regulate Commerce." The Interstate Commerce Commission is authorized and empowered to make a valuation of all common carriers of the United States. The term "common carrier" includes steam railways, electric railways, water lines, express companies, sleeping car companies, pipe line companies, telegraph lines, and telephone lines. The problem of valuation is one of gigantic proportions, because it deals with property which is capitalized at about \$20,000,000,000. There is no precedent in any country in the world for this important work, whose purpose is to establish a basis for the regulation of rates. In no other country have valuations ever been made for purposes of regulation. It therefore appears that a new work has been undertaken which will accomplish results of the greatest interest to the people. Important social and economic changes may follow.

The magnitude of the valuation problem is reflected in statistics showing the growth of the railway, the telegraph, and the telephone during the past fifteen years, as follows:

Development of Railways in the United States.

Subject	1900	1911	Gain %
Miles of railway.....	193,346	244,180	26.3
Miles of track.....	258,784	362,824	40.2
Number of operating roads	1,067	1,312	22.9
Number of locomotives	37,663	61,327	62.8
Number of cars in passenger service ..	34,713	49,818	43.5
Number of cars in freight service	1,365,531	2,195,511	60.8
Number of employees	1,017,653	1,669,809	64.1
Compensation of employees, yearly.....	\$577,264,841	\$1,208,466,470	109.3
Average yearly pay for employee	\$567.25	\$723.71	27.5
Number of passengers carried	576,931,251	997,409,882	72.8
Tons of freight carried	583,351,351	1,003,053,893	71.9

Average number of tons per train.....	270.86	383.10	41.4
Capital stock	\$5,845,579,593	\$8,470,717,611	44.9
Funded debt	\$5,645,455,367	\$10,738,217,470	91.9

Development of the Bell Telephone System in the United States.

Subject.	1900.	1912.	Gain %
Mileage of pole lines.....	131,538	315,003	139.4
Mileage of wire.....	1,961,801	14,610,813	644.7
Number of stations.....	855,911	7,456,074	771.1
Number of employees.....	37,067	140,789	279.8
Number of exchange connections daily	5,668,986	25,572,345	351.9
Number of toll connections daily	148,528	738,823	397.4
Liabilities—Total outstanding obligations	\$194,728,100	\$751,178,954	
Assets—Total	230,225,900	924,260,818	

Development of Western Union Telegraph Co.

Subject.	1900.	1912.	Gain %
Mileage of lines.....	192,705	220,928	14.6
Mileage of wires.....	933,153	1,517,317	62.6
Number of offices.....	22,900	25,392	10.9
Number of messages.....	63,167,783	90,000,000 (est.)	42.5
Receipts	\$24,758,570	\$42,987,807	73.6
Toll for average message....	\$0.308	\$0.388	26.0

Valuation is a problem involving (1) the law; (2) engineering; (3) accounting; (4) economics. First, the corporation is organized under the law, followed by the construction of the property, the accounting for its cost, and finally, the consideration of the results of its operation.

In 1898, at about the time of the first meeting of those eminent engineers who conceived and organized the American Railway Engineering Association, the Supreme Court of the United States handed down its decision in the Nebraska Rate Case, affirming the principle that "The basis of all calculations as to the reasonableness of rates must be the fair value of the property being used for the public convenience. What the company is entitled to is a fair return upon the value of that which it employs for the public convenience." In the opinion of the Circuit Court in the Nebraska Rate Case, Justice Brewer said, "Now, if the public was seeking to take title to the railroad by condemnation, the present value of the property, and not the cost, is that which it would have to pay. In like manner, it may be argued that when the legislature assumes the right to reduce rates, the rates so reduced cannot be adjudged unreasonable if under them there is earned by the railroad company a fair interest on the actual value of the property." The Supreme Court in the Consolidated Gas Case, in 1909, said, "We concur with the court below, in holding that the value of the property is to be determined as of the time when the inquiry is made regarding the rates. If the property which legally enters into the consideration of the question of rates has increased in value since it was acquired, the company is entitled to the benefit of such increase." In June, 1913, the Supreme Court decided the Minnesota Rate Case, and said: "The property is held in private ownership, and it is that property, and not the original cost of it, of which the owner may not be deprived without due process of law."

A duty will rest upon engineers in connection with this valuation work, because it is necessary to determine the cost of reproduction, which is distinctively an engineering problem. Congress has ordered, "That the Interstate Commerce Commission shall investigate, ascertain, and report the value of all the property owned or used by every common carrier subject to the provisions of this Act. The Commission shall make an inventory which shall list the property of every common carrier . . . in detail, and show the value thereof, . . . and shall classify the physical property, as nearly as practicable, in conformity with the classification of expenditures for road and equipment as prescribed by the Interstate Commerce Commission." The Commission is required to ascertain and report in detail as to each piece of property (1) the original cost to date; (2) the cost of reproduction new; (3) the cost of

reproduction less depreciation; and (4) in like manner, other values and elements of value.

Original Cost to Date.

It is probable that the original cost of many railways cannot be determined, because records have been lost or burned or destroyed. Roads built before the passage of the Hepburn Act, in 1906, kept their accounts in accordance with a multitude of accounting systems, and charges to capital were determined by a variety of principles. Uniformity of method in accounting was unknown, and where additions and betterments were made, the cost was divided between operation and investment according to the economic principle which was adopted by a particular carrier.

Railways constructed since July 1, 1907, have been required by the Interstate Commerce Commission to report their investments in accordance with a uniform system of accounts, by which charges to capital account were determined on the basis of a uniform principle. The original cost of these roads can be determined.

The determination of the "original cost to date" of railways, whether built before or after the passage of the Hepburn law, is largely an accounting problem. However, many difficulties will arise in connection with the preparation of a final inventory, and it is probable that a portion of the responsibility will rest on engineers.

Cost of Reproduction New.

The Commission is required to determine the cost of the reproduction of railways just as if they were being built anew, and the Act specifically requires that a detailed inventory shall be prepared, and that the units of the property shall be classified. In order to accomplish this purpose, it will be necessary to remeasure the units of the railways of the country, which, at the present time, amount to about 250,000 miles of road. This is a task of gigantic proportions, involving, as it does, an effort to determine the extent of properties which are variously estimated to be worth from fifteen to twenty billions of dollars. The work of estimating the "cost of reproduction new" is essentially an engineering problem, and will require the best energies of the engineers of this country. Many doubtful questions are involved, and since there is no precedent for this work in the history of Europe or America, it will be advisable for such organizations as the American Railway Engineering Association to carefully analyze this problem and study the fundamental principles and factors which should govern.

Cost of Reproduction Less Depreciation.

The depreciation problem is complex and has a bearing on the determination of "fair value." Considerable attention has been given to the depreciation problem in connection with water works, gas plants, and other municipal utilities; but in so far as the steam railroad business is concerned, the principle of depreciation has not heretofore been generally recognized in the keeping of investment accounts. The Supreme Court has decided that depreciation shall be deducted from the cost of reproduction, but there are various methods for computing the amount, and the problem now is to determine the method which will yield a result which will be just and true and fair. This work will involve an extended study on the part of engineers, economists, attorneys, and accountants.

Other Values and Elements of Value.

Congress has recognized the fact that valuation is a complex problem, and has ordered that every feature of the business of common carriers shall be investigated and studied in order that "other values, and elements of value, if any, of the property," shall be reported. This work opens up a large field for valuation experts.

Keeping Valuations Up To Date.

Congress has provided that, "Upon the completion of the valuation herein provided for, the Commission shall thereafter in like manner keep itself informed of all extensions or improve-

ments or other changes in the condition and value of the property of all common carriers, and shall ascertain the value thereof, and shall, from time to time, revise and correct its valuations, showing such revision and correction classified, and as a whole and separately in each of the several states and territories and the District of Columbia, which valuations, both original and corrected, shall be tentative valuations and shall be reported to Congress at the beginning of each regular session." All common carriers will be required to report to the Interstate Commerce Commission the details of their investment in each and every extension, improvement, or change, including deductions incident to property which is retired or abandoned. This is a work of great magnitude for construction and maintenance engineers, on whom will rest the responsibility of determining what units

special committee on valuation of railways, but no final action has been taken. In view of the importance of the work, the Board has arranged to publish a bibliography on the subject, which will be kept up to date by supplements issued from time to time. Many of the fundamental principles and factors entering into valuation remain to be determined, and the high standing of this Association makes it imperative that the membership should lead in the discussion of this question during the next few years. It seems desirable for the Association to appoint a special committee to consider the broad fundamental principles which should be adopted.

Canadian Pacific Electrification Project.

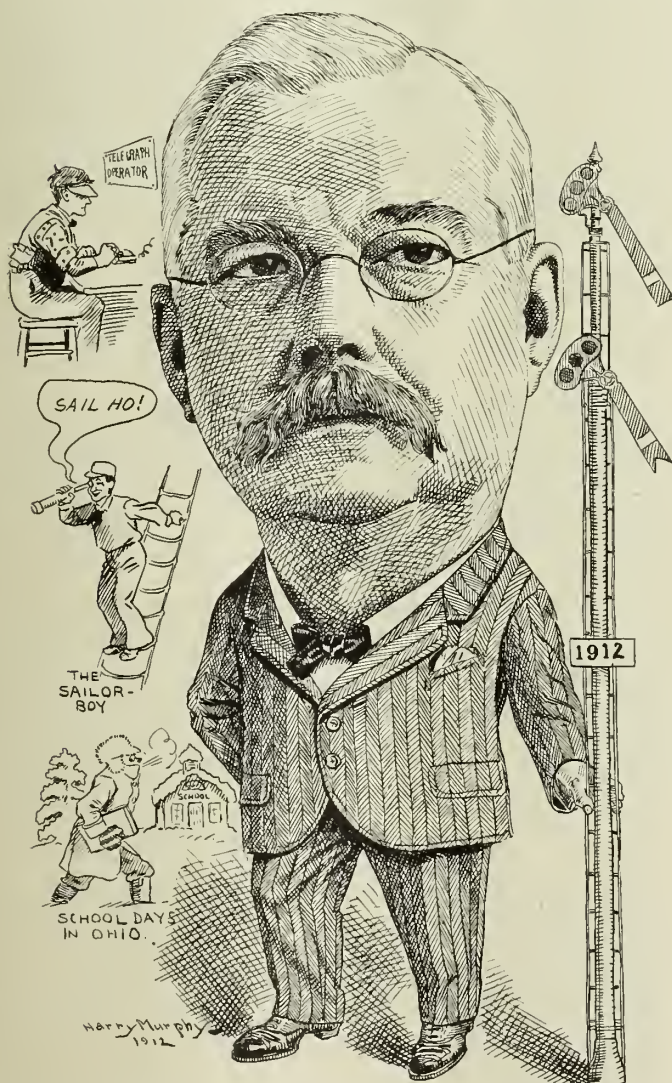
Westinghouse, Church, Kerr & Co., of Montreal and New York, have been retained by the Canadian Pacific Ry. as engineers to investigate the matter of the proposed electrification of the new double-track, 5½-mile Selkirk tunnel in British Columbia. The investigations will cover in general the type of system to be installed, the relative economies of steam and water power and the effect of the electrification upon operating conditions.

Conventions and Meetings.

The annual dinner of the Chicago Alumni of the Pennsylvania State College is held each year during the week of the convention of the American Railway Engineering Association. By this arrangement advantage is taken of the presence of out-of-town members of the alumni of the same institution in attendance at the convention. The annual dinner this year was held on Tuesday night, March 17, at the Union League Club, with an attendance of 44 men, all of whom, except one, were graduates of the Pennsylvania State College. The members from a distance were Mr. Arthur G. McKee, consulting engineer, of Cleveland; Mr. D. M. Taylor, assistant engineer, Wheeling & Lake Erie R. R., Canton, Ohio; Mr. W. F. Straus, assistant engineer, Baltimore & Ohio R. R., Baltimore; and Mr. J. C. Mock, signal engineer, Michigan Central R. R., Detroit, Mich. Mr. C. C. Denney, of the Lake Shore & Michigan Southern Ry., was toastmaster.

The regular monthly meeting of the Western Railway Club was held in the assembly hall of the Karpen building, Chicago, on Tuesday evening, March 17, 1914. The paper presented for discussion at that meeting was prepared by Professor L. E. Endsley, Purdue University, Lafayette, Ind., and was entitled: "A Report of Tests to Determine the Stress in the Plate of Cast Iron Wheels Due to the Heat Produced by the Brake Shoe." In making these tests an interesting example of the utility of the Barry strain gage for determining stresses actually set up in engineering structures, was afforded, the results giving a surprisingly close check on the known behavior of cast iron under stress and also indicating quite definitely, the superiority of certain designs of car wheels as compared with others tested and containing the same quality of material.

The regular meeting of the New York Railroad club was held at the building of the United Engineering Societies, No. 29 West 39th street, on Friday evening, March 20, 1914, at 8 o'clock. Mr. William McClellan, chairman of the standing committee on electrification, issued an announcement prior to the occasion stating that "the feature of the evening will be a visit from Mr. E. Huber-Stockar, formerly general manager of the Oerlikon works, now consulting engineer for the Swiss government and in charge of the electrification work for the Gothard tunnel and also for extensions in the Simplon tunnel. He has accepted an invitation to take part in the meeting and will bring some lantern slides. Some prominent electrical engineer will summarize the



William W. Slater, Late Signal Engineer of the Southern Pacific Co., Who has Retired on a Pension After a Service of Nearly Fifty Years.

of an improvement are to be charged to investment and what units must be charged to operating expenses on account of replacement. Engineering accountants will be required in the offices of original record, and the field of usefulness for the engineer who understands the principles of accounting will be greatly enlarged. Cost accounting is an important branch of railway engineering, and this Association will be justified in requiring its various committees to study the fundamental principles of economics which must be followed in order that the record of cost may be true and fair and just.

Special Committee on Valuation.

The Board of Direction has considered the appointment of a

conditions in the United States at present; and, in addition, there will be two or three speakers who will give short talks on certain phases of the work such as electrical safety devices, interference of high tension lines with telephone lines, etc. These talks will all be as broad and free from mere technical details as possible."

United States Civil Service Examinations.

The United States civil service commission has announced open competitive examinations for inspector of safety appliances and inspector of hours of service, on April 24 and 25, 1914. From the registers of eligibles resulting from these examinations certificates will be made to fill vacancies in these positions at salaries of \$1800 per annum, with necessary allowances for expenses incurred while absent from headquarters in the discharge of official duties. The duties of the respective positions will comprise the making of inspections and reports as required by the safety appliance and by the so-called hours-of-service acts. Applicants must have reached their twenty-fifth, but not their fiftieth, birthday on the date of the examination, and must be physically qualified to perform the duties required in these positions. It must be shown in connection with applications that each applicant is a person of good moral character and of good speech and manner, and qualified to address and confer with railroad officials and employees as occasion may require. An applicant for the position of inspector of safety appliances must have had at least eight years' experience in steam railroad service as conductor, engineer, trainman, yardman, fireman, or yardmaster, etc., and must within two years preceding the date of his application have been in active service in one or more of the capacities mentioned. An applicant for the position of inspector of hours of service must have had at least eight years' experience as trainmaster, yardmaster, train dispatcher, telegraph operator, block signal operator, conductor, engineer, fireman, trainman, or yardman, and must within two years next preceding the date of his application have been in active service in one or more of the capacities mentioned. No person interested either directly or indirectly in any patented article required to be used on any locomotive or car under inspection, or who is intemperate in his habits, shall be eligible for appointment to either of these positions. Persons who meet the requirements and desire either of these examinations should at once apply for application form 1933 to the United States civil service commission, Washington, D. C., or to the secretary of any of the United States civil service boards located in the principal cities.

Bulk Cement Used in Dock Construction.*

The first shipment of bulk cement for work in the immediate vicinity of Pittsburgh was made to the Union Railroad Co. It was for the construction of a 300-foot coal dock, for transferring coal from river scows to railroad cars. The dock is protected by steel sheet piling driven to a point about 32 feet below water level. The concrete foundations for the unloading cranes are carried down 45 feet below the tops of the piles, or about 18 feet below the pool level, and were built within a steel cofferdam and excavated with an orange peel bucket. In all cases, the steel sheet piling was driven well below the bottom of the foundation before the excavation was completed.

Following the excavation, the concrete was deposited with a submarine bucket, so designed as to permit the placing of a yard of concrete under water at one time and reducing to a minimum the separation of cement from the aggregate. The advantage of this method was that pumping was not

necessary from the time work was started until footings were complete.

The railroad track was approximately 25 feet above the pool level. A half-yard mixer was placed on blocking in the excavation about five feet above water level, and directly below the track. A hoisting tower, equipped with buckets, trip, and a discharge chute, was built, the mixer discharging directly into the bucket. Three chutes were carried from the material cars to the mixer and at the head of each chute was a measuring box of the proper size to insure correct proportions of the aggregates used. These measuring boxes held, respectively, 3 cubic feet of cement, 5.4 cubic feet of sand and 11.07 cubic feet of slag.

One man supplied the mixer with sand and four men with crushed slag. Cement was shoveled from a car into a measuring box, until the distance from the cement to the car door was so great that the work could not be done efficiently. A box was then used to carry the remainder of the cement to the car door. In this way it was possible to place about 110 cubic yards of concrete per day of ten hours. The contractor, E. M. Wickert Co., of Pittsburgh, states that the use of bulk cement saved the labor of two men, to say nothing of the trouble experienced in handling sacks and re-shipping them back to the cement plant. Although this is the contractor's first experience with bulk cement, he is so well satisfied that he will continue to use it wherever the railroad facilities are such as to make it at all possible.

The National Tube Company, Frick building, Pittsburgh, Pa., has reissued its circular entitled "About Steel Boiler Tubes," same being based upon a report before the 1910 convention of the International Boiler Makers' Association. The economy of using modern steel boiler tubes is presented in this circular in the form of a simple arithmetic problem, which should be of interest to boiler men generally. The above firm will, as usual, be glad to furnish copies of this circular on request.

An interesting pamphlet by the Gisholt Machine Co., Madison, Wis., describes the mechanism and the functions of the "Periodograph," a time recording device originated in that company's plant for the purpose of arriving at shop-operation cost with maximum facility and accuracy. The above mentioned literature conveys a forceful impression as to the usefulness of this device in manufacturing and similar operations where the time element is an important factor in the cost.

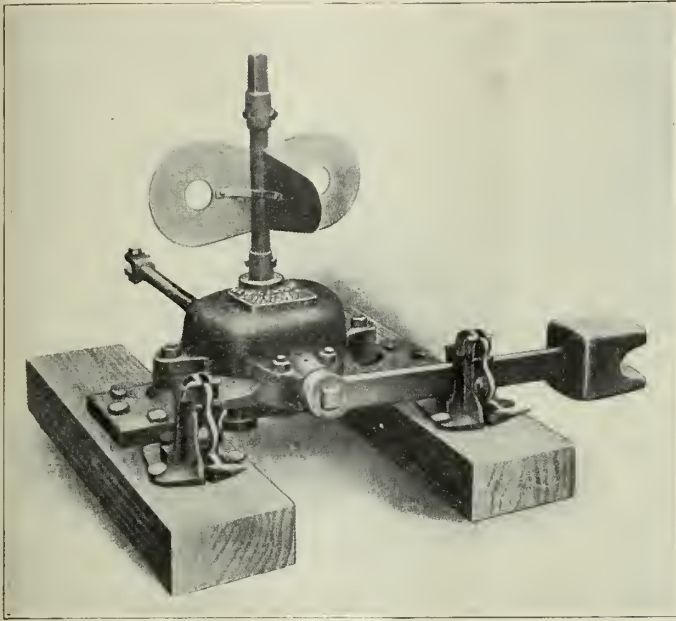
The New Century Switch Stand.

The constantly growing demand among railroad men for a low, automatic switch stand throwing parallel with the track has served to make "The New Century Switch Stand," as manufactured by The Pennsylvania Steel Company, the most widely known of all switch stands. It is made in a variety of models, to which any style of target or semaphore is applicable, and is an ideal stand for either main line or yard use.

The stand is operated by a weighted lever with the action transmitted through a segment gear, spindle and crank foot to the switch rod. The movement of the crank spindle is dependent upon a lug which engages in an aperture in the gear larger than the lug itself. This produces a "lost motion" the regulation of which controls the adjustment of the crank throw, and enables lost motion in the switch, caused by wear, to be taken up.

This feature performs a two-fold purpose. When the switch is trailed, and the stand automatically thrown, the lever is raised to a point somewhat past the dead-center line. From this point the weight begins to fall by its own mass, carrying no load whatever until the lug has traveled to the end of the aperture. Here the lug strikes a hammer blow under the combined impetus of its initial movement,

*From the Universal Bulletin.



The New Century Switch Stand.

caused by the motion of the train, and the momentum of the lever weight. With the fall of the lever assured, the complete closing of the switch is certain.

The second function of the lost-motion feature is to allow a variation in the throw. This is obtained by increasing or decreasing the amount of lost motion. The adjustment is simple and effective and permits keeping the joints tight against the stock rail. The connecting rod is fitted to the stand without the use of a wrench, and the entire stand can be put in operating condition without the use of special tools. The stand becomes positive when used with lock and latches.

To meet the requirements of some railroads a modification of this stand, known as model 60-A, has been placed upon the market. This stand is designed to permit trailing, when locked, without damage to switch or stand. The connection between target and switch remaining unbroken, the target always indicates the position of the switch points. This is accomplished by means of a shear pin of definite strength, which breaks when the switch is trailed.

The New Century switch stand is manufactured from the best gray and malleable iron castings, steel and wrought iron. All bearings are bored and reamed, and all journals are turned to obtain mechanical accuracy. This switch stand, on being placed upon the market, at once jumped into popular favor, and is now standard for many railroads. Its strength and efficiency combined with the adaptability of the several models to all conditions of service have brought it into favor.

The Valuation of Railway Systems.

The present is an opportune time for the transformation of the filing systems of railroads. The valuation of railways and the standardization of drawings and form sheets has caused the Art Metal Construction Co. to anticipate the special requirements of the railroads and to especially design cases for this purpose.

The "Art Metal Vertical Planfile" files more drawings—more conveniently—in less space—and protects them from fire, water and dust.

This file keeps drawings of assorted sizes flat, smooth and as easy to find as letters in a vertical file—protected from dirt, water, unnecessary handling—and from fire in a marked degree—at a saving of some 60 per cent in floor space and

a marked saving in cost, compared with ordinary plan drawers.

If the office, vault or drafting room is overcrowded—if it is necessary to struggle with wide wooden plan drawers—if rolled plans are tucked away—this new file will be of special interest.

One Planfile holds 3,000 tracings. Twelve or more flat drawers are required to give this capacity. The Planfile extends only 20 inches from the wall when closed—about 30 inches when open. A flat plan drawer case to file drawings 48x36 would take up about 78 inches of aisle space when drawer is fully extended.

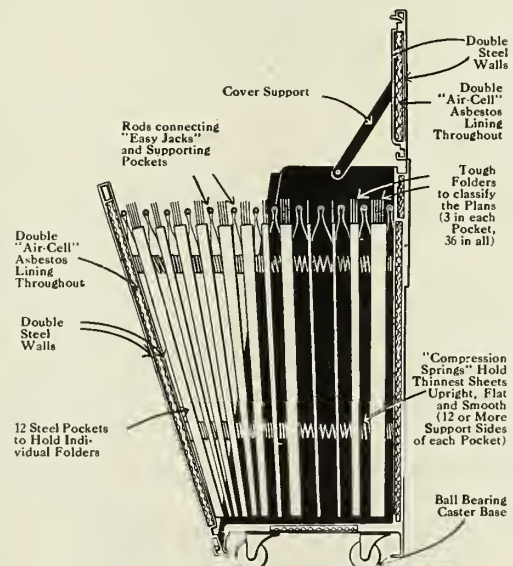
Thinnest sheets are held upright, flat and smooth. "Compression springs" support sides of each steel pocket—an exclusive feature. No matter what size or how thin the sheets, they are not crumpled down.

More accurate classification of drawings is obtained. Each set of drawings is filed in a separate folder with contents noted on tab, like letters in a vertical folder. The folder further classifies by grouping them in the twelve steel pockets; 36 large manila folders (3 for each pocket) are regularly furnished.

We understand that these new Planfiles cost very much less than the same capacity in ordinary flat files.

The new files are built entirely of steel plates, handsomely finished in olive green enamel. Other plain colors or hand-grained finishes in perfect resemblance of any cabinet wood are also furnished.

The files are made single or double wall construction as desired. The walls of double wall Planfiles are lined with two thicknesses of "air-cell" asbestos, adding to the heat re-



Cross section of Planfile showing exclusive ART METAL features.

Vertical Plan File with Horizontal Compression, Art Metal Construction Co.

sistance. Double wall Planfiles have Yale & Towne locks. They have a caster base and are easily wheeled about. A reference board, made of three-ply cork pine with hardwood edges, can be attached to the Planfile. This does not interfere with folders or drawings filed, and can be used as a drawing board if desired. When not in use, the board is easily detached and stored in front pocket, with or without drawing attached. Boards are width of case and 24 inches deep.

Exhibit of the General Railway Signal Company.

The exhibition of the General Railway Signal Co. at the Coliseum, comprised the following electric and mechanical

interlocking, alternating and direct current automatic block signaling appliances, also train dispatchers' selector system.

Electric interlocking (dynamic indication)—two model 2 electric interlocking machines, 110 volt semi-automatic model 2A signal, 110 volt model 2A dwarf signal, model 2 and model 4 switch machines, relays and indicators.

Mechanical interlocking—dwarf signal (R. S. A. design), "EZ" motion plate rail clips, adjustable deflecting bars, R. S. A. standard pipe carriers, cranks, compensators, solid and screw jaws, pipe lugs, pipe adjusting screws, jaw and crank pins. Model 2A power distant signal (dynamic indication), Model 2B electric lock, relays, indicators, circuit controllers.

Alternating current automatic block signaling—110 volt model 2A signal with induction motor, light signal, model 2 and model 4 relays and indicators, impedance bonds, transformers and other appliances which are also used in direct current signaling.

Direct current automatic block signaling—10 volt model 2A signal, model 9 relays and indicators, three position motor relay, model 5A switch circuit controller, model 1B lightning arrester, relay boxes, cable posts, cast iron battery chute.

Train dispatchers' selector system—Selectors, bells, key cabinet, line relay, reactance and capacity units, take siding signal with its "answer back" device.

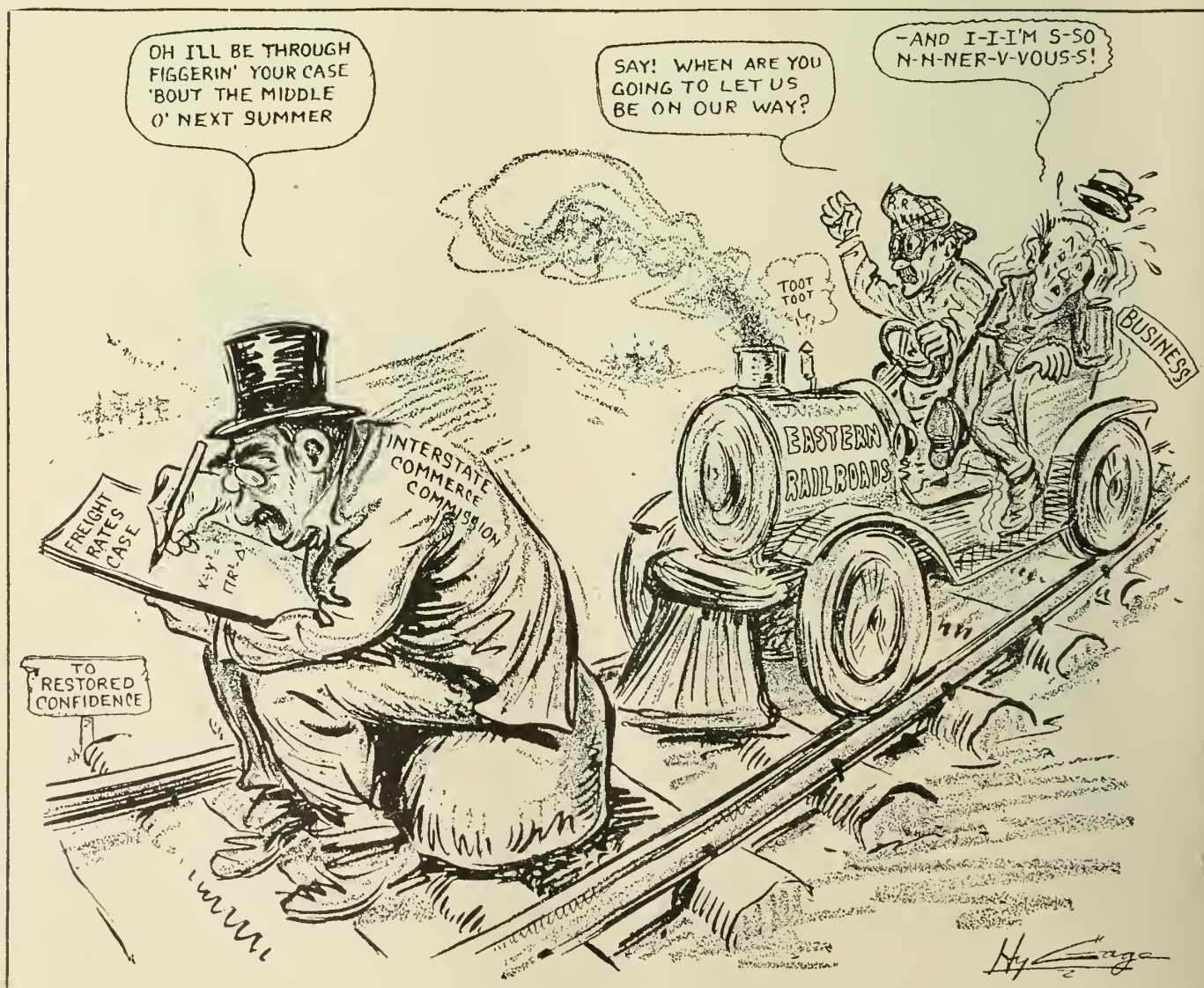
Miscellaneous—Outlying switch lock.

The electrical devices are connected to energy and may be operated as under service conditions. The representatives of the company present were M. R. Briney, P. E. Carter, E. P. Crane, S. M. Day, L. E. Dodge, F. L. Dodson, W. S. Henry, W. K. Howe, F. H. Jones, W. W. Lavarack, R. C. Leake, H. W. Lucia, F. W. Moffett, A. G. Moore, C. O. Poor, F. W. Rizer, F. B. Rosencrans, W. W. Salmon, V. I. Smart, H. M. Sperry, L. B. Somerby, H. B. Taylor, L. Thomas, A. Thomson, S. N. Wight, W. P. Woodruff, M. Wuerpel, W. R. Young.

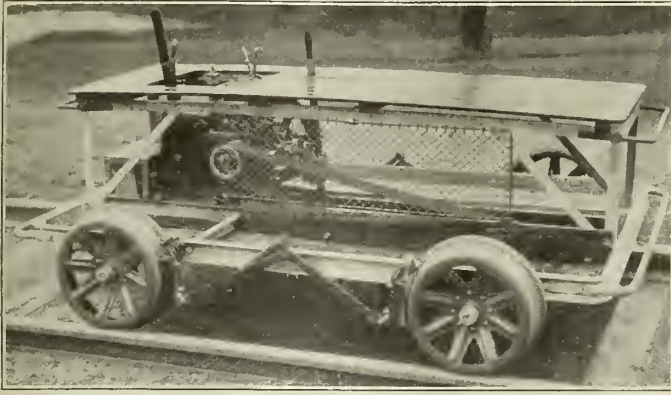
Rockford Motor Car No. 1.

The Rockford railway motor car for track workers and inspectors' use represents the result of a well developed design and involves a number of features making it especially desirable for this purpose. Notable among these is the fact that it is fitted with a free-running engine giving a range of speeds from 3 to 18 miles per hour and making it possible to start the car from rest under a full load of eight men and tools. The engine being readily detachable, it can be removed and shipped for repairs and a second engine installed during the interim, thus avoiding the loss of service of the car.

The car is built upon an all steel frame of 3-in. channel, the



The Business Hold-Up—As the Philadelphia Press Sees It.



The Rockford No. 1 Motor Car.

various members of which are welded by the autogenous process into a single unit, no rivets or bolts being used. The seat frame is hot-riveted into a removable unit, the side rails being given a noticeable upward bowing, thus overcoming any tendency of seat to sag when carrying passengers. The seat top made up of yellow pine slats is also a complete unit and can be removed entire without disturbing the engine. The main frame is mounted on four 16-in. steel wheels with standard M. C. B. flanges. The wheels are of standard taper-bore and are pressed upon the tapered axle, no keys or other fastenings being used. The wheels on left side of car are insulated from the axle, making it possible to operate car over track equipped with electric block signals without in any way disturbing them. The bearings are of high speed, heavy duty babbitt, scraped to surface. The brakes are made to operate on all four wheels, and are such that worn shoes can be readily replaced.

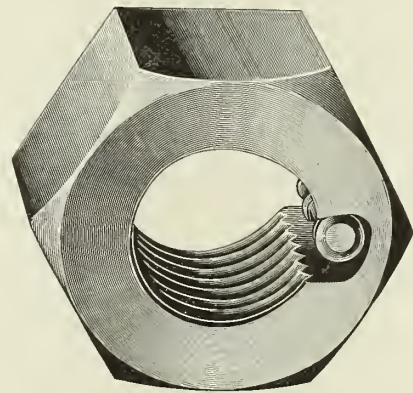
The car is equipped with a reversible two-cycle, removable motor of the hopper cooled type, and develops four horsepower. Cooling is secured by filling the hopper or jacket with water through an opening at the top, about five gallons being required to fill the hopper. In extreme cold weather a pail or two of hot water put into the hopper will warm up the engine so that it is readily started. The engine has no valves, gears, cams, cam shafts or other mechanism requiring close attention and delicate adjustment. The carburetor is of the float-feed needle valve type and is controlled by a lever near the upper part of the engine and convenient to the operator. The engine is equipped with the jump spark ignition system, composed of a single unit high grade spark coil and six dry batteries, this giving a simple and reliable ignition apparatus for railway motor car use. A switch is provided to prevent accidental running down of batteries. Lubrication of the cylinder is ob-

tained by a sight-feed oil cup feeding oil directly into the cylinder. The connecting rod bearing is lubricated by mixing oil with the gasoline in the ratio of one pint of oil to five gallons of gasoline. The crank shaft bearings are provided with grease cups.

The Absolute Lock-Nut.

The Absolute lock-nut, manufactured by the American Lock-Nut Co., of Pullman Station, Chicago, is exhibited by the Spencer Otis Co., who are the railway sales agents, in their space in the Coliseum exhibition. The principle employed in this lock is that of a rolling wedge.

A recess is cut in the inner surface of the nut, in which travels a locking pin of such size, that when the nut is screwed onto the bolt, the angled sides of the locking pin heads fit into the threads of the bolt, while the flat surfaces of locking pin heads travel just against the angled top of the recess of nut, rotating in its deepest portion. The top of the recess is of such angle that the nut is automatically



The Absolute Lock-Nut.

and continuously locked against any backward motion, as such motion only wedges locking pin tighter into the threads of the bolt. The heads of the locking pin align with the threads of the nut, forming a continuous thread and becoming a part of the nut.

These nuts do not require any special bolt, do not injure the thread of the bolt, and can be applied and removed repeatedly. It is claimed that they do not work loose and resist vibration absolutely. They have been in successful use in track and structural work for several years, as well as on cars and locomotives. It comes with nut and lock together ready for application, the same as ordinary nuts.

The Railway Supply Man's Point of View

The Right Time.

The time to get in good work in the way of publicity for selling railway material and appliances is when railway men have time to listen to consider and to investigate. When after a period of dullness in railway business, traffic conditions begin to improve, railway men are on the firing line every minute. Just at that time many supply people begin to advertise, to write letters, to exhibit and to build fires under their selling force out on the road. Then they think it strange that they cannot get the attention they think they deserve and blame railway men for lack of interest or worse.

We have said that several times before, but it needs to be said over and over until it sinks into the sub-consciousness of the railway supply industry. Just now we have a beautiful example in the great exhibit made this week of railway

appliances in Chicago synchronously with the annual convention of the American Railway Engineering Association, and meetings of the Railway Signal Association and other bodies.

Those exhibitors who withdrew owing to the dullness of business made a serious mistake and conversely those who came in to take their places did the right thing at the right time. Exhibiting is one form of advertising and has its own distinct value. It is most effective when supplementing or supplement by good publicity in the technical press. It takes time for a railway man to visit exhibitions and to read the papers carefully; although the latter has now become a habit with the most intelligent. But when he is "short on" time, he has direct duties which control. "The instant need of things" commands his every effort.

Then why, in the name of common sense, and plain every-

day efficiency, not get in your work when your victim is "long on" time?

The exhibition this week was an exceedingly good one, with hosts of new things all through. It was, we believe, extremely satisfactory. The attendance was large and of excellent quality. The railway men were bent on learning if not on immediate buying. They looked into things well, and future buying will be greatly influenced by what they saw and heard this week. They carried away the literature and read it. What more can you ask than to have the opportunity to present your case in this way?

Perhaps not many orders were taken; that ought not to be expected. You ate a good meal the other day; can you point to the exact spot in your physical system, where it nurtured and built you up? You know that it was good for you and that if you omit your regular nutriment or take it irregularly and spasmodically, you will run down. Just so, business needs good regular publicity at all times; and especially when it is not feeling just fit. The day of competitive advantages built upon other things than real merit, is fast waning. The power of cliques and friendship and graft and of mere business smartness, is fast waning. The light of day will banish miasmas and built up business health.

Good publicity work in advertising exhibiting and direct salesmanship will constitute the real business hygiene of the future. It is like the morning bath, the sensible diet and the open air exercise. It tones up and invigorates and establishes a healthy constitution. Drugs and stimulants and narcotics may keep a business going for awhile, but they break down its constitution sooner or later.

Come out into the open and take deep draughts of air and light into your business and the business will thrive as the individual does who adopts that policy before it is too late. Hardening of the business arteries and commercial diabetes have not gone so far that they cannot be remedied while business is yet alive. These are the days of X rays. "Let your light so shine!"

National Railway Appliances Association Annual Meeting.

The sixth annual meeting of the National Railway Appliances Association was held Tuesday, in the Coliseum Annex ball room. The following new officers were elected: President, N. M. Hench, Carnegie Steel Co.; Vice-President, P. W. Moore, P. & M. Company; Treasurer, C. W. Kelly, Kelly-Derby Company. L. G. Parker, of the Cleveland Frog & Crossing Co., was elected a director for one year and M. J. Trees, Chicago Bridge & Iron Works, and E. E. Hudson, Thomas A. Edison, Inc., were elected directors for three years.

The retiring president, Mr. Wyles made a few remarks on the past year's work of the Association calling attention to the new signs over the booths and the necessity of using only these standard signs without attaching any decorations or other matter to them. He stated that the directors had had the best co-operation in years from the exhibitors in the allotment of space and called attention to the grouping together of the signal companies and allied interests. He stated that the demand for admission tickets had been greater this year than ever before and that yesterday the door-man's records showed a larger attendance. He called attention to the good work of the enrollment committee and to the publication this year for the first time of the enrollment booklets giving the names and addresses of the supply-men in attendance.

The Year Book was commented on and Mr. Sperry given a vote of thanks for his interest and the work of his committee in getting out the book in such fine shape and at a profit to the organization.

The treasurer's report showed the association to be in good standing with a surplus on hand at the close of the 1913 year of over eight thousand dollars.

John N. Reynolds, who has been treasurer of the Association for the past twelve years, resigned. J. Alexander Brown, in behalf of the Board of Directors, presented him with a silver loving cup in appreciation of his loyal work for the Association. T. W. Snow brought up the question of closing the exhibit at nine o'clock and after some discussion it was decided to continue the opening hour at eight o'clock in the morning for the benefit of the railroad men who might desire to visit the exhibit prior to the opening of their meetings at the Congress Hotel at 9:30; and it was also decided to extend the closing hour to ten o'clock as has been done in other years.

The meeting closed with a vote of thanks being extended to Secretary Bruce V. Crandall for his work.

Co-operation.

By ARTHUR WYMAN, ASSISTANT TO PRESIDENT, CHICAGO RAILWAY EQUIPMENT CO.

The Century Dictionary defines co-operation as follows: (1) The act of working together to one end, or of combining for a certain purpose; (2) Joint operation or endeavor; (3) Concurrent effort or labor, as the co-operation of several authors; (4) The co-operation of the understanding and the will. Broad as these various definitions appear, they seem meagre, indeed, to the close observer of the present day; for co-operation is so manifest in every department of human activity that, like the air we breathe, it is often overlooked, unseen—unrealized as a vital factor in all human accomplishment.

We are inclined to look upon the word of co-operation, as applied to modern commerce or modern industry in a specific yet narrow sense, and as indicating nothing more fundamental than that method of conducting business which seeks primarily to eliminate unnecessary or wasteful competition among the producers of an article in common; secondarily as a means of reducing the cost of production by enlarged operations, and thirdly, by reduced cost of distribution and sale, with the increasing profits which result directly from the operation of the first mentioned considerations.

Thus, as applied in the business world at least, that splendid word co-operation is looked upon askance by many, and in a superficial and an erroneous sense by many more. Co-operation in the mind of the average man seems to associate itself only with that evolution in business and business methods which has produced the gigantic corporations, the vast railway systems, steamship lines and various business enterprises conducted on a scale so large as to give many of them the external appearance of monopoly—hence the illusion. A wide spread, popular belief seems to regard co-operation as being not only a new factor in the conduct of the world's affairs; but as a new economic force or principle. And yet, co-operation is as old, almost, as humanity. The whole fabric of existence is interwoven with it. Prehistoric man may not have recognized or employed it: but primitive man, in the earliest stages of civilization knew it and practiced it—yet perhaps, without a full realization of its real meaning and its potential value.

Co-operation takes on so many and such varied forms, its force is exerted throughout so many avenues of human endeavor, that it would seem self evident as a potent factor in the growth of civilization, and in the development and uplift of the human race. There are many students of economics and history who would frankly admit that co-operation has been a most logical and valuable contributor to all constructive effort and accomplishment, and who yet halt at its application to present day activities and undertakings. It should not be overlooked that, from time immemorial, nations have combined to attain laud-

able ends and to conserve common interests; that scientists have achieved their most notable triumphs and marked their greatest progress in research through co-operative effort; that governments are trending toward laws in common as the result of mutual comparison and co-operative effort—to eventuate in a common standard of justice, and individual rights. In fact, every unit of organized society is but a component part of some body politic which, as such, is in turn but a unit of some larger body actively contending for rights and privileges for those who compose it, be they communities, institutions, classes of society, corporations or individuals. Why then, with the vast number of world wide illustrations of this valuable force in all forms of progress, should we withhold it from those activities which have placed our country in the foremost rank of the world's nations?

But business! Ah! that word which seems to inspire our legislators, both national and state, with distrust and suspicion, and to brand its most successful followers as creatures of circumstance who have reared mammoth fortunes over the prostrate forms of their weaker brothers. Truly, there are none so blind as those who will not see. The interdependence of men in social and political life is so manifest as not to require comment. It is almost equally so in business life. Co-operation in business embodies the laws of selection, elimination, apportionment and blending. No industry or business enterprise of any magnitude could exist today were not these essential laws clearly recognized and consistently practiced. The most casual observer of present-day conditions and business methods would not for a moment attempt to deny that it requires all kinds and manner of men to make up a complete and well-balanced organization. The product of individual activity is extremely limited both as to value and volume; but many times multiplied when blended with that of others under an assignment of duty which takes careful note of individual ability, and the part it plays in the accomplishment of aggregate results. While the individual is thus in a sense dwarfed, it cannot be denied that he is in an equally logical sense expanded.

Co-operation as applied specifically to the conduct of some of our larger industries has accomplished many beneficial results; although, like any other economic force in traveling the path of progress, has left its blight upon those who have failed to recognize it, to embrace it, and to seek to guide rather than to thwart it. But, in all fairness, should a law, a method or a business policy be judged by its success or by its failures? Would not the limit of magnanimity toward past precedent be reached in adjudging them on their average results? From this view point, who can deny that the average man in this country is today receiving a better return for his labor, be it mental or physical; be he an executive or a mill toiler; the leader of the orchestra or the "torturer" of the base drum, than the same average man would receive were he called upon to personally and solely conduct a large industry; to assume the roll of the village blacksmith, or attempt to impersonate a whole brass band?

The scientific assembling and operation of a large business organization seeks first, to put the right man in the right place; to utilize the abilities of each man along lines for which he is by temperament, native ability and training best fitted. While constantly mindful of individuality, and the force of the personal equation; it nevertheless aligns its members in the composite human machine with the same care and discrimination with which the component parts of any complex mechanism are grouped—that harmony of action and a maximum of efficiency may result. It can hardly be doubted that, taken in a broad sense, more men are today doing the work for which they are fitted, are producing, both for the interests with which they are allied and for themselves individually, more lucrative returns than would be possible under a regime which forbade corporate existence—which left the country and its citi-

zens to work out its and their salvation by strictly individual activities.

Our government has heretofore assumed a most anomalous attitude toward this vital question—vital to the individual—vital to business—vital to the nation. The Sherman law has hung like a grim specter over the business world since 1890,—inert, dormant, and practically ignored during the greater part of this period, and which period, incidentally, has recorded the greatest progress of co-operative effort for over a century. This Law was a short time ago resurrected and its penalties invoked against some of the largest industries in the country—and with what result? Only to more clearly demonstrate the fact that economic law will assert itself, like all the forces in nature—and that like all the natural forces, it cannot ultimately be legislated out of existence, even by the most powerful of nations. In its attempted enforcement conscientious and honorable men have been brought face to face with possible, grave, consequences—because of their recognition and employment of this well known and valuable force in the conduct of affairs.

The government's attitude toward co-operation in its most highly developed forms is extremely vague—in some instances paradoxical. It admits that some businesses, because of their nature, must be exempted from the prohibitions of the Sherman law. It, however, vigorously asserts them against other classes of business which are logically and economically equally entitled to such exemption. Many of the so-called quasi-public utilities are exempted and why? For precisely the same reasons that would apply with equal consistency to many of our larger privately owned and conducted industries. Where shall the line of demarcation be drawn? Proper division and reward of labor, the adaptation of supply to demand, the elimination of economic waste, and the invaluable conditions of general business stability, are among the many advantages which flow from well regulated and intelligently directed co-operation.

It cannot be denied, however, that so many and mighty a force is susceptible of great abuse. All the forces in nature can be perverted into powerful agents of destruction. But why not harness, control and regulate this great natural force, rather than to attempt to either deny its existence or to crush it.

It has been the history of the world that co-operation has been a constructive agent up to that point where its attempted elimination has resulted in violent disruption, chaos and dissolution.

This is one of the administration's most vital problems of today. May we not hope that this mighty force of co-operation may be accorded its just place in the economics of our generation, receive that recognition at the hands of our lawmakers which will utilize its vast power, safe-guard its dangers, and permit it to play its wholesome part in the continued growth of our nation?

Readability.

Railroad Men for March has this to say about railway journals:

"The railroad field is pretty well occupied by publications, and custom does not stale their infinite variety. They range from the ultra-technical to the amateurish. From 'see diagram page thirteen, Figure II,' we may run the gamut all the way to the startling announcement that 'Brakeman Davy Hicks has sold his brindle calf.' Railroad Men confesses to a desire to land somewhere in the vicinity of half way between these types of journalism. It is generally supposed that the exceedingly technical articles are of enthralling interest to railroad officials, but frankly they are not. Railroad officials are just human beings after all, and mighty few of them have either the time or the disposition to wade through articles that are extremely technical in character. They like readable things, even as you and I.

"On the other hand, the 'Sadie Jones' type of railroad maga-

zine represents a very poor variety of literature that is of little, if any, value. While these 'come again Charley' comments may give momentary pleasure to someone, they do not constitute magazine work, at least not to our way of thinking."

But is technical matter necessarily dry and uninteresting, and should a railway man cast aside a paper because it has some valuable technical matter in it, although it also has a considerable amount of the lighter stuff? We believe it to be possible to be both technical and readable; and we certainly believe readability to be better than dry and stiff "dignity."

"Railroading" is an aggregate of many trades and professions. It may be a life avocation, but it is not in itself a trade or profession. Each man in it wants stuff relating to his own special point of contact with the business; and, of course, is inclined to magnify that. But the men who rise to high positions are those who observe and study the relations of things in the railway business. To those who have such an ambition, a weekly railway journal, like the Review, will be invaluable. The interesting and entertaining parts all help; but he needs something substantial as well. We have known men to miss great opportunities by simply neglecting to read certain articles which would have posted them, and while keeping them from making mistakes, would have kept them from saying later, "If I had only known."

George Westinghouse.

EXPRESSION ADOPTED BY THE GENERAL EXECUTIVE COMMITTEE OF
THE RAILWAY BUSINESS ASSOCIATION, AT CHICAGO,
MARCH 18, 1914.

In the death of George Westinghouse the general sense of loss is felt in especial degree by those branches of industry and commerce related to railway transportation. Their present development was founded upon his invention of the airbrake, which by permitting modern high-speed trains accelerated immeasurably the growth of the country and of its transportation system. His achievements in other fields would have made him known throughout the world, but what he did for transportation alone brought him universal fame and it was fitting that in 1905 when the International Railway Congress at Washington was invited to attend the ceremonial opening of the mechanical exposition held in compliment to that body, George Westinghouse should have stood forth to greet the delegates from many lands as the foremost American designer and manufacturer of railway appliances.

He added lustre to the occupation in which we are engaged; he augmented the world-wide prestige of American scientific achievement.

Discoverer of priceless knowledge, founder of industries supporting tens of thousands of families in half a dozen countries, pioneer in the amelioration of working men's condition, exemplar of self reliance, of devotion to earnest toil and of simple living, George Westinghouse confronted death with courage and conscience, sparing no exertion even in the valley of the shadow, that he might make all things ready and protect in tranquillity and prosperity the many thousands whose livelihood comes from the enterprises established by him.

We extend our deepest sympathy in their affliction to our colleague and to the other members of the bereaved family.

The Late E. L. Adreon.

The general committee of the Railway Business Association at a meeting held in Chicago, March 18, 1914, adopted the following resolution:

"E. L. Adreon, an executive members of the Railway Business Association since its formation, was taken from us on December 29, 1913.

"By reason of conscientious devotion, constant attendance, wisdom in conference, high character and influence, which he was at all times ready to exert for the promotion of the public welfare, Mr. Adreon had made most valuable contributions to our labors and won the confidence, esteem and affection of his associates. The members of the general executive committee express our deep sympathy with the bereaved, regret at the loss of our associate, admiration for his earnestness, sincerity, courage and loyalty as a public servant, as a business man, as a citizen and as a friend."

The June Conventions.

LIST OF EXHIBITORS WHO HAVE TAKEN SPACE FOR THE M. C.
B. AND M. M. CONVENTIONS, JUNE, 1914, UP TO DATE.

Acme Machine Tool Co.	Deforest Sheet & Tinplate Co.
Acme Supply Co.	Detroit Lubricator Co.
American Abrasive Metals Co.	Dixon, Joseph Crucible Co.
American Arch Co.	Draper Mfg. Co.
American Balance Valve Co.	Dressel Railway Lamp Works.
American Brake Co.	Duff Mfg. Co.
American Brake Shoe & Fdry. Co.	DuPont Fabrikoid Co., Inc.
American Brass Co.	Eagle Glass & Mfg. Co.
American Car & Fdry. Co.	Economy Devices Corp.
American Car & Ship Hdw. Mfg. Co.	E. D. E. Company.
American Flexible Bolt Co.	Edison Storage Battery Co.
American Locomotive Co.	Edwards, O. M., Co.
American Mason Safety Tread Co.	Electric Controller & Mfg. Co.
American Nut & Bolt Fast. Co.	Electric Storage Battery Co.
American Roll Gold Leaf Co.	Elwell-Parker Electric Co.
American Steam Gage & Valve Mfg. Co.	Equipment Improvement Co.
American Steam Foundries.	Fastnut, Limited.
American Tool Works Co.	Flannery Bolt Co.
Anchor Packing Co.	Forged Steel Wheel Co.
Armstrong-Blum Mfg. Co.	Fort Pitt Malleable Iron Co.
Ashton Valve Co.	Foster, Walter H., Co.
Baker Bros.	Franklin Railway Supply Co.
Barco Brass & Joint Co.	Frost Railway Supply Co.
Baush Machine Tool Co.	Galena Signal Oil Co.
Besly, Chas. H. & Co.	Garlock Packing Co.
Bettendorf Co.	General Electric Co.
Bird-Archer Co.	General Railway Supply Co.
Blackall, Robert H.	Gold Car Heating & Ltg. Co.
Boker, Herman & Co.	Goldschmidt Thermit Co.
Bowser, S. F., & Co.	Greene, Tweed & Co.
Brown Auto. Hose Coup. Co.	Griffin Wheel Co.
Brubaker, W. L., & Bros.	Grip Nut Co.
Buckeye Steel Castings Co.	Gould Coupler Co.
Buffalo Brake Beam Co.	Hale & Kilburn Co.
Camel Co.	Hammett, H. G.
Carborundum Co.	Harrington, Edwin, Son & Co., Inc.
Carnegie Steel Co.	Hartshorn, Stewart Co.
Cayuta Mfg. Co.	Heppenstall Forge & Knife Co.
Chase, L. C., & Co.	Hewitt, H. H.
Chicago Car Heating Co.	Hewitt Rubber Co.
Chicago Pneumatic Tool Co.	Heywood Bros., & Wakefield
Chicago Ry. Equipment Co.	Hunt-Spiller Mfg. Corp.
Chicago Varnish Co.	Hutchins Car Roofing Co.
Chisholm & Moore Mfg. Co.	Independent Pneu. Tool Co.
Cincinnati Bickford Tool Co.	Ingersoll-Rand Co.
Cincinnati Milling Mach. Co.	Illinois Steel Co.
Cincinnati Planer Co.	Jacobs-Shupert U. S. Firebox Co.
Clark Foundry Co.	Jenkins Bros.
Coe, W. H., Mfg. Co.	Johns, H. W., Manville Co.
Commercial Acetylene Ry. L. & S. Co.	Joliet Railway Supply Co.
Commonwealth Steel Co.	Jones & Lamson Machine Co.
Consolidated Car Heating Co.	Jones & Laughlin Steel Co.
Consolidated Ry. Elec. Lgt. & Equip. Co.	Joyce-Cridland Co.
Cooper-Hewitt Electric Co.	Justice, Phillip S., & Co.
Crane Co.	Kerite Insul. Wire & Cable Co.
Crosby Steam Gage & Valve Co.	Keyoke Railway Equipment Co.
Curtain Supply Co.	Keystone Lubricating Co.
Damascus Brake Beam Co.	Landis Machine Co.
Dazie Mfg. & Supply Co.	Lehon Co.
Dearborn Chemical Co.	Locomotive Superheater Co.
	Lodge & Shipley Machine Tool Co.
	Long, Chas. R., Jr., Co.

Lunkenheimer Co.
Lutz-Webster Engineering Co.
Locomotive Stoker Co.
Magnus Metal Co.
Mahr Mfg. Co.
Manning-Maxwell & Moore, Inc.
Massachusetts Mohair Plush Co.
Midvale Steel Co.
Mudge & Co.
McConway & Torley Co.
McCord & Co.
McCord Mfg. Co.
McGraw Publishing Co.
Nathan Mfg. Co.
National Graph. Lubr'cat'r Co.
National Lock Washer Co.
National Mall. Castings Co.
National Tube Co.
Newhall, Geo. M., Engr. Co.
Newton Mach. Tool Wks., Inc.
Niles-Bement-Pond Co.
Norton, A. O., Inc.
Nuttall, R. D., Co.
Okonite Company
O'Malley-Beare Valve Co.
Pantasote Co.
Parkesburg Iron Co.
Pels, Henry & Co.
Pilliod Co.
Pocket List of R. R. Officials.
Pollak Steel Co.
Power Specialty Co.
Pressed Steel Car Co.
Pyle National Electric Head-light Co.
Pyrene Mfg. Co.
Quigley Furnace & Fdry. Co.
Railway Electrical Engineer
Railway List Co.
Railway Materials Co.
Railway Review
Railway Utility Co.
Ralston Steel Car Co.
Reading Specialties Co.

Reed Mfg. Co.
Reliance Electric & Engr. Co.
Remy Electric Co.
Robinson Co.
Rochester Germicide Co.
Ross Schofield Co.
Ryerson, Joseph T., & Son.
Safety Car H'tg & L'tg Co.
Sargent Co.
Sellers, Wm. & Co.
Simmons-Boardman Pub. Co.
Standard Asphalt & Rub. Co.
Standard Heat & Vent. Co.
Standard Steel Car Co.
Standard Stoker Co., Inc.
Strong-Carlisle & Hammond Co.
Symington, T. H., Co.
Transportation Utilities Co.
Union Draft Gear Co.
Union Railway Equipment Co.
Union Spring & Mfg. Co.
United Engineering & Fdy. Co.
U. S. Light & Heating Co.
U. S. Metal & Mfg. Co.
U. S. Metallic Packing Co.
Universal Draft Gear Attachment Co.
Valentine & Co.
Vissering, Harry & Co.
Warner & Swasey Co.
Watson-Stilman Co.
West Disinfecting Co.
Western Ry. Equipment Co.
Western Steel Car & Fdry. Co.
Westinghouse Air Brake Co.
Westinghouse Elec. & Mfg. Co.
Westinghouse Machine Co.
Wheel Truing Brake Shoe Co.
Wiley & Russell Mfg. Co.
Wilmarth & Morman Co.
Wilson Remover Co.
Wilbonco Mfg. Co.
Wine Railway Appliance Co.
Yale & Towne Mfg. Co.
Zug Iron & Steel Co.

copper circuits will be constructed immediately and instruments will be installed at every station and block office.

Boston & Albany.—The reconstruction of the Boston & Albany R. R. bridge at Springfield, Mass., is contemplated, and providing the New York, New Haven & Hartford R. R. co-operates, it may be a four-track bridge. The building of a 13-mile line of road from Windsor Locks, Ct., to Springfield, on the west shore of the Connecticut river is also said to be under consideration. This would include building a bridge across the Agawam river.

Canadian Pacific.—Westinghouse, Church, Kerr & Co., of Montreal and New York, have been retained by the Canadian Pacific Ry. as engineers to investigate the matter of the proposed electrification of the new double-track, 5½-mile Selkirk tunnel in British Columbia. The investigations will cover in general the type of system to be installed, the relative economies of steam and water power and the effect of the electrification upon operating conditions.

Charleston & Western Carolina.—After taking care of \$5,700,000 of maturing obligations the Charleston & Western Carolina Ry., it is said, will have left from the proceeds of an issue of \$10,000,000 of bonds, \$4,300,000, which will be used presumably for betterments and terminal improvements, contemplated and under way and for new equipment.

Chicago, Burlington & Quincy.—Contractors expect to resume work on the construction of the new line of the Chicago, Burlington & Quincy R. R., from Casper to Orin Junction, Wyo., about April 1. Grading on this stretch, it is said, will be completed not later than August 1. The railroad will probably begin work on the proposed cutoff from Chalco to Yutan, Neb., by May 1. The latter, when completed, will furnish a direct line from Sioux City, Iowa, into Omaha, Neb., over the road's own tracks.

Denver & Salt Lake.—The Denver & Salt Lake R. R. is expected to begin construction of the tunnel through James Peak early this summer. At the same time, according to official advices, work will be begun on an extension into the Uinta basin in Utah. A considerable portion of this extension which will be 130 miles long has already been definitely located.

Illinois Central.—The Illinois Central R. R., according to report, will complete this year the construction of second track between Memphis, Tenn., and Fulton, Ky. This would involve the building of about 43 miles of second track since June 30, 1913.

Intercolonial Railway.—Efforts are being made by the Colonial government to negotiate a loan of \$2,000,000 for railroad developments to which the administration is pledged. Sir Edward Morris, the premier, has left for London by way of New York, and Gov. W. E. Davidson was expecting to leave this week direct for Liverpool for the purpose of trying to raise the money.

Kanawha & Michigan.—The terms on which the Hocking Valley Ry., Toledo & Ohio Central Ry., Chesapeake & Ohio Ry., and Lake Shore & Michigan Southern Ry., shall dispose of their equity in the Sunday Creek Coal company and the Continental Coal & Coke company and by which the Chesapeake & Ohio shall dispose of its interest in the Kanawha & Michigan Ry., are prescribed in a decree which has been handed down at Columbus, Ohio, by United States Circuit Judges Warrington, Knappen and Denison. The same court handed down an opinion in December, 1912, that these holdings were in violation of the Sherman anti-trust act. By the decree just given the Lake Shore is allowed two months to purchase the stock of the Kanawha & Michigan, owned now by the Chesapeake & Ohio, or the joint interest of both roads in the Kanawha & Michigan must be sold to others. The same time is allowed for complete disposal by private sale of the Sunday Creek Coal company's stock and that of the Continental Coal & Coke company by the railroads holding it. The principal feature of the decree is that the Lake Shore is virtually compelled to buy the Kanawha & Michigan stock owned now by the Chesapeake & Ohio. According to the former decision the Chesapeake & Ohio was forced to sell its interest, but since the Lake Shore was not compelled to buy it openly, Chesapeake & Ohio officials feared sale of the stock would be forced at an extremely low price.

Maine Central.—The stockholders of the Boston & Maine R. R. will on March 30, consider the proposed sale of 159,601 shares of stock of the Maine Central R. R. It is proposed to sell the Maine Central stock at \$95 a share, which would net the company \$15,162,095 to the Maine Railways Co., but the sale will be on terms by which the Boston & Maine expects to receive \$3,000,000 in cash on or before May

Supply Trade Notes.

—Col. H. G. Prout, vice-president and general manager of the Union Switch & Signal Co., has been elected president, succeeding the late George Westinghouse.

—E. F. Platt, formerly connected with the Platt Iron Works, of Dayton, Ohio, and C. A. Kurz, Jr., of the Kurz Laboratories, have recently organized The Electrolytic Gas Co. This company has secured the western selling agency of the International Oxygen Co., of New York, and it is the intention of the company to proceed with the installation of a number of electrolytic plants of the I. O. C. System for the production of oxygen and hydrogen in different parts of the country. Both Messrs. Platt and Kurz are well-known in the mechanical and metallurgical line throughout the country, and the success of the new company is, therefore, assured.

—Announcement is made of the incorporation of Hodgkins & Company for the manufacture and sale of railway specialties and supplies. Edward W. Hodgkins is president and treasurer and Charles L. Mahoney is vice-president and secretary. Both parties have been identified with the railroad trade for 15 years and enjoy a large acquaintance with officials in various departments.

RAILWAY NEWS.

Alabama Great Southern.—Vice-President T. C. Powell, of the Alabama Great Southern R. R., announces that the telephone will be substituted for the telegraph for dispatching trains and handling messages on the entire line of 296 miles between Chattanooga and Meridian. For this purpose two

1, and the balance in three or five-year 5 per cent notes of the Maine Railways companies secured by pledge of the purchased stock. The latter is a voluntary association organized among the Maine Central interests. The stock holders of the Maine Central will meet on March 31, to take action on the matter.

Prince Edward Island Ry.—See Intercolonial Railway.

Wabash.—The receivership of the Wabash R. R., is expected to end by August and a reorganization of the company is expected by that time, according to a statement made this week by an attorney for the road to the Missouri public utilities commission. The attorney said that in financing the reorganization provision would be made for the elimination of the grade crossing in St. Louis, Mo.

PERSONALS.

Charles N. Hebner has been appointed secretary of the Illinois public utilities commission.

James S. Harlan has been elected chairman of the Interstate Commerce Commission, succeeding Commissioner Edgar E. Clark. Commissioner Harlan's selection is in accordance with a policy adopted several years ago that the term of chairman of the commission should last one year and the senior commissioner should be elected for the post.

John Scullin, St. Louis, Mo., has been appointed a receiver of the Missouri & North Arkansas R. R., succeeding George L. Sands, resigned.

C. M. Mitchell, trainmaster of the Cincinnati, New Orleans & Texas Pacific Ry., at Danville, Ky., has been appointed assistant superintendent of the Chattanooga division, with headquarters at Oakdale, Tenn. J. G. Clements, trainmaster at Oakdale, succeeds Mr. Mitchell as trainmaster of the Cincinnati division, effective May 16.

W. H. Beardsley, vice-president of the Florida East Coast Ry., was elected president of the company on March 17, succeeding the late H. M. Flagler. William R. Kenan, Jr., was elected a vice-president and all other officers re-elected.

J. J. Murphy, trainmaster of the Columbia division of the Chicago, Milwaukee & St. Paul Ry., at Malden, Wash., has been appointed superintendent of the Rocky Mountain division, with headquarters at Three Forks, Mont.

W. F. Watterson, superintendent of the Buffalo division of the New York, Chicago & St. Louis R. R., effective March 25, will assume charge of the Fort Wayne division as Superintendent, and E. J. Parrish, superintendent of the Fort Wayne division, will assume charge of the Buffalo division as superintendent. Division headquarters will remain as at present.

P. F. Keating, superintendent of the Sioux City division of the Great Northern Ry., has been appointed superintendent of the Breckenridge division, with headquarters at Breckenridge, Minn., succeeding G. E. Votaw, transferred. W. D. Mason, trainmaster of the Fergus Falls division at Melrose, Minn., succeeds Mr. Keating, and C. C. Reynolds has been appointed trainmaster at Melrose, to succeed Mr. Mason.

J. A. Gordon, general superintendent of the western district of the Pere Marquette R. R., has been appointed general manager of the Chicago Great Western R. R. Mr. Gordon assumed his new duties at Chicago on March 16.

George F. Baer, president of the Philadelphia & Reading Ry., has resigned as a director of the Lehigh Valley R. R. and is succeeded by M. L. Clothier, of Philadelphia, Pa.

John G. Walber, assistant to the third vice president of the Baltimore & Ohio R. R. and head of the efficiency, discipline and employment bureau of the system, has resigned to take charge of the bureau of information of the association of eastern railroads.

L. C. Fritch has resigned his position as chief engineer of the Chicago Great Western R. R. to become assistant to the president of the Canadian Northern Ry., with headquarters at Toronto, Ont. The 10,000 miles of road built by Mackenzie & Mann will, during this year, be united and opened as a great trans-continental line from coast to coast. Construction work must be followed up by making it a real railway system on modern lines and making it an operating success. Mr. Fritch has had operating as well as engineering experience and is especially well equipped for his new work. He was born in 1868 at Springfield, Ill. He studied civil engineering at the University of Cincinnati; later studied law and was admitted to the bar in Ohio. He took up railroad

work in 1884, becoming supervisor's assistant on the Ohio & Mississippi Ry. He subsequently held various positions with different roads in the central states and November 15, 1909, became chief engineer of the Chicago Great Western R. R. Mr. Fritch has recently spent six weeks on the Seaboard Air Line Ry., studying operating conditions and reporting on the same to President Wm. J. Harrahan. A short time ago he also made a study of Boston & Maine R. R. with S. J. Felton, president of the Chicago Great Western. He was active in the organization of the American Railway Engineering & Maintenance of Way Association in Chicago in 1898 and Buffalo in 1899, and was the first secretary. He was president of the association in 1909-1910.

TRAFFIC.

J. J. McTague has been appointed commercial agent of the Chicago, Milwaukee & St. Paul Ry., with office at Buffalo, N. Y., succeeding C. H. Mitchell, promoted.

J. W. Bingham has been appointed general freight agent of the Chicago, Indiana & Southern R. R., and the Indiana Harbor Belt R. R., with headquarters at Chicago, succeeding F. Zimmerman, transferred.

M. D. Flanagan, general agent of the coal and ore department of the New York Central Lines, has removed his head-



W. P. Hinton, Who Recently Became Assistant Passenger Traffic Manager of the Grand Trunk Railway.

quarters from Cleveland, Ohio, to the P. & L. E. Terminal building, Pittsburgh, Pa.

Charles E. Phelps, soliciting city passenger agent of the Baltimore & Ohio R. R., at Washington, D. C., has been appointed southern traveling passenger agent of the Canadian Pacific Ry., with headquarters at New York.

J. W. Jones has been appointed commercial agent of the Central of Georgia Ry., at Cincinnati, Ohio, succeeding G. T. Solar, resigned, and G. M. Rowell succeeds Mr. Jones as commercial agent at Memphis, Tenn.

F. S. Sleight, commercial agent of the Missouri, Oklahoma & Gulf Ry., at Houston, Tex., has been appointed general agent at Dallas, Tex., succeeding C. E. Christopher, who has been appointed general eastern agent.

J. W. White, commercial agent of the Missouri, Kansas & Texas Ry., at Dallas, Tex., has been appointed commercial agent at Chicago, succeeding John J. Rogers, deceased.

W. I. Jones has been appointed assistant to the vice-president in charge of traffic of the Missouri Pacific, St. Louis, Iron Mountain & South, Denver & Rio Grande and Western Pacific railways, vice M. C. Markham assigned to other duties. Mr. Jones has heretofore been assistant to the general traffic manager of the Missouri Pacific and Iron Mountain, which office is abolished.

H. M. Adams, effective April 1, is appointed general traffic

manager for the Missouri Pacific and St. Louis, Iron Mountain & Southern lines, with headquarters in St. Louis, Mo., and J. T. Hendricks is appointed freight traffic manager of the Western Pacific Ry., with headquarters at San Francisco, Cal. Mr. Hendricks has been general traffic manager of the Missouri Pacific and Iron Mountain lines, and Mr. Adams has been freight traffic manager of the Denver & Rio Grande R. R., and Western Pacific Ry.

H. M. Adams, the new general traffic manager of the Missouri Pacific-Iron Mountain, was born at Comanche, Iowa, forty-seven years ago. He began his railroad career about 1880 as a messenger boy on the Southern Kansas railway at Cherryvale, Kan. He became cashier in the local freight office there in 1887. From there he went to Portland, Ore., as chief clerk in the general baggage office of the Oregon-Washington R. R. & Navigation Co. He worked in various positions for that company, and in 1895 was made traveling freight agent and later general agent at Spokane, Wash. In 1902 he was appointed assistant general freight agent of the company at Portland, Ore., and in 1905 went to the Great Northern Ry., as assistant traffic manager at Seattle. In 1908 he was made general freight and passenger agent of the Spokane, Portland & Seattle Ry., with headquarters at Port-

ENGINEERING.

T. H. Nichols, assistant roadmaster of the Great Northern Ry., at Spokane, Wash., has been appointed roadmaster of the Marcus division, with headquarters at Marcus, Wash.

G. Davis, superintendent of the Louisiana division of the Chicago, Rock Island & Pacific Ry., at Eldorado, Ark., has been appointed division engineer of the Oklahoma division, with headquarters at El Reno, Okla.

J. L. Taylor, Jr., has been appointed assistant division engineer of the Erie & Ashtabula division of the Pennsylvania Lines West of Pittsburgh, Northwest system, with office at New Castle, Pa., succeeding H. J. Shaw, transferred.

H. J. Shaw, assistant engineer of the Pennsylvania Lines West of Pittsburgh, with office at New Castle, Pa., has been transferred to Chicago in a similar capacity, to succeed W. E. Guignon, transferred.

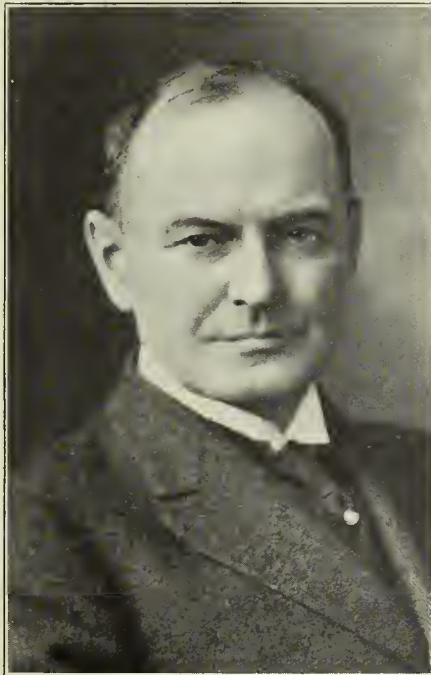
F. V. Berkey has been appointed assistant engineer of the Zanesville division, Central system, Pennsylvania Lines West of Pittsburgh, with office at Zanesville, Ohio, succeeding J. A. Rothbrock, transferred.

J. M. Morrison, engineer and superintendent of structures of the Central Vermont Ry., at St. Albans, Vt., has been ap-



Photo by Matzene, Chicago

L. C. Fritch, Who Has Been Appointed Assistant to the President of the Canadian Northern Railway.



E. H. Lee, Who Recently Became Vice-President and Chief Engineer of the Chicago & Western Indiana Railroad.



Photo by Strauss

James S. Harlan, Member of the Interstate Commerce Commission, Who Has Been Chosen Chairman of the Commission.

land. On July 1, 1910, he went to the Western Pacific Ry. as freight traffic manager. Last August he was also made freight traffic manager of the Denver & Rio Grande and has held the position of freight traffic manager of both lines since.

W. P. Hinton, whose appointment as assistant passenger traffic manager of the Grand Trunk Pacific Ry., and the Grand Trunk Pacific Coast Steamship Co., was recently noted in these columns, was born in Hintonburg, Ont., now part of the capital city of Ottawa, in 1871; educated in Ottawa, and entered the service of the Canada Atlantic Ry., audit department in that city in 1887. In 1901, entered the traffic department as rate clerk and in 1898 was appointed assistant general freight agent; was appointed general freight agent in 1901 of the Canada Atlantic and the Canada Atlantic Transit Co., and in 1903, general freight and passenger agent. When the Canada Atlantic was taken over by the Grand Trunk in October, 1905, he became general agent, passenger department, of the latter company in Ottawa in charge of immigration and trans-Atlantic steamship business. In January, 1907, was appointed assistant general passenger agent, Montreal, Que., and in May, 1909, became the first general passenger agent of the Grand Trunk Pacific Ry., and in 1910 the Grand Trunk Pacific Coast Steamship Co., being appointed to his present position in February, 1914, with office at Winnipeg, Man.

pointed chief engineer of the Southern New England Railroad Corporation and the Southern New England Railway Co., with office at St. Albans, succeeding H. R. Safford, resigned.

J. H. Roach, assistant engineer of construction of the Lake Shore & Michigan Southern Ry., at Cleveland, Ohio, has been appointed assistant valuation engineer with headquarters at Cleveland.

D. M. McKey has been appointed locating engineer of the Seaboard Air Line Ry., succeeding H. S. Thomas, promoted, and L. A. Murr has been appointed assistant engineer with office at Portsmouth, Va., succeeding R. M. Coburn, transferred to the chief engineer's office.

W. S. Murray has been appointed by the New York, New Haven & Hartford R. R. to be consulting engineer in general charge of all electrical engineering and construction, reporting to President Hustis, with offices at New Haven. Mr. Murray, following the substantial completion of the construction of the system for complete electrical operation west of New Haven, will enter into closer relations with the railroad company. His jurisdiction will hereafter be extended to also include the electrical features of operation in addition to electrical construction. He will continue with the firm of McHenry & Murray in general consulting practice as before.

C. G. Delo, engineer maintenance of way of the Chicago Great Western R. R., at Chicago, has been appointed chief engineer with office at Chicago, succeeding L. C. Fritch, resigned.

E. H. Lee, who recently became vice-president and chief engineer of the Chicago & Western Indiana R. R., and Belt Railway of Chicago, as already noted in these columns, was born at Dayton, Ohio. He prepared for college at one of the smaller Ohio colleges and attended college at another. Mr. Lee held positions from rodman to assistant engineer on various railroads, including parts of what are now the Norfolk & Western; Baltimore & Ohio; New York, Chicago & St. Louis; Wisconsin Central, and Union Pacific railroads. He entered the service of the Elgin, Joliet & Eastern Ry. in 1887 as office engineer, and was appointed chief engineer about 1889. He resigned as chief engineer in 1893, and entered the service of the Sanitary District of Chicago, and worked in that organization, with the exception of about two years when he had a partnership interest in contracting work, until the spring of 1898. He then became principal assistant engineer of the Chicago & Western Indiana on the separation of grades at Sixteenth street, Chicago. In November, 1898, became chief engineer of the Chicago & Western Indiana R. R., and the Belt Ry. Co., of Chicago and since has continued in the service of these companies, becoming vice-president and chief engineer March 3, 1914. Mr. Lee is a member of the American Society of Civil Engineers, American Railway Engineers' Association, Western Society of Engineers and various clubs.

MECHANICAL.

John Simmes has been appointed general foreman of the Cincinnati, New Orleans & Texas Pacific Ry., at Ludlow, Ky., vice J. G. Lewis, assigned to other duties.

Millard F. Cox, formerly mechanical engineer of the Louisville & Nashville R. R., at Louisville, Ky., has been appointed assistant superintendent of machinery, with headquarters at Louisville, and the position of assistant to superintendent of machinery has been abolished.

W. N. Bosworth, mechanical engineer of the Kansas City Southern Ry., at Pittsburg, Kan., has been appointed mechanical engineer of the Louisville & Nashville R. R., with headquarters at South Louisville, Ky.

W. E. Ricketson has been appointed mechanical engineer of the Cleveland, Cincinnati, Chicago & St. Louis Ry., with headquarters at Beach Grove, Ind., succeeding C. A. Brandt, transferred to Indianapolis, Ind., as master mechanic of the Chicago, Michigan and the Peoria & Eastern division.

OBITUARY.

James W. Munn, assistant general passenger agent of the Chicago & North Western Ry., died in Chicago March 13, aged 51 years. Mr. Munn had been in the employ of the railroad for the past thirty-five years, holding various positions in and away from Chicago since 1879. He was appointed assistant general passenger agent September 1, 1912.

Col. R. G. Butler, former general agent of the Grand Trunk Ry., at Milwaukee, Wis., died in that city March 18, aged 70 years.

D. O. Ives, transportation manager of the Boston chamber of commerce, died in Boston, March 18, aged 63.

NEW ROADS AND PROJECTS.

British Columbia.—The Pacific Great Eastern Ry., has let three contracts on the Kelly Lake-Fort George section as follows: H. E. Carleton & Co., the first 25 miles; A. E. Griffin & Co., the next 25 miles, and Burns, Jordan & Co., the remaining 50 miles. The three firms which have been awarded contracts have just completed portions of the Grand Trunk Pacific line into Fort George, and as their forces are already organized, they will be in a position to commence the next work immediately.

California.—The California railroad commission has rendered a decision granting authority to the Death Valley R. R. company to issue 473 ten-year bonds of the face value of £100 bearing interest at the rate of 5 per cent per annum, for the purpose of constructing 16 miles of railroad between the Ryan branch of the Tonopah & Tidewater R. R. into Inyo county, to the Biddy McCarty borax mine. The bonds are to be guaranteed by the Borax Consolidated, Ltd. Besides authorizing the issue of \$230,361 in bonds, the company is also authorized to issue \$75,000, par value, of its capital stock.

Colorado.—See Railway News under Denver & Salt Lake R. R.

Connecticut.—See Railway News under Boston & Albany R. R.

Iowa.—The Central of Iowa Ry. has been incorporated at Pierre, S. D., with a capital stock of \$5,000,000. The company proposes to build a line from Omaha to Des Moines, about 140 miles. Headquarters are to be at Council Bluffs, Iowa, and South Dakota capitalists are the incorporators.

Massachusetts.—See Railway News under Boston & Albany R. R.

Nebraska.—See Railway News under Chicago, Burlington & Quincy R. R.

Oregon.—Oregon-Washington R. R. & Navigation Co., it is said, will start work soon on the construction of its proposed cut-off from a point west of Echo, Ore., to Coyote, Ore., about 35 miles.

Saskatchewan.—The Saskatoon & Hudson Bay R. R. has applied to the Canadian parliament for permission to construct a line from Saskatoon, Sask., to Melfort, Sask., thence northeasterly to Le Pas, Man., about 200 miles. V. T. Bartram, Toronto, Ont., is interested.

South Carolina.—The Columbia, Congaree & Orangeburg R. R. has been incorporated, with \$250,000 capital stock, for the purpose of constructing a railroad from Columbia, S. C., south to Orangeburg. A. J. Bethea, Orangeburg, is interested.

Texas.—The International & Great Northern Ry., according to report, contemplates building a connecting line from Austin, Tex., to a point near Navasota, Tex., a distance of about 100 miles.

Surveys are reported as nearly completed for a railroad between Brownsville and Laguna Vista, Tex., a distance of about 22 miles. It is expected that material for the new road will be purchased at once and construction of the road commenced within a short time. A bonus of \$100,000, about one-fourth the cost of construction, has been raised by the citizens of Brownsville.

The Gulf, Freeport & Northern R. R., chartered last June, which proposes to construct a new railroad from Freeport, Tex., to a point on the Southern Pacific system in Fort Bend county, has completed 16 miles of grade to date. Eleven miles of the grade has been thrown up in Fort Bend county, between Damon and Fairchild and beyond. The remaining five miles has been constructed in Brazoria county between Columbia and Damon, and the grading outfit is now headed north. The exact terminus on the road has not been made public, but it will be one of three towns, namely, Beasley, Rosenberg or Richmond. The new road has secured right of way between the Southern Pacific line and Columbia, but has not yet secured the right of way south of Columbia to Freeport its proposed southern and deep water terminus, where the general offices are located. The company is doing its own construction work with a traction engine and two graders. This work was started December 1, 1913, but was greatly delayed by the recent Colorado-Brazos river floods. No rail has been laid as yet, but the outlook for the road's completion in 1914 is bright. The route as proposed will follow the west bank of the Brazos river from its mouth, and will be approximately 60 miles long.

The charter of the Uvalde & Northern Ry. has been filed in the office of the secretary of state at Austin, Tex. The company, which is capitalized at \$60,000, proposes to construct and operate a railroad from Uvalde, Uvalde county, to a point at or near the head waters of Camp Wood creek, in Real county, a distance of 55 miles. The principal place of business is to be established at a point on the line about four miles south of Barksdale, in Real county. The road will traverse lands of the United Timber & Kaolin Association, Ltd., on which are mountain cedar and large deposits of kaolin. A majority of the stock of the railroad company is owned by trustees of the timber and kaolin association. The incorporators of the new road are: L. J. Smith and E. H. McVey, of Kansas City; L. J. Wardlaw, of Sonora, Sutton County; Fred C. Adams, Will A. Morriss, W. P. Brice, J. J. Ford, S. P. Skinner and Sidney Turner, of San Antonio and R. C. Walker, of Austin.

Utah.—The Central Utah R. R., Provo, Utah, is making preliminary arrangements for the construction of its proposed line from Salina, Utah, to Nioche, Utah, via Salina Canon, a distance of 20 miles. W. O. Creer, Provo, Utah, is president.

See also Railway News under Denver & Salt Lake R. R.

Washington.—The North Yakima & Valley Ry., it is said, will spend \$300,000 this year on extensions of the lines in the Cowlitz Valley and the Yakima Reservation. The existing lines, about 47 miles, are to be improved at a cost of \$30,000.

The Metolius, Prineville & Eastern Ry., Tenino, Wash., has been incorporated, capital stock is \$500,000. H. P. Scheel, Tacoma, Walter G. Scheel and William McArthur, Tenino, are incorporators.

Electric Railways.

The Washington, Westminster & Gettysburg R. R. proposes to construct 83 miles of electric railway lines from Brentwood, Md., via Sandy Springs and Westminster, Md., to Littlestown, Pa., to Gettysburg, Pa. Contract for construction is reported awarded to the Columbia Construction Co., Southern building, Washington, D. C. T. B. Redmond, same address, is general manager of the railway company.

The Mississippi Electric Ry., of Columbus, Miss., has been chartered to build an interurban line from Oklahoma via Columbus to Aliceville, Ala., about 70 miles, with street-car lines for local service in the towns on the route. The capital stock is to be \$5,000,000 and the charter provides that the company may, in addition to its railway business, operate other public utilities. It is hoped to complete the proposed line within two years from the date of the charter, February 25. The incorporators are Charles F. Sherrod, F. W. Crosby, Battle Bell, J. W. Lipscomb, G. Y. Banks, W. H. Sherrod and T. B. McCrary, all of Columbus.

The Illinois Traction Co. (McKinley system), has filed mortgages for \$2,225,000 in favor of the Central Trust Co. of Chicago, covering all the property of the company in Nebraska. Besides these bonds there is a stock issue of \$750,000, a total of about \$3,000,000. The new money will be used in completing the extension of lines from Omaha to Lincoln. Seventeen miles of the stretch already are in operation.

Fred M. Smith, Paducah, Ky., general manager of the Kentucky Southwestern Electric Ry., is quoted as saying that general contract for the proposed line from Paducah to Murray, Ky., 57¾ miles, has been closed, but that considerable work will be sublet. It is also contemplated to build from Paducah to Marion, Ky., 50 miles. H. C. Rhodes is president and Maj. W. A. Calhoun is chief engineer.

The Shelbyville, Petersburg & Decatur R. R. plans to award contracts this month for the construction of the first section of its line from Shelbyville, Tenn., to Petersburg, Tenn. S. P. Kirkpatrick, Shelbyville, is president. See Railway Review of January 31.

The Dallas Electric Co. plans an expenditure of \$1,000,000 on the street railway lines in Dallas, Tex., including \$300,000 for new cars, \$150,000 for new shops, much double tracking, extensions, etc. The controlling interests also plan the erection of a union terminal station for all electric lines entering Dallas.

Officials of the Chicago & Oak Park Elevated R. R. have been cited to appear before the Illinois public utilities commission on March 24, and show cause why the railroad tracks from Laramie avenue, Chicago, to the western terminus should not be elevated.

The Kentucky Southwestern Electric Railway, Light & Power Co., Paducah, Ky., has filed a mortgage for \$2,000,000, and work on the first division of the proposed interurban line from Paducah to Murray via Mayfield, will be started in a short time. It is stated that the company eventually will connect its line with interurban systems at Evansville, Ind., and Cairo, Ill.

The Montreal & Southern Counties Ry. will award contracts to build about 15 miles of new track between St. Cesaire and Granby.

The construction of an electric railway from Welland to Port Colborne, Ont., and along the shore of Lake Erie to Ft. Erie, and from there along the Niagara river to Niagara Falls, was decided upon at the annual meeting of the Niagara, Welland & Lake Erie Ry., held recently in Toronto. Extensions of the Welland Street Ry. on N. Main street to Parkway Heights and to Rosedale are also to be built at once. C. J. Laughlin, Jr., Welland, Ont., is general manager.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Georgia Southern & Florida Ry. has ordered 6 ten-wheel type (4-6-0) locomotives from the Baldwin Locomotive Works.

—The Mason County Logging Co., Bordeaux, Wash., has ordered 1 Mikado type (2-8-2) locomotives from the Baldwin Locomotive Works.

—The City of Newark, N. J., has ordered 1 four-coupled (2-4-0) locomotives from the Baldwin Locomotive Works.

—The John L. Roper Lumber Co., Norfolk, Va., has ordered 1 prairie type (2-6-2) locomotives from the Baldwin Locomotive Works.

—The Virginia & Southwestern Ry. has ordered 2 superheater Mikado type (2-8-2-S) locomotives from the American Locomotive Co.

—The Kanawha & Michigan Ry. is reported in the market for 10 locomotives.

—The Carolina, Clinchfield & Ohio Ry., reported in the Railway Review of January 10 as preparing to enter the market for additional locomotives, is said to have decided on the purchase of 6 Mallet type and 3 Pacific type locomotives.

—The Southern Railway, according to report, has ordered 21 locomotives from the Baldwin Locomotive Works and 13 switching locomotives from the Lima Locomotive Corporation.

Freight Cars.

—The Chicago & North Western Ry., has issued an inquiry for 2000 box cars, 80,000 lbs. capacity.

—The Illinois Central R. R. is in the market for 3000 box cars.

—The Illinois Central R. R. has ordered 500 refrigerator cars from the American Car & Foundry Co.

—The Southern Railway, it is said, will build 1200 cars in its own shops. The recent order placed with the American Car & Foundry Co. was for a total of 1750 cars. There were 500 flat cars instead of 300, as reported.

—The Virginia & Southwestern Ry., reported in our issue of March 7, as ordering 935 freight cars, has ordered only 650. These are 50-ton steel double drop bottom gondola cars and will be built by the Pressed Steel Car Co.

—The Bangor & Aroostook R. R., reported in our previous issue as ordering 117 freight cars has ordered 125 cars from the Standard Steel Car Co., 89 flat, 34 box and 2 stock cars.

—The Tennessee Copper Co., 11 Broadway, New York, is inquiring for 50 hopper cars. The company operates mines in Polk county, Tenn.

—The Atlantic Coast Line R. R. is in the market for 100 50-ft. logging cars, 80,000 lbs. capacity.

—The Duluth, Missabe & Northern Ry., according to report, is in the market for 1000 freight cars.

—A report says the Pittsburgh & Lake Erie R. R. will order 3500 gondola and hopper cars.

Passenger Cars.

—The New York, New Haven & Hartford R. R. is reported in the market for 6 club cars.

—The Atlantic Coast Line R. R., has ordered 17 passenger cars from the Barney & Smith Car Co. These are in addition to 15 to be built by the American Car & Foundry Co., previously noted in these columns.

—The Southern Pacific Co. is reported in the market for 45 to 50 passenger cars.

—The Union Pacific R. R. is said to be preparing to place orders for about 200 passenger cars.

Signals and Interlocking.

—Automatic electric block signals will be immediately installed by the Southern Railway on the double track line between Knoxville, Tenn., and Morristown, a distance of 42 miles and one of the most important lines on the Southern Railway system, as over it are handled through trains between Memphis and New York, between New Orleans, Birmingham, Chattanooga and New York, and a large part of the travel to Asheville and other Carolina resorts. The system will be of the most modern type, similar to that completed last year in North Carolina between Greensboro and Charlotte, and now being installed in Virginia between Alexandria and Orange. A special pole line will be constructed for the wires which will carry an alternating current of 4400 volts, three phase, and by means of special transformers, buildings and switches also will be lighted. A small sub-station or power house will be built at Morristown for emergencies while the main power supply will be obtained from the Southern's shops at Knoxville.

Iron and Steel.

—The Great Northern Ry. has awarded contract for 6000 tons of rails to the Cambria Steel Co.

—The Chicago Junction Ry., it is said, has ordered 2000 tons of rails from the Illinois Steel Co.

Bridges.

—The Gulf, Florida & Alabama Ry. will award contract soon for a bridge over the Alabama river, on the line now being built from Broughton, Ala., to Pine Hill, Ala.

—See Railway News under Boston & Albany R. R.

—The Atlanta & West Point R. R. has ordered 900 tons of bridge steel from the Virginia Bridge & Iron Works.

—The Boston & Maine R. R. has received bids on about 300 tons of steel for three bridges in New Hampshire.

—The Oregon-Washington R. R. & Navigation Co. is reported as ordering 1500 tons of bridge material from the American Bridge Co.

—The approaches for the Mississippi river bridge of the Arkansas & Memphis Railway Bridge & Terminal Co. at Memphis, Tenn., about 4000 tons of steel, will be fabricated by the Virginia Bridge & Iron Works.

—Plans are completed, according to report, for the elevation of the tracks of the Chicago, Burlington & Quincy R. R. through Aurora, Ill. This work will involve an expenditure of about \$5,000,000.

—The Winston-Salem Southbound Ry. has awarded the contract for the erection of a steel bridge over Linden street, Winston-Salem, N. C., to the Virginia Bridge & Iron Co., Roanoke, Va.

Buildings, Terminals, Etc.

—The Southern Railway is preparing to make an initial expenditure of \$750,000 for classification yards and shops near Birmingham, Ala. The company owns 112 acres between North Birmingham and Thomas, which will be devoted to this use. Work is to be begun at an early date on the locomotive and car shops and it is expected that the total cost of the improvement completed will be about \$1,500,000. The proposed new plant will be called the "Finley Shop and Yard" in memory of the late W. W. Finley.

—The improvements which the Southern Railway is preparing to make near Memphis, Tenn., will include a round house, machine and boiler shops and a large coaling plant, 14.7 miles of track and a two-story office building. The site on which these will be located is at Buntyn, a suburb of Memphis.

—The Gulf, Colorado & Santa Fe Ry. has acquired title to 20 acres of submerged land on the bay front at Galveston, Tex. The company will eventually use this for yards and wharves.

—The Chesapeake & Ohio Ry., it is reported, will enlarge yards at Russell, Ky.

—The Buffalo, Rochester & Pittsburgh Ry. will enlarge its shops at Dubois, Pa. The power house will be enlarged and additional machinery will be installed.

—Press reports state that the Atchison, Topeka & Santa Fe Ry. is about to enter Sacramento, Cal., using the tracks of the Oakland, Antioch & Eastern Ry. north from Bay Point, and a \$500,000 union station is to be erected in Sacramento immediately.

—The Pennsylvania Railroad has opened its new passenger station at Euclid avenue and East Fifty-fifth street, Cleveland, Ohio. It is one of the most modern structures of its kind in Ohio and has 9300 square feet of floor space. This is an increase of floor capacity for passenger purposes of 155 per cent over the old station.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, MARCH 10, 1914.

Process for manufacturing tie-plates, 1,089,389—Edwin H. Bell, Chicago, Ill.

Dump-car door, 1,089,392—Richard Webb Burnett, Montreal, Quebec, Canada.

Railway signaling apparatus, 1,089,395—Clyde J. Coleman, New York, assignor to Hall Switch & Signal Co., New York.

Flexible lock-joint for car bodies and trucks, 1,089,396—James McCutcheon Coleman, Westmount, Quebec, Canada.

Railway-car door, 1,089,398—Walter L. Conwell, Montclair, and Allen Edward Ostrander, Ridgewood, N. J., assignors to Transportation Utilities Co., New York, N. Y.

Load-brake, 1,089,401—Edward H. Dewson, New York, N. Y., assignor to The Westinghouse Air Brake Co., Wilmerding, Pa.

Car-door, 1,089,421—Fred Matthews, Chicago, Ill., assignor to Clinton C. Murphy, Chicago, Ill.

Separable body-bolster, 1,089,450—Charles T. Westlake, St. Louis, Mo., assignor to Commonwealth Steel Co., St. Louis, Mo.

Flue-cutter, 1,089,463—Fred Dix, Hardtner, Kans.

Auxiliary step for car-platforms, 1,089,481—John R. Kunzelman, Duluth, Minn.

Dump-car, 1,089,493—Spencer Otis, Chicago, Ill.

Antirobbery and burglar-proof car, 1,089,506—Thomas G. Smith, New Orleans, La.

Cattle-guard, 1,089,509—John Isaac Stephens, Chaffee, Mo.

Tank-car, 1,089,535—Charles H. Coyle, Clyde, Ill.

Car-roof, 1,089,553, 1,089,554 and 1,089,555—David W. Hawksworth, Detroit, Mich., assignor to Hutchins Car Roofing Co., Detroit, Mich.

By-pass valve for locomotive-engines, 1,089,570—Henry C. Manchester and Samuel S. Riegel, Scranton, Pa.

Process of Making Journal-Boxes, 1,089,585—Ivar A. Randel, Chicago, Ill., assignor to McCord & Co., Chicago, Ill.

Switch-point-operating-mechanism, 1,089,588—Dino Samaia, Brussels, Belgium.

Locomotive acetylene-gas headlight, 1,089,605—William R. Thurston, Hammond, Ind.

Car-roof, 1,089,604—William D. Thompson and David W. Hawksworth, Detroit, Mich., assignors to Hutchins Car Roofing Co., Detroit, Mich.

Derailment brake appliance, 1,089,623—William R. Carroll, Many, La.

Railway-rail, 1,089,631—Thomas Huntly Elliott, Vancouver, British Columbia.

Railroad angle-bar, 1,089,632—Eligah H. Field and William F. Walker, Suwanee, Ga.

Track-cleaner, 1,089,636—George William Green, Feltham, and John McIlvaine Cater, London, England.

Valve for controlling air-brakes, and the like, 1,089,640—Hiram T. Hall, Oakland, Cal.

Locomotive-fire-box construction, 1,089,666—Le Grand Parish, New York, N. Y.

Side-liner for truck-boxes, 1,089,669—Robert Preston, Winnipeg, Manitoba.

Switch-point-controlling device, 1,089,685—Walter Thorsteinson, Winnipeg, Manitoba.

Rail-fastener, 1,089,704—Isaiah E. Hindman, Beechview, Pa., assignor to The Duff Manufacturing Co., Pittsburgh, Pa.

Locomotive boiler, 1,089,758—Lewis D. Freeman, Pittsburg, Kans. Intermediate support for track bonding, wires and nut-lock, 1,089,787—Welles M. Post, Elizabeth, N. J.

Piston-rod packing, 1,089,789—Haken Wilfred Ramberg, Brooklyn, N. Y.

Locomotive superheater apparatus, 1,089,807—Charles D. Young, Altoona, Pa.

Rail-fastening means, 1,089,861—Warren M. Osborn, New Britain, Conn.

Sash construction for car-windows, 1,089,873—Albert H. Sisson, High Point, N. C., assignor to Forsyth Brothers, Chicago, Ill.

Safety switch-point, 1,089,903—Joseph B. Cobb, Jr., Shawnee, Okla.

Drifting-valve for locomotives, 1,089,904—Francis J. Cole, Schenectady, N. Y.

Draft-gear, 1,089,908—John E. Courson, Pitcairn, Pa.

Switch-rod, 1,089,940—Jackson A. McElroy and William B. Freeman, Hattiesburg, Miss.

Dumping-car, 1,089,964—Clifford F. Rice, Springfield, Mass.

Boiler-flue-fastening means, 1,089,970—Frederick Schmitt, Oakland, Cal.

Apparatus for operating the switch-points of railways, tramways and the like, Hugh Alexander Thomson, Glasgow, Scotland.

Car coupling and brake, 1,089,991—Philander Kile Tucker, Sioux Falls, S. D.

Dump-car, 1,090,001—John M. Wilcox, Cleveland, Ohio.

Rail-tie, 1,090,041 and 1,090,042—Sigmund Friedman, Gorgona, Canal Zone.

Flagging device, 1,090,070—Robert C. Keene, Frankfort, Ind.

Journal-box, 1,090,085—Ivar A. Randel, Chicago, Ill., assignor to McCord and Co., Chicago, Ill.

Throttle-rod stuffing box, 1,090,086—William H. Renn, Rocky Mount, N. C.

Trap-door for railway-cars and similar structures, 1,090,092—Roy T. Axe, Syracuse, N. Y., assignor to Oliver M. Edwards, Syracuse, N. Y.

RAILWAY REVIEW

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Railway Revenues and Expenses for January.

The Bureau of Railway Economics has prepared a summary of the revenues and expenses of steam railroads in the United States for the month of January, 1914, based upon the monthly returns of the railways to the Interstate Commerce Commission and covering roads having annual operating revenues of \$1,000,000 or over. The returns for January reduced to a per mile of line basis and compared with the returns for January, 1913, show a decrease in total operating revenues per mile of 7.5 per cent, and a decrease in operating expenses per mile of 3.3 per cent. Net operating revenue per mile was less by \$56, or 19.5 per cent, than for January, 1913, while that for January, 1913, was 40.0 per cent greater than for January, 1912. Comparison of the returns for seven months of the current fiscal year with those of the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 1.5 per cent, an increase in operating expenses per mile of 3.8 per cent, and a decrease in net operating revenue per mile of 12.0 per cent. This net operating revenue per mile decreased 19.3 per cent in the East as compared with the corresponding period of the previous year, increased 1.2 per cent in the South, and decreased 9.0 per cent in the West.

Eastern Arbitration Board Meets Again to Settle Disputed Interpretations.

The arbitration board which made its award in the case of the demands of the trainmen and conductors of the Eastern railroads last November has begun final hearings in New York city, on complaints that a number of the railroads misinterpreted certain provisions in the award. The present hearings were called by Seth Low, as chairman, who with J. J. Finley represent the public, and are being held in executive session. A. H. Smith and W. W. Atterbury represent the railroads and Lucius E. Sheppard and Daniel L. Cease represent the trainmen. The board expects to make its decision some time this week, and both the railroads and the trainmen have agreed to abide by its interpretation of the disputed provisions. The conditions and wages under the award are to continue for a year after the time the award went into effect, and will hold further unless thirty days' notice is given by either side of a desire to change them.

Test of an Automatic Train Stop.

On March 28 the Cincinnati, New Orleans & Texas Pacific Ry. will make a practical test of the Julian automatic cab signal and train control system. The trials will take place at Ludlow, Ky.

Petitions for Rehearing of Industrial Railways Case.

Petitions were filed with the Interstate Commerce Commission, Friday, March 20, by Charles S. Belsterling, traffic manager of the Carnegie Steel Co., for that company, the Universal Portland Cement Co., the American Steel & Wire Co., the National Tube Co. and the American Sheet & Tin Plate Co., requesting the suspension of freight tariffs filed by practically all of the principal railroads in classification territory canceling the charges heretofore paid by the trunk lines to industrial railways for switching and similar services.

The new tariffs were filed in accordance with the commission's recent decision in the industrial railways case. The petitions also asked for a rehearing of the industrial railways case on grounds similar to those advanced in other petitions recently submitted to the commission. The commission has not given serious consideration yet to the petitions for rehearing of that case, and may not for two or three weeks.

Decision Upholds Authority of Interstate Commerce Commission.

In a decision rendered on March 23, Judge Adams, in the United States Circuit court, at St. Louis, Mo., held that the Interstate Commerce Commission has exclusive jurisdiction over the regulation of interstate railroad rates. Judge Adams dissolved a temporary injunction restraining the Wabash Railroad from filing new rates for shipments from the Illinois Glass Works at Alton, Ill. Joseph W. Folk, chief counsel for the Interstate Commerce Commission, in commenting upon the decision, said that it will prevent shippers in the future from enjoining the enforcement of increased rates granted by the commission. Judge Adams upheld every point made by Mr. Folk. The court held that it was for the Interstate Commerce Commission to decide whether a railroad was an industrial line or a common carrier and whether a railroad could file new rates. The Wabash Railroad filed the new rates soon after the Interstate Commerce Commission decided that certain concessions to industrial lines were in reality rebates and therefore improper.

Commissioner Hall Takes Office.

H. C. Hall, of California, took the oath of office, Saturday, March 21, as a member of the Interstate Commerce Commission and entered upon his duties. Mr. Hall was named to fill the unexpired term of Judge Charles A. Prouty, of Vermont, which would have expired December 31 next, and who was appointed director of the work of valuation of railroads. A portrait of Mr. Hall and a statement of his appointment as a member of the commission were published in the Railway Review, Feb. 14, 1914.

New Coal Chute Devices, Baltimore & Ohio R. R.

Plans have been completed for equipping the large coal pier in the Curtis Bay export terminal of the Baltimore & Ohio R. R., at Baltimore, Md., with automatic telescopic chutes, to prevent the breakage of coal in loading shipments from the cars directly into vessels. The new device, which will be put in operation at Curtis Bay for the first test in this country, will mark an advanced step in the method of loading coal, overcoming the annoyance of having coal broken, which has been unavoidable up to the present time. The automatic chute will be attached to the end of the pocket through which the coal passes when leaving the car, and will be adjusted to an angle which will eliminate a large part of the destructive effect of gravity. It is also planned to attach a spiral chute to the Curtis Bay pier, designed to likewise eliminate breakage of coal. This latter chute will be installed as an experiment and will be watched with interest by coal operators and railroad companies. With the new chutes in operation it is believed that the new pier will be particularly well equipped to meet the requirements of foreign coal users who prefer large-lump bituminous fuel.

Winter Fires in Southern Forests.

Reports for the winter fire season in the southern Appalachians covering the months of January and February just received by the forest service show that the winter has been dry and that fires have occurred on land which the government is acquiring under the provisions of the Weeks law. While these two months are normally not so dry as the fall or the spring fire season, serious fires may occur in an open

winter, though they are not usual. During January there were nine fires, five of which covered more than 10 acres each. In February there were ten, of which only two spread over more than 10 acres. All of these fires occurred during the latter part of January and the first of February when the weather was unusually dry. The fact that the fires were reported from southern Virginia to northern Georgia shows that the danger from fire was widespread. However, they occurred on only four of the twelve acres within which land is being purchased. At least three-fourths of the fires, the forest service says, were due to railroads. Forest officers say that until the southern states adopt and enforce laws requiring the use of adequate spark arresters on railroad locomotives, losses from forest fires can scarcely be prevented.

Permanent Railway Terminal Commission for Chicago.

The ordinance authorizing construction of a new Union passenger station in Chicago, passed by the city council, March 23, included provisions constituting a permanent railway terminal commission. This body is to consist of seven members and is directed to make a study of the entire terminal situation. The mayor will appoint five of the seven members of the commission; of the remaining two, one will be recommended by the Citizens' Terminal Plan Committee and the other by the Chicago Plan Commission.

Observance of Rules on the Pennsylvania Railroad.

To test the general observance of rules on the Pennsylvania Railroad, 5,961,732 observations were made and reported in 1913, with 8120 failures, showing a record of 99.9 per cent perfect. These tests included a great variety of violations, from employees reporting late to smoking on duty, using a locomotive whistle unnecessarily, leaving headlight burning in day time, using foot to adjust couplers, going between cars to repair leak in air brake hose without notifying train crew, placing torpedoes where persons are liable to be injured by them, and the use of reliable watches. In all, 93 different kinds of observations were made. Exactly 784,675 observations were made as to the use of intoxicants by employees, and only 158 cases required discipline.

The Chinese-German Railway Transaction.

The recent contract under which German interests undertook an extensive program of railway construction in China, was noted in the Railway Review at the time. At that date, however, the full significance of the transaction was not apparent, for lack of information. George E. Anderson, United States counsel general at Hong Kong has now transmitted an item extracted from the National Review, of Shanghai, which offers the following detail and comment, regarding the subject: "One of the most important preliminary railway agreements of recent years was negotiated during the New Year holidays. We refer to the exchange of notes between the German minister in Peking, Herr von Haxthausen, and the minister of foreign affairs, Sun Pao-chi, by which it is agreed that German capital shall be used for building two railways, one from Kaomi, a point to the northwest of Tsingtao, to Ichowfu and Hanchwang, and the other from Tsinanfu to a point between Shunchfu and Sinsiang on the Peking-Hankow line, to be decided after preliminary surveys have been made. Both these railways will be built (at a cost of \$20,000,000) as Chinese state railways by German capital under German engineers, and when completed will be under German management and German auditors. The importance of the two lines is in itself considerable. The first line will provide a much needed means of communication between two important districts, and will pass through a third district of considerable importance. Hanchwang is the point at which the German-built section of the Tsinpu Railway and the British-built section meet

and is a Grand Canal port of some size. Ichowfu is a coal center and it is probable that proper surveys will reveal other mineral wealth besides, for geologically Hanchwang is of the same series as Hsuechowfu, where, or near where, coal, antimony, iron and lead are to be found. The second line, effecting a cross-country, east-to-west junction between the Tsingpu Railway at Tsinanfu, where the Kiaotsi Railway joins the Tienstin-Pakow Railway and the Peking-Hankow Railway, will open up a country of great economic possibilities, largely unrealized because of the lack of means of communication and of capital for productive purposes." This new railway system will link up the trunk line from Tienstin to Shanghai by way of Pukow-Nanking and the Peking-Hankow system. It will be an important system and its construction by German interests will further emphasize the "sphere of influence" policy or condition which governs the granting of railway and similar concessions in China at present.

Louisville & Nashville Wins in Contest to Refuse Access to Files.

Judge Walter Evans in the federal court, at Louisville, Ky., has refused the mandamus asked by the government to give examiners of the Interstate Commerce Commission access to all files and records of the Louisville & Nashville R. R. The court held that certain communications the railroad refused to produce were privileged between lawyer and client; that the Hepburn law does not give the commission power to make general examinations and that the inquiry in this instance is not along lines sufficiently specific.

Carnegie Hero Award for Chicago Switchman's Deed.

The Carnegie hero fund commission has awarded a pension of \$50 a month and a bronze medal to Mrs. George W. Brew, the widow of a Baltimore & Ohio R. R. switchman in Chicago. Switchman Brew lost his life last summer while trying to save a party of women and children who were in a launch which capsized on the Chicago river at the Taylor street bridge.

Ordinance Passed for New Union Station in Chicago

The Chicago city council passed, Monday evening, March 23, the ordinance granting to the group of railroads which now enters the Union station, the privilege of constructing new and extensive terminals, according to plans set forth in the ordinance, and following in general the description previously given in these columns. The ordinance yet lacks the signature of the mayor and the formal acceptance of the railroads, to become effective; but there is no expectation that that official will withhold his approval.

If the ordinances are signed the occasion will mark the closing of an affair which has claimed the consideration of every large business interest of the city and agitated a good share of the public. More than a year ago the Pennsylvania Railroad took steps to press the passage of the ordinances which would give it the right to make the improvements. The issue was at once made to include the entire problem of the location of railway terminals in the central part of the city, for it was recognized that a permanent improvement of this character would fix the question of future location of railway terminals. Engineering advice was called for, and John F. Wallace was engaged at large expense, as a consulting expert, to make a report for the city, covering all phases of the terminal problem. This report was returned last October, as fully noted in the Railway Review at the time; but before Mr. Wallace's report was forthcoming, Bion J. Arnold was engaged by a non-partisan citizen's committee to review the subject from his own standpoint and to pass upon Mr. Wallace's report and any other advice offered. Mr. Arnold's report was published in the Rail-

way Review, Nov. 22, 1913. In the meantime numbers of public bodies and volunteer experts contributed plans and discussions upon various phases of the terminal problem.

There was little common ground between the city authorities and the railroads' representatives, in their respective demands and counter-demands, until an entirely new proposition was submitted by the Pennsylvania Railroad, last February. This proposition has since been modified in some particulars, but in the main it was approved by the city council committee on railway terminals, and was passed by the council practically intact as it left the committee. It embodies many of the principles set forth by Mr. Arnold, and as a whole represents a fair compromise of the divergent views originally presented.

The ordinances provide for the erection of a new passenger terminal at a cost of approximately \$40,000,000, which will be used by the roads now using the Union Station, namely: the Pennsylvania, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & St. Paul, and the Chicago & Alton. The passenger station will comprise a monumental structure occupying the entire block bounded by Adams, Canal, Clinton and Jackson

Twelfth streets, with permission to locate two more tracks on the subsurface, \$2,375,000; to build a viaduct 118 ft. wide in Twelfth street, between Canal street and the west bank of the river, \$270,000; to construct an elevated roadway between the west and north sides of the city, the expense being divided with the Chicago & Northwestern Ry., \$650,000; to build and maintain a new viaduct at Monroe street when the city constructs a new bridge, \$100,000; to widen all viaducts between Lake street and Twelfth street to the full width of the streets east of the river, \$1,760,000; to grant an easement for Congress street over the railroad property east of Canal street, and to construct a viaduct the width of the street east of the river, \$300,000; to build viaducts and rearrange approaches at Sixteenth and Fourteenth streets, \$400,000; to repair and maintain all the viaducts included in the foregoing, and to pay adequate compensation for all streets and alleys vacated. The list of expenditures recited above totals \$5,855,000, and may correctly be considered as the compensation which the city has exacted for permission to the railroad to proceed with the improvements.



Bird's Eye View of Present Union Station in Chicago and Site to Be Occupied by New Passenger Terminal.

streets, with a passage the full width of the block under Canal street to the concourse and train shed, situated in the space between Canal street and the river and extending both north of Adams street and south of Jackson. In this respect the present plan follows the design originally prepared by D. H. Burnham & Co., and illustrated in the Railway Review, August 24, 1912.

The freight terminal is to be for the use of the Pennsylvania Railroad only, and its location was modified in the later negotiations. As now provided for, it will be built east of Canal street and south of Polk street. Most of it will be north of Twelfth street, but a part may extend as far south as Sixteenth street.

In the provisions of the ordinances the railroads agree to cooperate in the straightening of the Chicago river south of Taylor street, and to give property required in this straightening at a price fixed by arbitration. This enterprise will cost a large sum of money, but concerning it Mr. Arnold said, "The expense of changing the river would not only be more than fully realized by the railroad companies who now own practically all of the abutting property on both sides of the river, as far as it is herein recommended to be changed, but they would also profit greatly by the change." The companies also agree to a number of other related improvements, which with their respective costs, may be summarized as follows:

To widen Canal street to 100 ft. between Washington and

The expense of the entire terminal project is placed roughly at \$65,000,000, which includes about \$15,000,000 already spent for land. It is estimated that the work will employ 10,000 men for more than three years. The buildings involved in the entire project will contain an aggregate of 48,000,000 cubic feet. The train sheds will cover an area of thirteen acres, and will involve with the immediate trackage, 50 miles of new track. Including the viaducts, the plans call for the revamping of 16 acres of street space, in which about three miles of new sewer will have to be constructed. The general waiting room of the new passenger station will have 31,000 square feet of floor space. This is surpassed by only two stations in the world, Washington and Leipsic. The South station in Boston, has 15,000 square feet, the Pennsylvania in New York 29,500, the New York Central in New York 20,000, Washington 35,000, St. Louis 19,000, Baltimore union 7000, Northwestern station, Chicago, 24,000, and La Salle street station, Chicago 13,000.

No delays are foreseen in proceeding with the project, and it is now expected that actual work will be started early in May. The railroads are allowed five years in which to complete the work. D. H. Burnham & Co., architects, are at work on the designs and will superintend the construction of the entire project.

The accompanying illustration, which is reproduced by the courtesy of the Chicago Daily News, is a bird's-eye view of



Fig. 34—Reinforced Concrete Arch Near Rhodes, Ia., C., M. & St. P. Ry.

the present Union station and the adjacent terminal district. The passenger station now in use is indicated by the figure 2, with the connecting train sheds 3 and 4. The new station will be located on the site indicated by the figure 1, with its train sheds extending over the space at present occupied by the train sheds, and an additional distance to the south, beyond figure 4 in the illustration. The new freight station will be located several blocks further south, as indicated by the figure 5.

Comparison of Efficiency of Japanese and American Railroads.

DESPITE IMMENSE ADVANTAGE OF LOW WAGES AND COSTS, FREIGHT RATES IN JAPAN EXCEED THOSE IN AMERICA.

Although their railways pay the highest wages in the world and must face correspondingly higher prices for material than are borne by any other transportation system, the American shipper today is paying a smaller bill to have his freight transported than is the shipper in Japan, whose railway, operated by the government, bears nearly, if not quite the smallest burden in wages or costs of materials in the world. This striking show-

ing of comparative economy is based upon the latest report of the Imperial government railways of Japan, which has been received in Chicago by the Bureau of Railway News and Statistics. The railroad system paying the highest labor costs of operation in the world, in other words, is selling its commodity transportation, at a smaller price than is the most cheaply operated system on the globe. It is such competition the United States railways must meet in winning their distinction of making the lowest freight rates in the world.

How little the question of cost burdens the Japanese railways may be learned from the fact that in the fiscal year ended March 31, 1912, it cost only \$46 out of every \$100 taken in to operate the system. In the corresponding fiscal year American Railways paid in operating expenses a few cents under \$70 for every \$100 earned in gross. The difference in wages alone is almost enough to explain the discrepancy, for whereas American railways yearly pay out in wages more than \$44 for every \$100 earned, Japan's railways pay only \$23; and whereas almost 64 per cent of all operating expenses on American roads represents wages, less than 51 per cent represents wages in Japan.

In the face of this huge advantage the average rate per ton mile charged shippers on Japanese railroads is 0.83 cent, against 0.74 cent on our own railroads. Yet the Japanese rate, unlike



Fig. 35—Skunk River Bridge, Near Cambridge; Progress View; Five 75-Foot Deck Plate Girders, with Concrete Slab Deck

our own, does not cover terminal services. For this service a charge of 11.3 cents per ton is made, which, added to the road charge gives a total rate of 0.97 cent per ton mile against our own 0.74 cent.

Although Japan affords a passenger rate of 0.69 cent per mile against our own 1.98 cent, the difference is almost wiped out by comparison of the traffic, for 95 per cent of travelers on Japanese railroads are third class; only 4.7 per cent use second class accommodations and three-tenths of one per cent use first class. Whereas this small number of first class passengers pays 1.60 cents per mile, almost so much as our own, the third class, in accommodations which would not be tolerated in this country, pays only 0.65 cent, which accounts for the low general average.

Why the Japanese wage bill is so low may be judged from the fact that the highest paid officials, vice-president and engineer-

in-chief, receive \$200 a month. The average for officials of the higher grade is \$166 per month and for officials of the lower grade \$68 per month. Clerks receive an average monthly salary of \$21, assistant engineers \$26, general employees \$9.70 and laborers in regular employ only \$7.47. For all employees the average is only \$112.50 per year against almost \$750 yearly on American roads.

Another reason why Japanese railroads have kept expenses as low is that immense amounts which on our own railroads must be met by operating expenses there are charged to capital. The effect is seen in the capitalization figures, for whereas the cost per mile in 1908, just after nationalization was only \$47,759, by 1912 it had risen to \$88,104, almost doubling the figure prevailing when the state took over the roads. Japan's railways today are capitalized at some \$25,000 more per mile than those of the United States, frequently accused of over-capitalization.

Double-Tracking the Chicago and Council Bluffs Division of the C. M. & St. P. Ry. in Iowa

(Continued from page 449.)

Between Coon Rapids and Manilla, 32 miles, a new double-track road is being built entirely on revised location. A map of the old and new line is seen in Fig. 6. In this distance the relocated line crosses the old one thirteen times. West of Dedham $1\frac{1}{2}$ miles there is a cut 77 ft. deep at the maximum excavation, and 3,000 ft. long, involving the removal of 325,000 cu. yds. of earth. The maximum fill on this district is about 50 ft. in height. The work has been done principally with steam shovels and work trains, and the grading is now completed between Coon Rapids and Aspinwall, or over the en-

tire district except 4 miles. In general, the earthwork is heavy, the excavation averaging about 125,000 cu. yds. per mile. To take care of settlement in the embankments an allowance of 15 per cent is being made in the height of the same. On the new line there will be two summits with nearly regular grades. The lateral deviation from the old line at one place on this change is $1\frac{3}{4}$ miles. A total rise and fall of 1183 ft. on the old line has been reduced to 761 ft. on the new location.

The revision has, in many instances, taken the line quite away from old townsites, or transferred it from one side of



Fig. 37—Des Moines River Viaduct, C., M. & St. P. Ry.



Fig. 36—Reinforced Concrete 50-Foot Arch Near Maxwell, Ia., C. M. & St. P. Ry.

a town to the opposite, as at Manning. In some of these cases, where the new road has left the town high and dry, the people will move bodily. Where the line touches the opposite side of a town, the company has moved or is preparing to remove the station buildings and facilities to the new location. In some places, notably at Aspinwall and at Cambridge, the new grade lies 20 ft. above the old depot and an incline will be necessary to reach the level of the yards at

those points. The depots will be raised to the new elevation. Notable bridges on the division are the Des Moines River and the Manning viaducts. The former (Figs. 37 and 38) is a steel structure 2400 ft. long, with base of rail 130 ft. above the bed of the stream. At the east end of this viaduct there is a long fill more than 100 ft. in high, containing 1,200,000 cu. yds. of earth. This structure is located on a change of

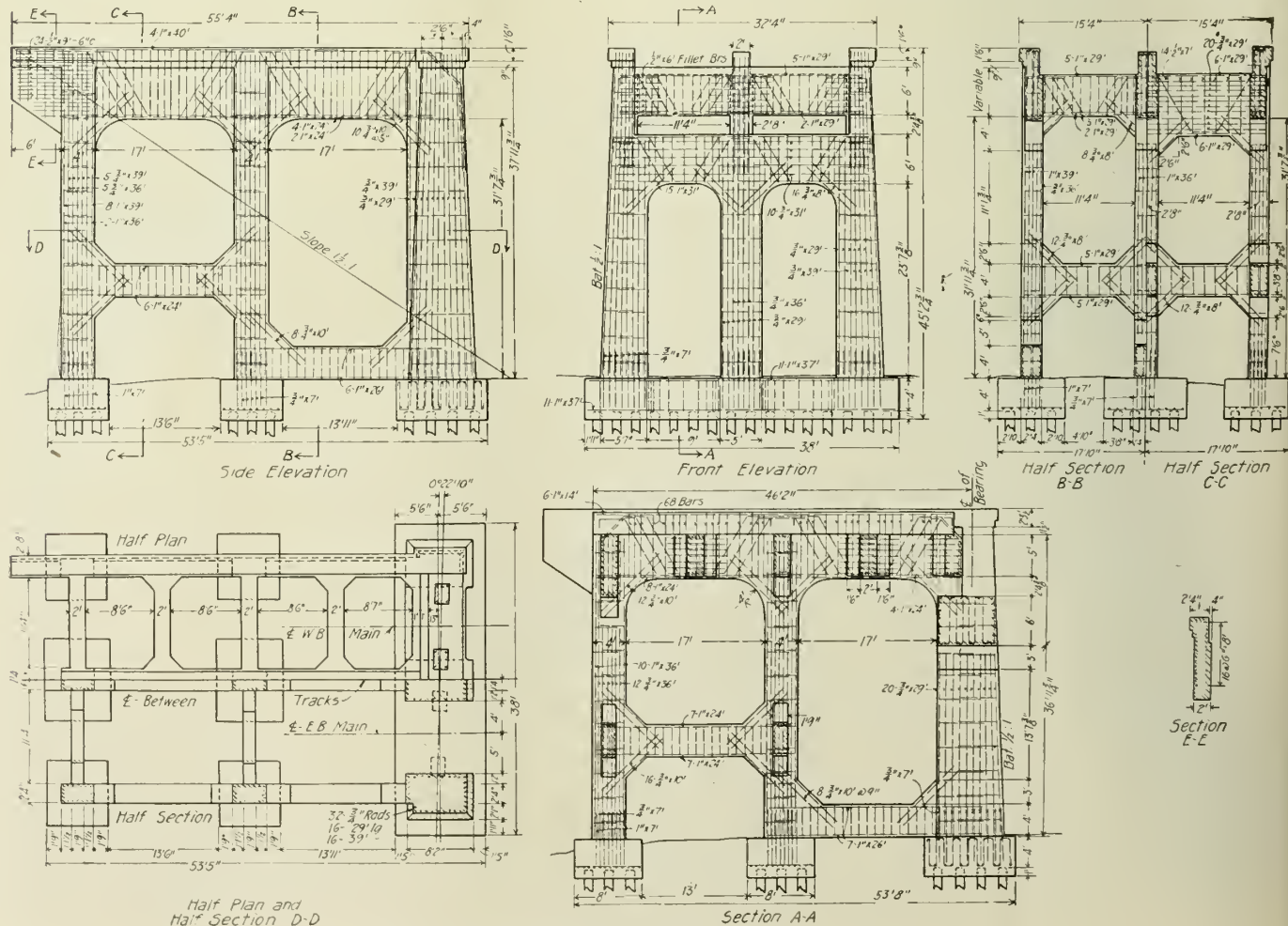


Fig. 40—Details of West Abutment, Manning Viaduct, C. M. & St. P. Ry.

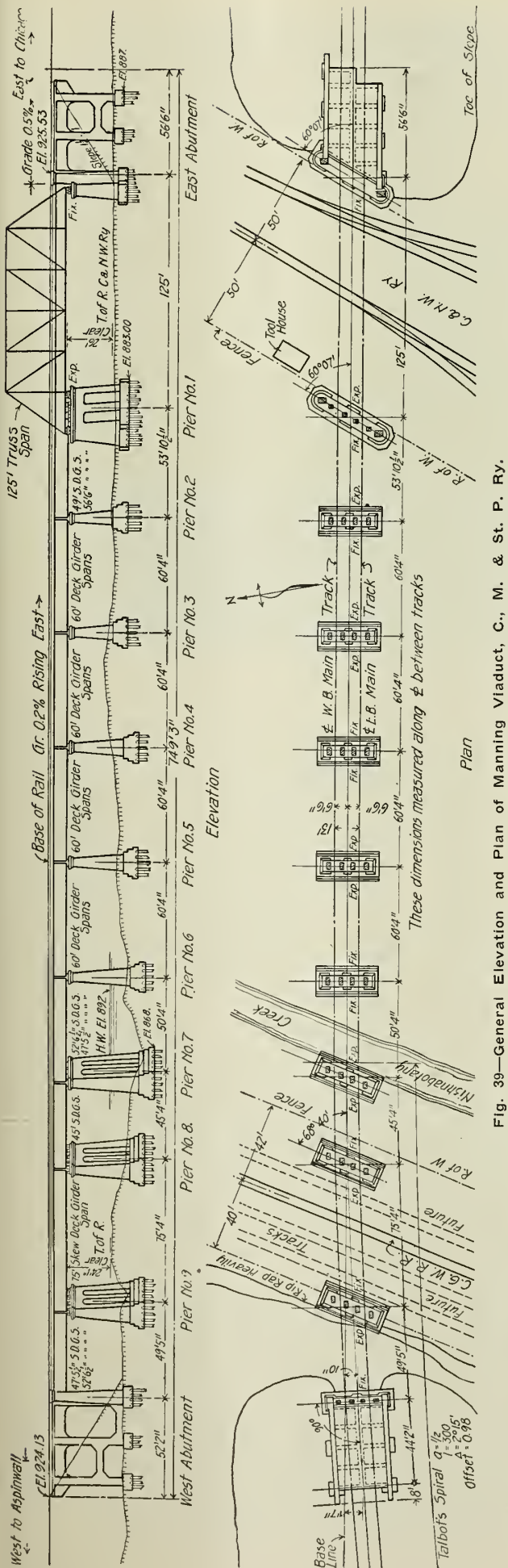


Fig. 39—General Elevation and Plan of Manning Viaduct, C., M. & St. P. Ry.

alignment extending from Madrid to Woodward, a distance of 7½ miles. By the construction of the viaduct 2.3 miles was saved in distance and 200 ft. of rise and fall and 800 degrees of angle were eliminated, besides doing away with the use of helper engines to assist trains up and out of the valley.

On the change of line east of Cambridge, where, also, there is a notable reduction of rise and fall and of curvature, there is a summit cut over a mile in length.

One of the notable improvements accomplished is the elimination of 52 grade crossings with public highways. This has been done by the erection of substantially designed undercrossings and overhead bridges of which Figs. 7 to 24 show typical structures. Figure 25 shows the general plan of a typical overhead highway bridge. It is in three spans of 31½ ft. The reinforced slabs in the floor are 2 ft. thick. These are supported on concrete abutments at top of slope and on two intermediate reinforced concrete bents, the details of which are shown.

An interesting feature of design in all of the bridge work is the reinforced concrete floor or deck, to support and retain a ballasted track. Details of the design are illustrated in Figs. 26 and 27. These slabs are 3 ft. 7 in. wide and 27 in. deep, curved at the sides. The top of the slabs are sloped for drainage.

Figure 30 shows the details of reinforced concrete pile trestle bents. As previously stated, reinforced concrete piers are substituted for the pile bents wherever the foundation is sufficiently stable, and Figs. 31-33 show examples of such construction. These trestles are built in spans of 16 ft. Some

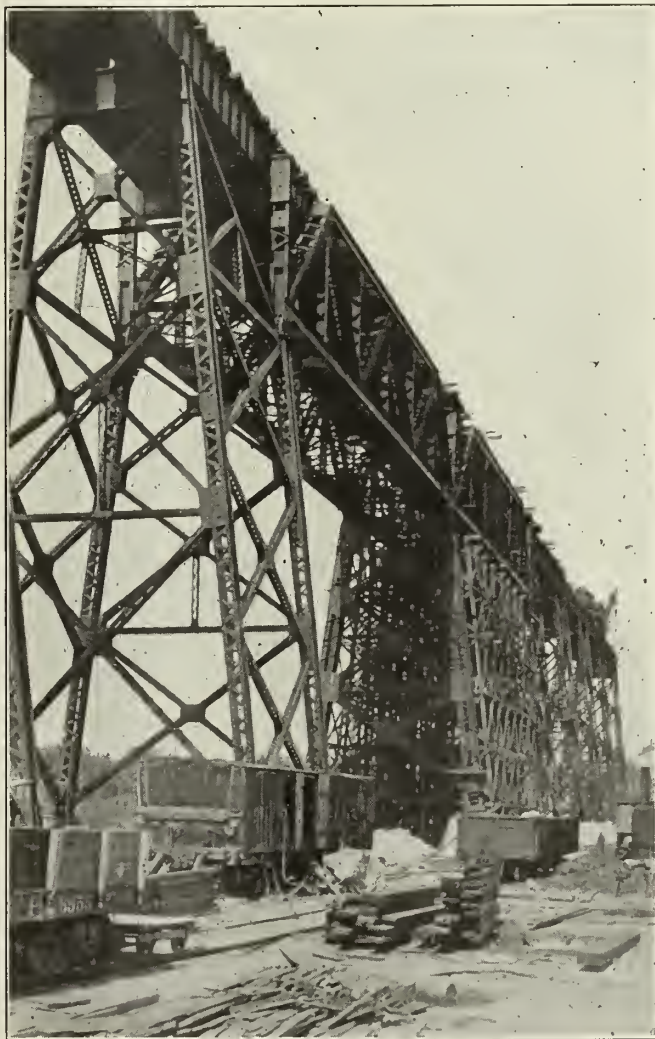


Fig. 38—Des Moines River Viaduct, C., M. & St. P. Ry.

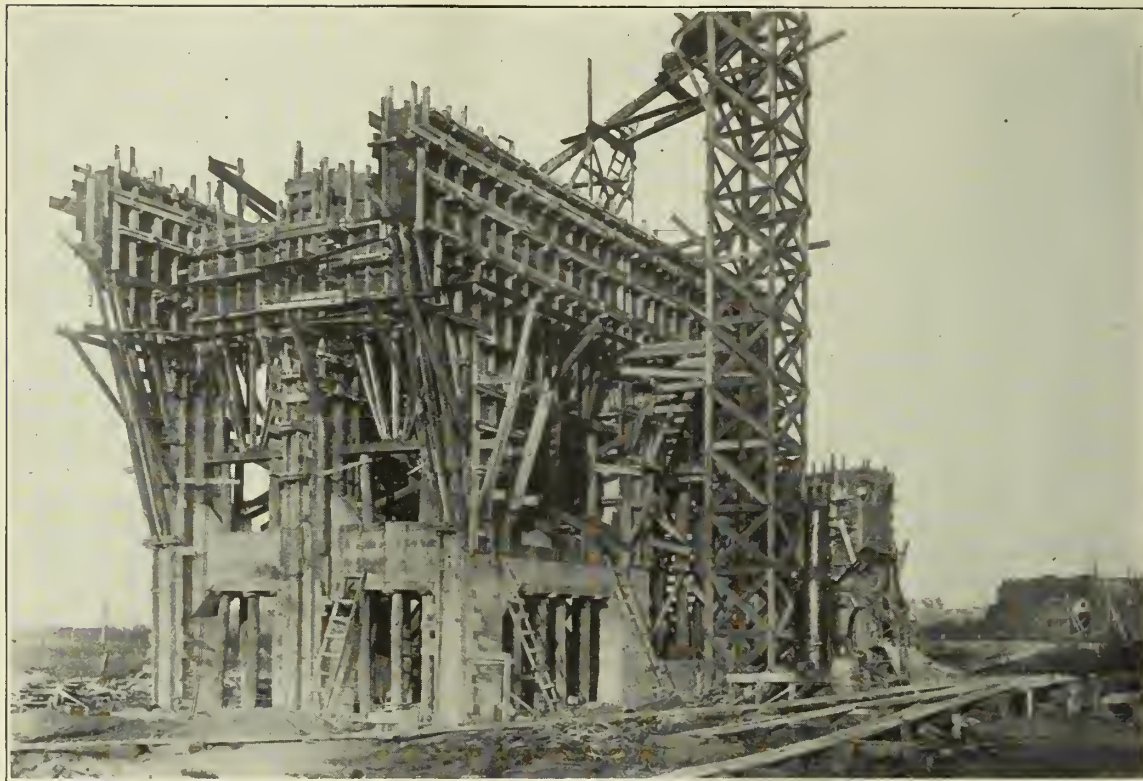


Fig. 42—Forms for West Abutment, Manning Viaduct, C., M. & St. P. Ry.

striking examples of large concrete arch construction are shown in Figs. 34 and 36.

The Manning viaduct consists mainly of a concrete slab deck on steel plate girders which rest on concrete abutments and piers. This viaduct crosses the Chicago & Northwestern roads. It consists of one 125-ft. steel truss through span, and nine deck plate girder spans of various lengths, as shown, with the concrete slab ballasted floor referred to. The details of some of the reinforced concrete piers and of the west abutment are shown in Figs. 41 and 40, respectively.

The new track is being laid with 90-lb. A. R. A., Section "A" rails, spliced with Weber and Bonzano joints. The ballast was taken from pits located at Sabula, Des Moines River, Springville and at other places. The Sabula gravel was load-



Fig. 43—Reinforced Concrete Piers in Manning Viaduct.

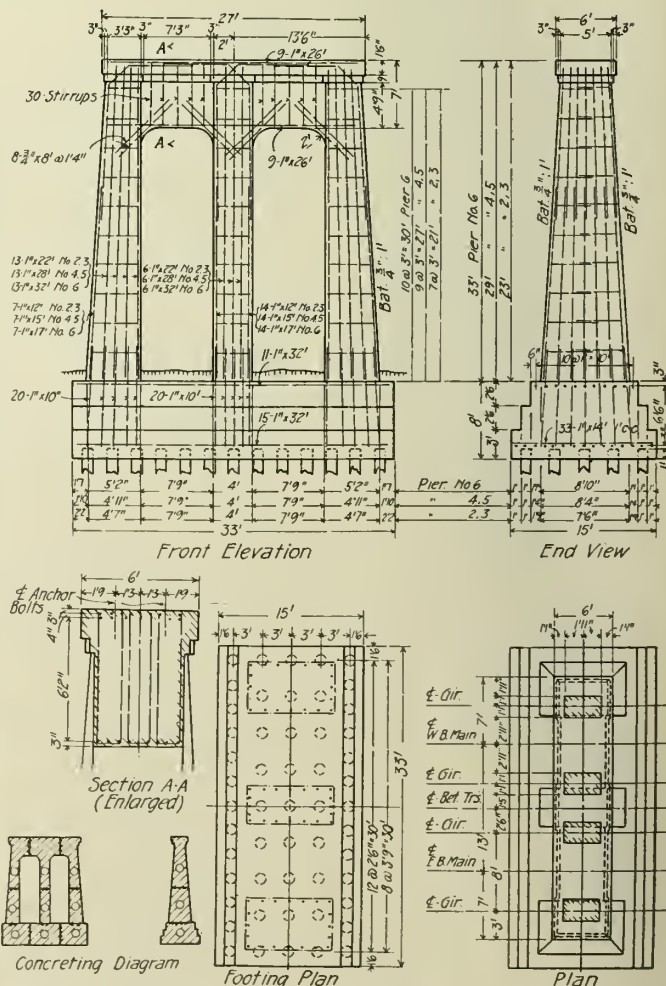


Fig. 41—Details of Piers, 2-6 Inc., Manning Viaduct, C., M. & St. P. Ry.

ed by contract, with a drag-line outfit. At other pits, the gravel was loaded by company shovels. The work of track-laying and ballasting has been done with the company's own forces.

Dissolution of New Haven System Arranged.

The dissolution of the New York, New Haven & Hartford R. R. system, which has been a subject of conferences between the railroad officials and the United States department of justice for weeks past, is covered in an agreement consummated between the two parties March 21. The dissolution will be arranged, in the event the present plans are carried out, to meet the ideas of the department of justice regarding compliance with the "anti-trust" law. The announcement, which was made from Washington, D. C., carries its own explanation, and is as follows:

"The attorney general has indicated to the representatives of the New York, New Haven & Hartford R. R. the arrangements which he thinks would result in bringing the affairs of that company into harmony with the law. The representatives of the railroad are willing to accept the requirements indicated and to endeavor to put them into effect without delay if approved by the stockholders in a meeting to be called at once. The indicated arrangement stated in general terms follow:

"1. The Boston Railroad Holding Co. is a Massachusetts corporation, holding a majority of the stock of the Boston & Maine R. R., and 90 per cent of the former stock, in turn, is owned by the New Haven railroad. The character of the holding company prohibits it from disposing of the Boston & Maine stock. The legislature of Massachusetts will be asked to remove this prohibition, and, if this is done, the stock of the holding company will be transferred at once to five trustees, and, after arrangements have been made to protect the minority stockholders of the company, they shall sell the Boston & Maine stock prior to January 1, 1917.

"2. The stocks of the companies which control the Connecticut and Rhode Island trolleys will be placed in the hands of trustees—five from each state—and shall be sold within five years from July 1, 1914.

"3. The majority stock of the Merchants & Miners' Transportation Co., now held by the New Haven railroad, will be placed in the hands of three trustees and shall be sold within three years from July 1, 1914.



Fig. 44—West Abutment, Manning Viaduct.

"4. The minority stock in the Eastern Steamship Corporation held by the New Haven railroad shall be sold within three years from July 1, 1914, and in the meantime shall be deprived of voting power.

"5. Whether the New Haven railroad shall be permitted to retain the Sound lines will be submitted to the Interstate Commerce Commission for determination under the provisions of the Panama Canal act.

"6. That Berkshire trolleys shall be sold within five years from July 1, 1914.

"7. A decree embodying the foregoing shall be entered in the United States District court for the Southern District of New York. The decree shall further provide that upon application of the New Haven railroad for the trustees and for good cause shown, the time within which any of the above-mentioned stock shall be sold may be extended by the court.



Fig. 45—East Abutment, Manning Viaduct.

"Trustees satisfactory to all parties have been suggested. Those proposed in connection with the Boston & Maine stock have signified their willingness to serve and their names are: Marcus P. Knowlton and James L. Doherty, of Springfield, Mass.; James L. Richards and Charles P. Hall, of Boston, and Frank P. Carpenter, of Manchester, N. H. Names of the others will not be made public until acceptance by them is fully assured.

"The essential reason for placing the property in the hands of trustees is to secure their immediate independent managements. The outlines of the proposed decree and trust agreements have been discussed and are understood. Their verbiage remains to be worked out, but no difficulty is anticipated in that respect. This statement has the approval of both the attorney general and the representatives of the railroad."

Chairman Elliott said regarding the above: "In the judgment of the directors the general business and financial condition in New England, and particularly those affecting the transportation lines, were such that it seemed wiser to make

a settlement, if possible, rather than face a general dissolution suit, with all of its ramifications and uncertainties. The directors feel that the time allowed, with the right in the court to extend it upon application of the company, or of the liquidators, gives an opportunity for disposing of the various properties to the best advantage possible and with the least disturbance to general business conditions. A meeting will be called in the very near future for that purpose. Prior to that meeting a statement will be submitted to each stockholder outlining the situation."

Directors of the New York, New Haven & Hartford at a meeting in New York city, March 25, unanimously approved of the agreement reached between Chairman Howard Elliott and Attorney General McReynolds, which prescribes the terms and conditions as above, under which the New Haven system is to disintegrate. Chairman Elliott was authorized to call a special meeting of the stockholders in New Haven, April 21, when formal action on the agreement will be taken. Officials of the road believe that the compact with the government will be ratified by a large majority vote.

Scherzer Rolling Lift Bridge for the Indo-Ceylon Connection

Among recent extensive engineering undertakings the construction of the Indo-Ceylon connection is receiving a good deal of attention. This route between India and Ceylon has been completed this year, and on Feb. 24 was officially opened for traffic, when Lord Pentland, governor of the Madras presidency and Sir Robert Chalmers, Governor of Ceylon, inaugurated the portions within their respective jurisdictions.

The work consisted of an extension of the South Indian Railway from Mandapam, on the mainland of India, to Dhanushkodi on the island of Rameswaram; an extension from Madawachi on the main line of the Ceylon Government Railways to Talaimanaar on the island of Manaar, and the

construction of two piers, and customs, postal and railway quarters at each of the railway termini for the service of ferry steamers provided between them. In addition, a large quarantine camp is being constructed near Mandapam on the island of Rameswaram for the detention of Indian Coolie



Fig 1—Map Showing South Indian Railway Lines and Connection.

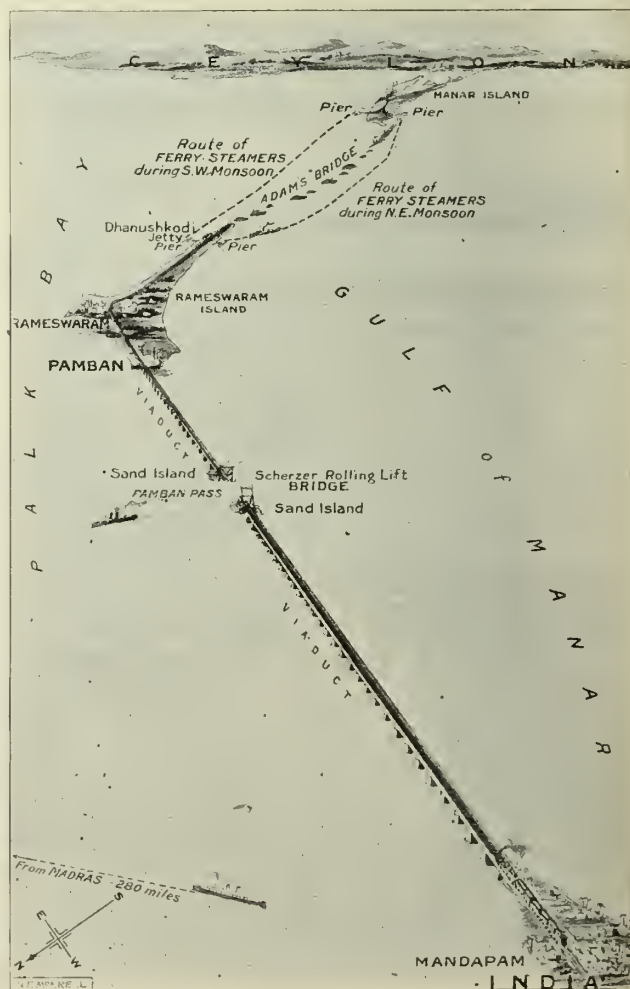


Fig. 2—Bird's Eye View of the Indo-Ceylon Viaduct



Fig. 3—View of Indo-Ceylon Viaduct from Scherzer Bridge, Looking Westward Toward Mainland of India.

labor bound for Ceylon and a slipway repairing the ferry steamers.

The new route will be of general interest in providing for tourists between India and Ceylon a convenient and interesting railway trip instead of the sea voyage of about 200 miles between Columbo and Tuticorin. It will also be of considerable importance in the transportation of Indian labor and cattle to Ceylon tea and rubber estates, and in the general development of South India and Ceylon. The Indian portion will provide through service to the temple of Rameswaram and the bathing places near Dhanushkodi for the immense pilgrim traffic which is one of the principal sources of revenue to the South Indian Railway.

The ferry steamers which have been specially designed are 250 ft. long and 38 ft. wide, with maximum draft of 6 ft. and are driven by Parson's turbines of 2200 h. p., geared to twin screws, to make the run of about 20 miles in slightly more than an hour. Accommodations on the steamers are provided for European and Indian first-class passengers and third-class passengers and for carrying cattle and freight.

The piers are about 700 ft. long, and consist of a steel floor system bolted together, on cast iron screw piles 2 ft. 9 in. in diameter, supporting the railway tracks and timber decking. The piers are provided with 4-ton hand cranes with 40 ft. jibs for transferring freight directly between the ferry steamers and railway trains.

Probably the most interesting part of the work was the bridge construction across Palk straits along the reef extending from the mainland of India to the island of Rameswaram. The structure commencing from Ramen Point on a narrow sandy promontory called Toni Torai, about 2 miles from Mandapam consists of 112 plate girder spans of 40 ft., one of 43 ft., a Scherzer rolling lift bridge of 289 ft., one plate girder span of 44 ft. and 31 spans of 40 ft., extending to Pamban. The piers for the girder spans are of granite masonry in cement mortar, with concrete footings enclosed

in steel caissons, founded on hard calcareous sandstone. The reef consists of large blocks partly above water, resting on softer sandstone on a stratum of compact sand. Though the reef is partly awash, in some places the depth of water even at low tide is as much as 6 ft., the tidal variation being about 3 ft.

At the Scherzer span, Pamban Pass, an artificial channel made some fifty years ago, provides for coastwise navigation. This is the only navigable channel between India and Ceylon and has a depth of about 14 ft. The substructure for the Scherzer bridge consists of two 9 ft. diameter and two 12 ft. diameter cylindrical piers at each side of the channel. The cylinders of $\frac{3}{4}$ -in. steel plate with bolted water tight joints are in sections, extending down about 45 ft. below mean sea level into a stratum of stiff yellow clay, and are filled with concrete. The cylinders on the Pamban side were sunk with an airlock but those on the Toni Torai side were sunk by dredge and divers. To facilitate the sinking of these cylinders an artificial island, on each side, about 60 ft. square, was made of coral boulders and concrete in sacks enclosed within a timber caisson and covered with clay and sand.

From an engineering standpoint the erection of the Scherzer bridge is of interest because native Indian labor solely was used; and to prevent interference with navigation the leaves were erected in a position inclined about 60 deg. to the horizontal, with high wind and strong current prevailing. This was designed by the Scherzer Rolling Lift Bridge Company, of Chicago, and fabricated by Head, Wrightson & Company, of Thornaby-on-Tees and London, England. Mr. Robert White, of London, was consulting engineer and Mr. H. P. O'Shaughnessy executive engineer on the entire construction work for the South Indian Railway Company. Mr. R. L. Larson was resident engineer for the Scherzer Rolling Lift Bridge Company during the Scherzer bridge erection. The bridge is of the double leaf, through type, for single track of 3 ft. 3 $\frac{3}{8}$ -in. gage, with a span of 225 ft. between bearings, and a width of 20 ft. between center lines of trusses. The two leaves are hand operated and can be opened to an inclination of about 82 deg.

The erectors were Moplahs, who are natives of Malabar Coast on the western side of India. They were employed by two contractors, Abdulla Kooty and Chinna Bawa, each of whom had been awarded the erection contract for one leaf and had previously erected the 40-ft. girder span. This division of the work necessitated two sets of erection plant and equipment, but the rivalry created (although not exactly



Fig. 4—Operator's House and Operators for Scherzer Bridge, Indo-Ceylon Viaduct.



Fig. 5—View of Scherzer Bridge from Pampan Channel.

friendly at times), did much toward expediting completion of the bridge. The Moplahs did not have much previous experience of bridge erection, but were strong and active and skillful of rigging work. Unlike the Tamil inhabitants of the locality, who are generally Hindus, the Moplahs were strict Mohammedans and therefore, temperate. All other labor was employed directly by the South Indian Railway Company and was composed mainly of Anglo Indians (Zurasians) and Tamils as foremen, engine men, mechanics, rivet inspectors, painters and boatmen, in addition to the coolies of both sexes.

The 400 tons of Scherzer bridge material, shipped from England, arrived in July, 1913, and was transferred about two miles from the shore to pontoons and lighters or native boats. The pontoons and lighters were towed by a launch or poled by Indian boatmen to Toni Torai, where the material was inloaded and stored with the exception of the track girders and segmental girders and the anchorage columns, which were taken directly to the artificial islands at the bridge site.

The average hours of work were about ten per day, and work was carried on continuously, on Sundays as well. Occasionally a Mohammedan feast-day would stop the work, but the Hindu feast days did not effect the work to any extent, as the Moplahs did not recognize them. During the Mohammedan fasting period, which continued for thirty days from August 4, work stopped at about four every afternoon, the working hours then being about eight per day. Then the Moplahs abstained rigidly from eating, drinking, smoking and chewing from sunrise to sunset, notwithstanding the climatic conditions, and even tried to abstain from swallowing. The wages of the Moplahs was from twenty-five to fifty cents per day, and for the coolie labor from eight to sixteen cents per day.

Erection work commenced on July 20, with the drilling

of holes in the anchorages for the anchorage column splices. The anchorages about 36 ft. long had been embedded 30 ft. in the concrete of the 9-ft. cylindrical piers, during construction of the substructure. The 12-ton track girders were then moved and hoisted into place by means of tackle and hand winches and a gantry or frame work of teak poles lashed together, on each island which had been left standing after being used on the substructure work.

Erection of the fixed portions for each leaf proceeded, the anchorage columns being placed, and subsequent material was brought to the islands as needed. Because of the small space on the islands, only a few pieces could be brought at a time from the store yard at Toni Torai. There the pieces required were marked and workmen, sent from each of the erection gangs, loaded them on flat cars with the assistance of a 10-ton railway crane. The materials for each half of both leaves had been painted a distinctive color in addition to the erection marks, the colors used being brown and yellow for one leaf and gray and green for the other, so the most illiterate of the workmen could distinguish them. The cars were moved to a pier at Ramen Point and transferred by another 10-ton crane to pontoons or lighters, which were poled out to the islands at the bridge site.

Riveting was performed by pneumatic tools, as well as the drilling and reaming necessary, for which a steam driven compressor plant was installed on each island. Coal and water for the compressor engines and other supplies were brought to the islands by boats. The riveting done was a source of annoyance at first, due to the inexperience of the workmen, but as the work progressed the riveting improved. The workmen soon acquired experience and were able to drive good rivets at a rate of 250 a day per squad.

When the fixed portions of the bridge had been erected and the segmental girders and some of the subsequent pieces placed and blocked up in their proper positions, the gantry



Fig. 6—Diaphragm Leaf Closed for First Time.

poles used for erecting were removed and the counterweight boxes assembled. Riveting followed closely on erection, and after completion of the counterweight boxes, forms of $\frac{5}{8}$ -in. teak wood for the adjustment pockets were put into place in the boxes by Indian carpenters from the construction workshop at Toni Torai. Though these carpenters, like the other Indian workmen, used tools and methods that do not wholly conform with American and European ideas, and had little knowledge of plans, their work was good. In one respect they have the advantage of being adepts in supplementing their handicraft with their foot craft. Stacks or cribs of old railway ties were placed to support the counterweight wings during the unbalanced condition of the leaves, and runways were built for placing the counterweight concrete. The work of mixing and placing concrete for the counterweight followed. A machine mixer of $\frac{1}{2}$ cubic yard capacity mounted on a pontoon scow moored at each island was used, the concrete materials being brought alongside on other scows.

As the batches of concrete were mixed they were dumped upon the deck of the scow and shoveled into galvanized iron dishes about 12-inches diameter and 5 inches deep. The concrete was carried up the runways in these dishes by the coolies comprising young boys and women of all ages, and passed along to be deposited in the counterweight. In this way as much as 2 cubic yards per hour could be placed. While the concreting was going on, the erection and riveting were also progressing. Two panel lengths of top chords for each truss, the adjacent web members and the machinery floor and bracing for each leaf were in place, when an erection derrick was assembled to rest on the top chords of the second panel.

By means of these erection derricks the web members, chords, floor and bracing members were hoisted up and bolted in place in logical sequence. The jibs of the derricks were 30 ft. long, so that the erection could be done one panel length ahead of the position of the derricks. The derricks were moved up along the top chords one panel at a time, as the erection progressed, by means of blocks and tackle attached to the top chords, and then securely lashed in place. The hoisting was done with the hand winches down on the islands and the jibs were swung up or down with hand winches on the derrick platforms.

Erection was interfered with to some extent by the strong winds, especially about the middle of October, when the southeast monsoon was concluding with a final blow. The



Fig. 7—Hindu Temple on Rameswaran Island, South India. Pilgrim Traffic Served by South Indian Railway.

southwest monsoon commenced in May and concluded in October, when the wind alternated between southwest and northeast with intervals of calm, until the northeast monsoon set in late in October, with occasional storms and an average daily rainfall of about two inches. Notwithstanding the weather conditions the erection and greater portion of the riveting were completed and the operating machinery was set, so that the west leaf of the bridge was operated to the closed position for the first time on November 15 and the east leaf three days later.

On November 22 the Indo-Ceylon connection was honored

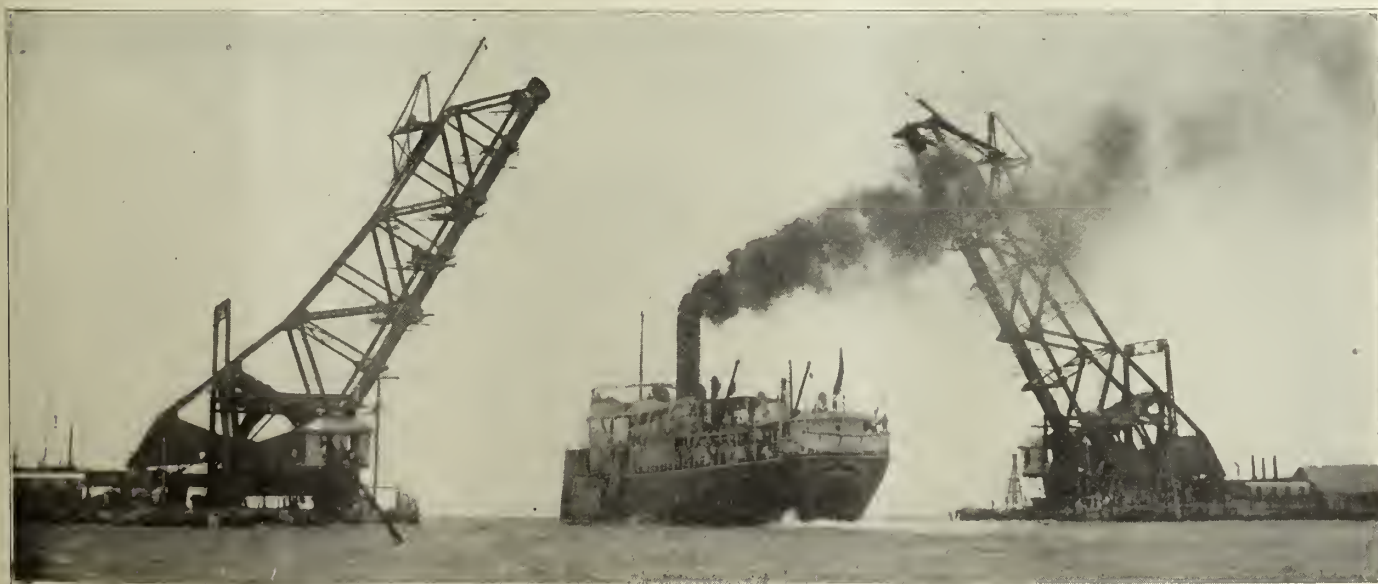


Fig. 8—Steamer Passing Through During Erection of Scherzer Bridge.

by a visit of Lord Hardinge, Viceroy of India. For several days previously very little construction work was done because of the preparation for the viceregal visit. However, work had progressed to the state where it was possible to operate the Scherzer bridge. His Excellency expressed his interest in the construction work and especially in the successful operation of the movable span, the first of its kind to be erected in India.

After the slight adjustment in alignment of the two leaves had been done and the bracing riveted, track materials were laid. While this work was being done the bridge was kept in the closed position. The work had to be carried on with a view to the necessity for opening the bridge for navigation, whenever a ship was sighted. Usually, at least one ship per day passed, but no interruption to navigation occurred.

Much delay was caused, not only on the bridge construction but on other construction work of the Indo-Ceylon connection by four days of stormy weather at the end of November. Many miles of railway embankment on the island of Rameswaran were damaged, as were the islands at the bridge site, though the bridge showed no effect of the storms. On the east island sheet piling and top frilling were washed away, so that only half of the island remained above water, and the compressor plant had to be removed. The damage on the west island was not so great, but the compressor and boiler had to be moved because of settlement.

The first train across the bridge was run through on

the South Indian Railway to Dhanushkodi was inaugurated, and the ferry service between Mandapam and Pamban was abolished, which had previously served the immense pilgrim traffic at times amounting to more than thirty thousand passengers per day. Several illustrations are given herewith, showing interesting features of the work.

Rate Decision Again Deferred.

The Interstate Commerce Commission announced, on March 24, that the railroads involved in the Eastern advance rate case will be given an opportunity to present additional testimony as to their need of increased revenues; and also to offer evidence in rebuttal of the testimony introduced by those opposed to the advance. Requests embodying the foregoing have been made to the commission and are now complied with. The commission will begin to take the additional testimony on March 30 and 31, and, if necessary, the hearing will be completed, April 20, 21 and 23.

In the announcement to the above effect the commission virtually indicates that a decision in the case can not be expected before some time in May at the earliest, and probably not until a short time before the commission adjourns for the summer, late in June. As Clifford Thorne, chairman of the railroad commission of Iowa, representing eight Western states in opposition to the proposed advance, is to present his views on March 30 and 31, it is hardly possible that the hearings can be concluded until late in April. Those in



Fig. 9—View of Scherzer Bridge with Official Test Load of Locomotives and Cars, Dec. 18, 1913.

Dec. 14. In connection with this the Hindu belief in "inauspicious occasions" was brought up. According to Hindu religious chronology one of these occasions commenced at 4 p. m. on the 14th, during which any new undertaking would result in misfortune and disaster. Because of that, the work of tracklaying was continued throughout the previous night, so the first train was run across the bridge at about ten minutes to four, with no cause for misgivings on the part of the interested Hindu spectators of the event.

The final adjusting and riveting were completed at about this time by the Moplahs, the laying of track material as well as the setting of the operating machinery and building of the operators' houses being performed by departmental labor of the railway company. Several trains per day were thereafter run over the bridge to the island of Rameswaran, carrying ballast and materials for construction and for repairs caused by the storm.

The official inspection and approval of the bridge by the senior inspector of the government of India occurred on December 29.

On January 1 regular passenger traffic across the bridge commenced. Thus through service from the main line of

intimate touch with the procedure of the commission regard it as likely, therefore, that the case cannot be argued until some time in May. In the usual course of events the necessary procedure thereafter would consume the time until nearly the first of June.

The announcement of the commission was expressed in the following language:

"Carriers have expressed their desire to present at an early date additional testimony touching their financial requirements and also to have an opportunity to offer evidence in rebuttal of the testimony recently introduced in opposition to the proposed increase in rates. Having no other date available in the near future, the commission has thought it wise to postpone until further notice the argument on the spotting question now assigned for March 30 and 31, and to devote those dates to the hearing of such future evidence. If the carriers are not able to complete this additional testimony on March 31 the hearing will be continued on April 20, 21 and 22, those being the earliest available additional dates. As none of the commissioners was able to be present when the testimony was given on this subject by the representative of the railroad commissions of the states of Iowa,

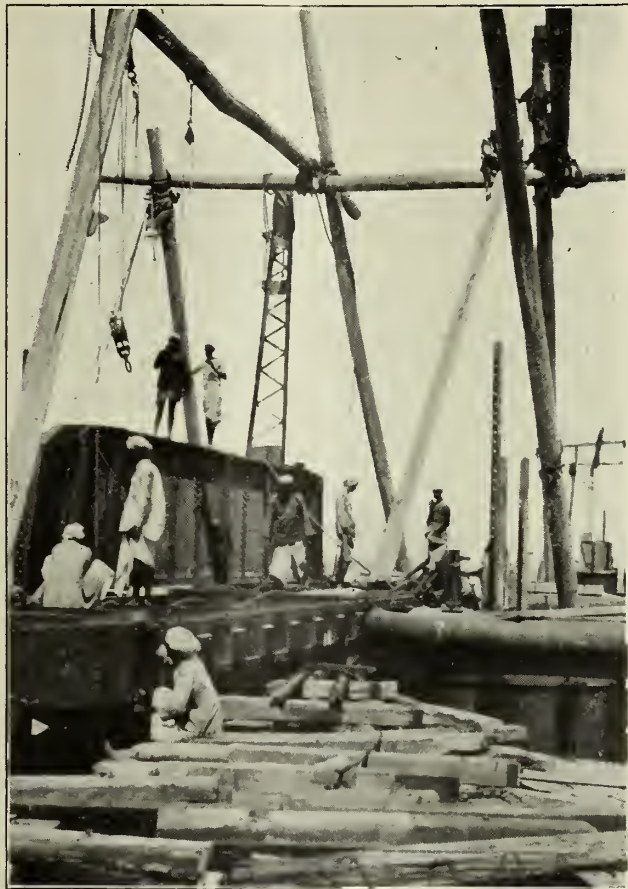


Fig. 10—Early Erection Work on Scherzer Bridge. Taken July 22, 1913.

Kansas, Nebraska, North Dakota, South Dakota, Arkansas, Oklahoma, and Missouri, he has been requested to appear again on March 10, to restate in substance the testimony already given by him."

Commercial Bodies Oppose Extension of Parcel Post.

Two of the largest commercial associations of the country have formulated a protest against any extension of parcel post that will cause further inroads into the business of the express companies. The executive committee of the Chicago Association of Commerce adopted the following resolutions at the instance of the freight traffic committee:

"Whereas, a new and complete system of express rates throughout the entire United States became effective February 1, 1914, by order of the Interstate Commerce Commission; and Whereas, effective on January 1, 1914, a change was made in the regulations governing parcel post: (a) Extending the weight to 20 pounds in all territories and somewhat modifying the rates; (b) Extending the weights to 50 pounds in first and second zones; and Whereas, there has been a more or less change in package rates by freight; and Whereas, these three modes of transportation are open to all shippers on a competitive basis; and whereas, it is desirable that for some definite period a relative adjustment remain permanent in order that commerce may shape itself to the new conditions; therefore be it Resolved, that the freight traffic committee request the executive committee to ask the president of this association to communicate with the postmaster general, urging that for a reasonable period there be no radical change in the parcel post regulations, to the end that commerce may have an opportunity to shape itself to present conditions, and secure the benefit of a relative adjustment in the forwarding of small packages, to-wit: freight, parcel post and express."

On February 20 last the board of directors of the Merchants' Association of New York adopted a set of resolutions embodying the following:

"Whereas, the parcels post, although useful and desirable within its present limits, is by reason of numerous limitations unfitted effectively to meet all the needs of commerce for quick transportation; and Whereas, the express service fully provides for those needs in a highly efficient manner, and at rates fairly proportioned to the cost of rendering the service; and Whereas, the extension of the parcels post weight limit to 100 pounds would so deplete the volume of traffic available to the express companies as to make their operation profitless and force their retirement—

"Resolved, that in the opinion of this board the express service is an indispensable agency for quick transportation, whose continuance is imperatively required by the needs of commerce; that the parcels post as at present organized would be a wholly inadequate substitute, inferior in many respects to express service; that it is lacking in many important features essential to a complete service, and being unadapted to many classes of traffic, its substitution would leave that traffic unprovided for.

"Resolved, that if the parcels post be so expanded as to cover the entire field of quick transportation it cannot in any event perform that function more efficiently or economically than it is now performed by the express companies, and that in all likelihood the cost will be greater.

"Resolved, that in the opinion of this board no social or economic benefit will result from substituting the parcels post for the express service beyond the limits now established, but that on the contrary serious harm to the country's traffic facilities will ensue, with a probable loss resulting from the parcels post's operations, to be borne by the public treasury.

"Resolved, that the further extension of the parcels post be opposed by this association, and that the reasons for such opposition be stated in full in a proper memorial to congress."



Fig. 11—Progress View of Erection Work on Scherzer Bridge, Indo-Ceylon Viaduct.

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HAROLD A. SMITH	- - - - -	Assistant Manager
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Willard A. Smith, President.

Sworn to and subscribed before me this 15th day of March, 1914.

Robt. R. Greig, Notary Public.

(My commission expires Oct. 26, 1915.)

SATURDAY, MARCH 28, 1914.

The steel trade is enjoying another brief breathing spell as to future business, partly due it is estimated to an expected shading of prices especially in bars, plates and shapes. The quiet is merely a counting room quiet. The undertone of the market is even stronger than two weeks ago as measured by known tabulated requirements. The requirements of the electrical industry, ship yards, pipe works and users of iron bars are large and pressing, though not for immediate placement.

Advocates of government ownership of railways can hardly derive much encouragement from the experience of the state of New York in improving its highways. Just how much of the immense sums ex-

pendent went for graft does not yet appear to be definitely determined, but it seems to be over half. And now comes the governor of the state and says:

"New York is engaged in building 12,000 miles of roads which will wear out forty years before they are paid for."

A recent consular report stated that about 45 per cent of railway crossing gates in Germany were operated by the trains; or, in the ordinary way of speaking, automatically operated. Investigation shows that this report, although officially made through the consular service, was entirely erroneous, and probably resulted through a mistake in translation at the original source of the information. As we expected, it transpires that railroad crossing gates throughout Germany are operated by hand, and the so-called "train-operated gates" are merely those with which a warning signal is put into operation when trains reach the block or section in which the gates are located, after the manner of the common crossing bell so extensively used in this country. Automatic or train-operated gates at grade crossings have been experimented with on the state railways of Prussia, but without satisfactory results, and government engineers are opposed to the introduction of such gates at railway crossings, obviously on account of the risks. The obstacle in the way of using such gates lies not at all in the difficulty of designing a mechanism to be set in motion at the approach of a train, but rather in avoiding such a coincidence as having the gate come down on top of some one's head; or in advance of a person or team on the crossing, thereby shutting him in and actually preventing escape from accident. If experience with the public at railroad crossings in Germany is anything similar to that which is found in this country, every installation of crossing gates requires not only human intelligence to warn persons in advance of closing the gates, but also a reserve of physical force behind such intelligence, to prevent people from trying to beat the train after the gates have been closed.

A good deal of attention has been given in the past few years to the question of substituting a number of inferior timbers for others which heretofore have been considered standard for railroad ties but which are now becoming scarce by reason of approaching exhaustion of supply. The very heavy demand for the white cedar of northern Michigan, Wisconsin, Minnesota and other northern districts further west, and for the red cedar of Washington, Oregon and northern Idaho, for telegraph and telephone poles, is now enforcing consideration of some desirable substitute for those timbers, the supply of which has already become restricted, with resulting increase in price. The Forest Service, of the Department of Agriculture, now suggests the use of lodgepole pine as this substitute for the cedars. It is urged that a creosoted lodgepole pine

pole can be furnished, at a distance from the cedar region, cheaper than the cedar pole, and that it should last longer.

Lodgepole pine trees, as the name implies, grow straight, and they cover the ground thickly. In the Rocky Mountain and coast ranges vast areas are covered with timber of this variety that is too small for general lumbering purposes, including the making of railroad ties. From the standpoint of strength it is as efficient as cedar. There are also large quantities of fire-killed lodgepole pine, and this, if utilized before decay has well set in, is officially considered to be every bit as suitable as timber cut green. The Forest Service is authority for the statement that "there is no inherent difference in wood seasoned on the stump and wood cut when green and then seasoned."

Another substitute for cedar named by the forest department is Engelmann spruce. It is not as strong as lodgepole pine and does not absorb preservative solutions as well, but large quantities of it can be found further south than lodgepole pine, thereby making it more available for pole use in some localities than either the pine or the cedar.

Present "Profit-Sharing."

In considering the various schemes for modified government ownership of railways, such as partnership, profit-sharing, etc., it would be well to remember that the state is already sharing the profits of railway operation on a large scale. In considering the profits said to be made by some governments out of the railways which they own, the taxes which would be paid by private owners should of course be subtracted. Railways in this country pay about four per cent of their gross earnings in taxes. Government collects this in direct taxes whether the railway makes any money for its owners or not. In addition, the general government collects income tax from those corporations which have net earnings.

The net profit which the government, state and national, gets from the railways is about as large as the owners themselves get on an average. The states would have to forego this great income if the national government owned the roads; and would have to look for other recoupment through possible lower rates of transportation for their citizens. This loss of income would of course have to be met by increase of other taxes and the taxpayers then would carry the burden in increased proportion.

The profit-sharing at present is most favorable to the state. It does not stand to lose except in the matter of the one per cent tax on net corporate earnings. Taxes on the property are sure; and are continually increasing. Railway property is assessed, as a rule, on a higher basis than any other. The railway owner gives up more, in proportion, to the state, than the owner of any other class of property.

Under real profit-sharing the sharers should participate in losses as well as net earnings. Government now takes its four per cent arbitrarily; and at the same time contrives to reduce earnings by rate laws and orders. Real statesmanship would realize that the prosperity of the nation and that of its railways are interlocked; there is now a real partnership of interest; and the railways should be fostered, as well as regulated. Rightly considered, there is now as much mutuality of interest between the government and the railways as there would be under a money partnership or a profit-sharing such as suggested by Mr. Kenna or Mr. Yoakum. And as for raising money for extension of transportation facilities, that can be done if the government will play fair and let the railways have remunerative rates and a chance to make as much money as can be made in other investments.

Canadian Railway Legislation.

The contrast in the application of governmental authority in the United States, where the state rights doctrine has served to make the operating of our interstate roads almost a law-respecting impossibility, and in Canada where railroad regulation, even though it may be exacting, has the advantage of being uniform, is brought out in the proposed consolidated railway act now pending before parliament at Ottawa. The last general code adopted by the Canadian government was formulated in 1906. Since that time the country has acquired a tremendous amount of railway experience, and has been given opportunity to learn a great deal, though largely of negative value, from state and federal attempts at regulation in this country. Since 1906 twelve amplifying and amending acts have been passed. It is the purpose to incorporate these amendments in the general law and at the same time to inject certain new features which the Canadian law makers seem to feel necessary in view of the rapidly developing railway situation in that country. The act as proposed, will also apply to a number of other questions including express business, telegraphs, telephones, water power and electricity and traffic by water between ports in Canada when carried by railway companies.

Features pertaining to railway interests include a clause intended to prevent the evasion of the railroad commission's control over traffic rates, provision is made for applying the act and the authority of the railway board to railways in insolvency or under mortgage or receivership, changes are also being made with respect to the regulations governing location railway lines and the cutting up of cities, towns and highways, wider powers are given to prevent unnecessary and injurious duplication of railways and railway rights-of-way, regulations governing the placing and the use of industrial sidings and relations between railway and mining interests are

defined, the arbitration clauses have been remodeled, the board is empowered to act in highway crossing, street pre-emption, damage, and hours-of-service cases, the length of a section and the number of men comprising a section crew has been defined, and the board is given power to forbid the use of coal in any district and to order the use of electricity or such other kind of fuel or power as may be deemed proper, etc., etc.

The one prominent feature that is of interest both in Canada, because of recent developments showing extravagance in the construction of government subsidized roads, and in this country because of a number of flagrant instances of financial mismanagement, is that relating to stock and bond issues. Some weeks ago a federal statute covering these points seemed a prominent possibility in our own congress, but as explained editorially in our last weeks issue, the committee of the house having in charge a draft of a bill seeking to establish this control, concluded it more advisable to empower the Interstate Commerce Commission to acquire and make public full information pertaining to railway financial matters, hoping in this way to place a check on unprincipled stock-jobbing and other questionable practices. In the proposed Canadian bill it is provided that hereafter the issue of stock, bonds and other securities by railway companies shall be subject to the control of the national board of railway commissioners. Leave must be obtained from this board before any issue of stock, bonds or other securities, payable more than a year after date, or issued otherwise than solely for money consideration, can be made. The board is given power to impose terms and conditions respecting such issue and may refuse leave or limit the amount to what it is satisfied is reasonable and proper. The board is also given power to see that the proceeds of any such issue are properly applied and duly accounted for. The relative measures of success attained by the respective clauses in Canada and in the United States will afford the subject of future interesting comparisons.

The Status of the Rate Hearing.

The situation in the matter of the increase of freight rates which the Interstate Commerce Commission has been considering for some four months, is not such as to encourage the belief that any early conclusion is impending. It has been complicated beyond any expectation, and it looks now as though the time for the hearing of final arguments were still a long way off. The inquiry was begun under an order made June 21st, 1913. It involved two questions: first, as to the adequacy of present revenue; and, second, if inadequate what course the carriers may pursue to meet the situation. The railways claimed that the proper course was to increase rates and filed new rate schedules covering an average horizontal increase of five per cent. The commission suspended these schedules and the hearings have proceeded on both questions.

Under date of Dec. 20th, 1913, the commission, following the presentation to it of what it termed "elaborate and helpful compilations from the carriers accounts * * * showing the diminishing net returns from operations and lessened net income," issued a series of 78 questions with 51 blanks for answers. The purpose of this extensive inquiry was to ascertain whether by other means than increasing rates to the public, the railways could increase their net earnings. Answers were required to be filed by January 31st, and presumably most if not all of these answers have been in the hands of the commission for nearly two months. It proceeded to hear various shippers, organizations of shippers, representatives of state railway commissions, etc., and probably, meantime, is having the mass of information given on these 51 forms carefully examined and digested.

The hearings have so far been principally devoted to "Group B., Revenues and the Conservation Thereof." An opinion rendered meantime on the allowances to industrial or plant railways, has to do with this especial subject. The question of private sidings and making charge for switching and spotting cars, also belonged here among "practices in granting to shippers special service or allowances". These propositions and the attitude of the commission regarding them came evidently as a surprise to certain large shipping interests which believed that they were secure in the advantages which custom and general acquiescence had given them. The opinion estimated that an abolition of these allowances would give the carriers in the official classification territory about \$15,000,000 additional revenue, and of course that would amount to a large increase of transportation cost to those shippers now possessing such advantages. If the commission decides that transportation rates must begin with delivery to the carriers' tracks, there must be charges imposed for spotting cars and every other possible service rendered by the carriers on private sidings and spurs. This would also add to railway revenues and to the cost to shippers now receiving such service. It should be noted also that such final orders if given will have the same effect in all other territory.

It was not surprising that shippers and commercial organizations are opposing the abolition of this class of "special privilege." There is much to be said on their side of the case; and while the commission has indicated clearly that current practice must be revolutionized, it is not clear to just what extent it will go. It may consider such plant roads and sidings as built solely as a part of the shippers' plants and for their own convenience (which seems to be its present purpose), or it may be convinced that the carriers profit to some extent by the facility of doing business with such shippers as compared with business done through its own freight houses or from team tracks; and that the allowances instead of being totally abolished should be cut down and regulated. Other special services such

as lighterage, the provision of special types of cars, etc., are being considered in this group also.

It is stated that, in view of these developments, certain large shipping interests, some of which are accused of being closely identified with the railways (like the steel companies), have shifted their attitude from a tacit approval of the five per cent increase to one of positive hostility. They were willing to come into an arrangement which left their own special margin of advantage untouched, but not willing to have their own cost first brought up to the level of others. Leaving out of the question the wisdom of impeding the prosperity of their own large customers upon which their own prosperity so largely depends, it is evident that the opposition of these interests will be largely discounted by the court.

The manufacturer, generally speaking, can and does assess his increased cost of production and transportation against the consumer. He is not in a very consistent position when he demands that the carrier shall not be permitted to do the same. There are no laws governing his prices and they are fixed under present conditions, only by a limited competition. It may well come about that the arguments and efforts now put forth by these interests against the railway movement for fairly profitable rates may be turned against them disastrously, when the new legislation for trade regulation now pending in Congress becomes effective.

Fifteen Years' Progress of the American Railway Engineering Association—1899-1914.

BY E. H. FRITCH, SECRETARY.

The American Railway Engineering Association was organized in March, 1889, and in view of the fifteenth anniversary of the formation of the Association, the Board of Direction has considered it pertinent to have prepared a review of what has been accomplished during the past fifteen years.

In the following is given an historical review of the formation of the Association; a brief reference to the formal actions of the Association, being a summary of the recommendations adopted and embodied in the Manual of Recommended Practice; a bibliography of special articles contributed by members and others, which have added to the common fund of knowledge, and a list of past and present officers of the Association.

Historical.

On October 16, 1897, the following circular letter was addressed to American railroad officials:

"It has been suggested that a movement be inaugurated for the organization of an association of railway officers connected with the engineering and maintenance of way departments. Nearly all other branches of the service have their representative associations, which are of undoubted value in their respective provinces. In the engineering and maintenance of way departments, however, there is no organization between the general engineering societies and technical organizations that can adequately cover the field.

"The new association, whatever its name might be if organized, would include all officers interested in the construction and maintenance of the track and roadway and the structures associated therewith, whatever the titles of such officers might be on individual roads.

"Would you join such an organization if properly organized, and would you endeavor to attend a preliminary meeting if called to meet in Chicago at some date in the near future?"

The responses to the foregoing circular were of such character as to warrant a call for a meeting at Chicago on October 21, 1898. At that meeting a preliminary organization was effected, with the late Augustus Torrey, chief engineer of the Michigan Central Railroad, as Chairman, and L. C. Fritch, then superintendent of the Baltimore & Ohio Southwestern, as secretary.

The preliminary organization chose as a name for the new organization "The American Railway Engineering and Maintenance of Way Association." By constitutional amendment, the official designation of the association was changed in 1911 to the "American Railway Engineering Association," and that title will be used hereafter in this historical review.

The chairman of the preliminary organization was authorized to appoint a committee of five representative railroad officials to prepare a constitution and by-laws, to report at a later meeting.

The chairman appointed for that purpose the following railroad officers: John F. Wallace, assistant second vice-president, Illinois Central R. R.; P. Alex. Peterson, chief engineer, Canadian Pacific Ry.; Thos. Rodd, chief engineer, Pennsylvania Lines West of Pittsburgh; C. H. Hudson, chief engineer, Southern Railway; W. G. Curtis, engineer maintenance of way, Southern Pacific Co.

A call for a meeting for the purpose of adopting a constitution and perfecting a permanent organization was issued on March 20, 1899, to be held at Buffalo, N. Y., March 30. At that meeting the committee appointed by the chairman of the preliminary organization presented a constitution, which was adopted, and officers for the permanent organization were selected, as follows:

President, John F. Wallace, assistant second vice-president, Illinois Central R. R., Chicago.

First vice-president, P. Alex. Peterson, chief engineer, Canadian Pacific Ry., Montreal, Canada.

Second vice-president, W. G. Curtis, engineer maintenance of way, Southern Pacific Co., San Francisco, Cal.

Treasurer, W. S. Dawley, chief engineer, Chicago & Eastern Illinois R. R., Chicago.

Secretary, L. C. Fritch, superintendent, Baltimore & Ohio Southwestern R. R., Washington, Ind.

Directors: Augustus Torrey, Michigan Central R. R.; Thos. Rodd, Pennsylvania Lines West of Pittsburgh; D. J. Whittemore, Chicago, Milwaukee & St. Paul Ry.; F. H. McGuigan, Grand Trunk Ry.; W. K. McFarlin, Chicago, Rock Island & Pacific Ry.; Hunter McDonald, Nashville, Chattanooga & St. Louis Ry.

During the first year of the organization's existence the efforts of the officers were directed mainly toward perfecting the organization, the selection of chairmen and vice-chairmen and members of the standing committees, preparing outline of subjects, and increasing the membership.

Plan and Scope.

The original outline of committee-work provided for fourteen standing committees, as follows: Graduation; Ballasting; Ties; Rail; Track; Buildings; Bridges and Trestles; Masonry; Signs, Fences, Crossings and Cattle-Guards; Signaling and Interlocking; Records, Reports and Accounts; Uniform Rules; Water Service; Yards and Terminals.

Subsequently it was considered preferable to change the name of the first committee from Graduation to Roadway; also, to divide the committee on Bridges and Trestles into committees designated respectively Wooden Bridges and Trestles and Iron and Steel Structures, and to form a new committee on Economics of Railway Location; on Wood Preservation; on Electricity, and on Conservation of Natural Resources.

From time to time it has also appeared desirable to appoint special committees to consider questions not directly within the province of the regular standing committees; among these spe-

cial committees being one on Classification of Track; on Injury to Signals, Track and Bridges due to Brine Drippings from Refrigerator Cars; on Impact Tests; on Uniform General Contract Forms; on Allowable Limit of Flat Spots on Car Wheels, and on Lumber Grading Rules.

The co-operation of this association has frequently been requested by other technical bodies, and the results have been mutually beneficial. Representatives of the American Railway Engineering Association have been in conference with committees of the American Railway Association; American Society for Testing Materials; American Society of Civil Engineers; American Railway Master Mechanics' Association; Master Car Builders' Association; Railway Signal Association, and Association of Portland Cement Manufacturers. This association is also represented on the National Advisory Board for Testing Materials, appointed by the President of the United States, and was officially represented at the conference on the Conservation of Natural Resources, held at the White House on the invitation of President Roosevelt.

Prior to the formation of the American Railway Engineering Association there was but little uniformity in methods and practice on American railroads, as far as railway engineering and maintenance of way work was concerned, even where similar climatic, physical and commercial conditions existed; and there was little approach to uniformity except in so far as certain forms had, through what might be termed a "survival of the fittest," become types. A wide field seemed, therefore, to exist in which much good might be accomplished by an interchange of views and a comparison of practice, to the end that

and maintenance of way work.

That the methods outlined above have been productive of excellent results is attested by the high standing attained by its publications, not only in railway engineering offices, but in private enterprises as well, and even the national government finds it advantageous to make liberal use of the valuable information contained in the publications of the association and apply it in the construction of public works. Colleges and universities also find the data embodied in the several publications of great assistance in their engineering courses, and in many of the leading institutions they are used as textbooks.

Publications.

The association issues three publications—the monthly bulletin, the annual volume of proceedings, and the Manual of Recommended Practice.

The monthly bulletin contains committee reports, special articles contributed by members and others, and brief items concerning Association affairs. The committee reports are issued to the members through the bulletin in advance of each annual convention, to give members an opportunity to examine the reports and prepare any discussion they may wish to present.

The annual volume of proceedings contains the full text of committee reports, the verbal and written discussions thereon, and special articles by members and others.

The Manual of the American Railway Engineering Association contains definitions, specifications and principles of practice adopted at each annual convention.

The following table gives the number of pages of printed matter issued to date:

	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	Total
Constitution	54	...	...	...	...	...	...	...	...	...	...	...	...	...	...	54
Bulletins .....	...	172	513	430	1124	794	1028	1074	848	1302	2234	1990	1470	2344	2196	17,519
Proceedings .....	...	244	825	598	602	1000	980	942	768	970	1778	1412	1982	1364	1776	15,241
Manual .....	...	...	...	...	...	...	210	...	316	...	...	...	522	198	134	1,380
Program .....	...	...	...	44	36	36	44	48	48	80	78	62	82	56	56	670
Miscellaneous .....	...	...	...	...	24	8	...	...	...	26	34	34	32	128	36	322
Total	54	416	1338	1072	1786	1838	2262	2064	1980	2378	4124	3498	4088	4090	4198	35,186

there might be established a practice that would be recognized as standard by the railroads of the North American continent.

The membership of the association is an individual and voluntary one, as distinguished from representation by railroad companies. The actual work of the association is performed by and through standing and special committees. For each of the main divisions a standing committee is appointed, and a certain phase of the general subject assigned for investigation and report to the association. The members of committees are selected with due regard to their qualifications for handling certain subjects, in order that the work undertaken be performed by experts in each particular line.

In the preparation of committee reports the following general plan is adhered to as far as practicable: Each committee ascertains the present practice relating to the particular subject in hand; the information is carefully analyzed and digested by the committee, and from the data before it and from its own personal knowledge of the subject it is expected to formulate its recommendations to the Association for adoption as recommended practice.

In the preparation of reports for publication the following plan is used: (1) Definitions of terms used in the report, the meaning of which is not clearly established, the terms being defined from a professional standpoint only; (2) Historical—a history of the subject-matter dealt with in the report, giving an outline of its origin and development; (3) Analysis—an analysis of the subject-matter, especially the most important elements thereof; (4) Argument—an argument in favor of the recommended practices, and the disadvantages of the old or present practices; (5) Conclusions—the final conclusions of the committee, embodying its recommendations to the Association for adoption as recommended practice for railway engineering

Requisites for Membership.

In the constitution, the requirements for membership are stated to be: Either a civil engineer, mechanical engineer, electrical engineer or an official of a railway corporation, who has had not less than five years' experience in the location, construction, maintenance or operation of railways, and who, at the time of application for membership, is engaged in railway service in a responsible position in charge of work, or a professor of engineering in a college of recognized standing." The constitution also provides for the admission of Associates, who shall be persons not eligible as a member, but whose pursuits, scientific acquirements or practical experience qualify them to co-operate with members in the advancement of professional knowledge, such as consulting, inspecting, contracting, government or other engineers, instructors of engineering in colleges of recognized standing, and engineers of industrial corporations when their duties are purely technical.

The membership of the association includes presidents, vice-presidents, general managers, general and division superintendents, chief engineers, principal assistant engineers, engineers of maintenance of way, division engineers, bridge engineers, signal engineers and assistant engineers; also professors of railway and civil engineering of the leading colleges of the United States, Canada and other countries.

The geographical distribution of the membership is as follows:

United States	1069
Canada	94
Japan	8
Mexico	5
Central America	5
New Zealand	4

China	3
Cuba	4
Philippine Islands	2
India	2
Argentine Republic	2
Brazil	2
Peru	1
Ecuador	1
Bolivia	1
Panama	1
Porto Rico	1
Russia	1
Uruguay	1
Haiti	1
Costa Rica	1
Hawaii	1
Total membership	1210

The constitution provides that all annual meetings shall be held in March of each year in the city of Chicago. The first annual meeting was held in Steinway hall in 1900; the second to the eleventh annual conventions were held in the Auditorium hotel; the twelfth to the fourteenth annual conventions were held at the Congress hotel.

The original constitution was amended at the fifth, eighth and twelfth annual conventions, in the following particulars:

The name of the association was changed from "American Railway Engineering and Maintenance of Way Association" to "American Railway Engineering Association."

An additional class of members termed associates was created in 1907.

The number of members composing the board of direction was increased from eleven to nineteen by adding the five latest living past-presidents to the board and providing for three additional directors.

The term of the president was limited to one year.

A nominating committee, composed of the five latest living past-presidents and five members of the association, not officers, was provided for.

Upon close analysis it will invariably be found that back of every successful enterprise there is a personality, a "live wire," that directs the organization along right lines. The American Railway Engineering Association has been particularly fortunate in the choice of its Presidents, and it owes a great measure of its remarkable growth and influence to men like John F. Wallace, George W. Kittredge, Hunter McDonald, Howard G. Kelly, A. W. Johnston, the late Walter G. Berg, William McNab; L. C. Fritch, W. C. Cushing, Chas. S. Churchill and Edwin F. Wendt, who have successively served the association as president.

Combination of Maintenance Forces.

Report of sub-committee of Committee No. 1, Railway Signal Association, submitted at the spring meeting of that association in Chicago, March 16, 1914.

Presuming that signal forces, as now organized, are efficient generally, the only considerations involved are that of either combining them with other forces which make up a railroad organization, or adding to their duties some of those now undertaken by others. At the start it must be acknowledged that when a certain point is reached signal work involves special training. Under the present social conditions this special training must be given to men with a limited education, must be along practical lines and developed gradually, so that the existing organizations seem to be necessary generally.

The above is true of all departments of a railroad organization, and therefore since the men in charge must have the highest training it seems impracticable to combine the duties

of various departments under one foreman. While he might discover that men were actually loafing, he would have little information to guide him in deciding on their efficiency unless he were trained along the same lines.

It would appear uneconomical to pick out certain bright men and train them to become efficient to supervise a combined force. They must be inefficient at the start in all lines, and to obtain the combined education would prolong this efficiency and involve more cost than is true of practice now.

If social conditions made it possible to employ men of higher education as supervisors, the time occupied in acquiring the special knowledge would be less, but the results are problematical. We must know how to do a thing before we can teach others to do it efficiently, and it is not expected that this class of men will be willing to spend a number of years learning the practical details of the several departments. They will specialize because this brings the quickest returns.

Although it appears impossible to effect economy generally by combining maintenance forces, there is territory on nearly every railroad system where the amount of signaling equipment is small and where a combination of duties would be economical. No definite line can be laid down, but this association can point out the possibilities.

At interlocking plants and manual block stations the local section foreman can be taught to take care of minor mechanical adjustments. In automatic signal territory he can be taught to take care of broken bond wires, the rebonding of broken rails, the adjustment of switches and the maintenance of insulated joints. If these things are done by track forces it might mean extended territory for maintainers.

It is not at all certain that the last suggestion will bring about economy, because it involves assigning duties to track forces which will take them periodically away from their regular work, and it is more than probable that only special cases can be considered. Even testing switches and inspecting bond wires will take time, and if a fair-sized gang is involved may mean loss. When signals fail it becomes necessary to send some one to inspect, and if a hand car only is available, this means from two to four men.

So far only track forces have been considered, but we still have bridge and building, water service, telegraph, telephone, electrical and mechanical department forces. Again no definite lines can be laid down. All are trained in some special work which is more or less analogous to different details of signal work, and under favorable conditions it would appear that signal department duties could with economy be assigned to local men along these forces.

The assignment of duties of some of the above departments to local signal men should also be considered. Signal work draws men from every class, and a well advised superintendent should know that he has a carpenter, mechanical or an electrical worker at some point who can be called on in cases of emergency.

The whole question is local. It seems one which must be handled by each superintendent, probably in different ways on different parts of a division. Granting that the superintendent is supplied with efficient supervisors for each department of his organization, it is his duty to so arrange them that the greatest economy will result. In this effort he should take counsel with the heads of the different departments to insure that work is not assigned to forces for which they are eminently unfitted.

In signal construction work there is a better field for a coordination of division forces. While some of the work is special, much of it is such as other departments are familiar with, and the possibility of maintaining a force of efficient mechanics of all kinds, who will, under the orders of the superintendent, be used on any class of work, seems to offer a good field for an economical general organization; and, so with heavy repairs; if a system of reports were adopted, showing work necessary to be done involving different departments, work of the same gen-

eral character could be assigned to each with a probable large saving.

The result of the adoption of any of the above suggestions cannot be foretold. After all, it seems a question for each road to settle. Labor conditions, traffic conditions and climatic conditions are all involved and an economical practice laid down for one railroad or part of a railroad might be uneconomical for another.

First Public Tests of Watches, U. S. Bureau of Standards.

The national bureau of standards of the Department of Commerce, Washington, D. C., has announced that the first test for the public, of watches in the class A test will be begun on Tuesday, April 14, 1914, and that the test under class B will begin fourteen days later on April 28, 1914. The class A test is intended for watches adjusted to five positions, isochronism and temperature, and will last 54 days. It will be carried out in 15 periods and under certain specified conditions. The test will be carried out under regulations practically the same as those proposed by the bureau recently, and watches of which the performance is within the stated tolerances on the criterions proposed will be granted a class A certificate showing the results of the test.

The test made under class B is intended for watches adjusted to three positions and temperature, and will last 40 days. It will be carried out in 10 periods and under certain specified conditions. Watches whose performance is within the tolerances

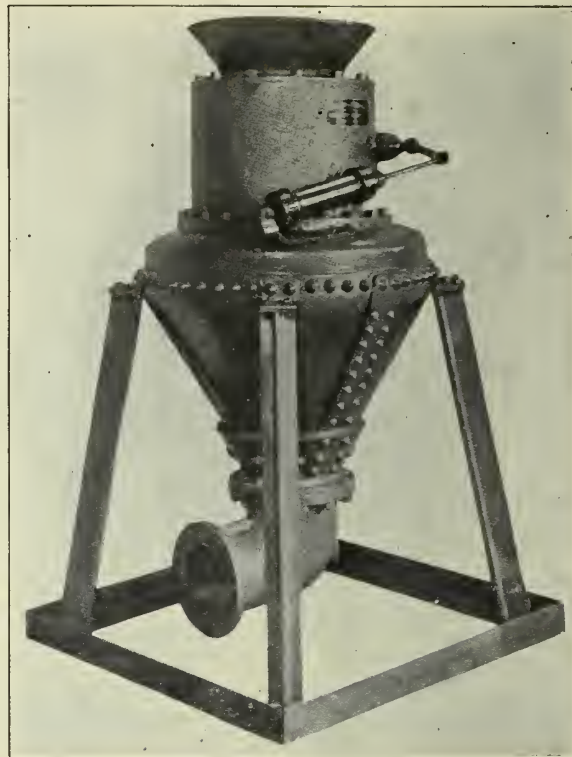


Fig. 1.—The Pneumatic Concrete Mixer and Conveyor.



Fig. 2.—Car Equipped with Pneumatic Concrete Mixer for Tunnel Lining, C., B. & Q. R. R.

given below will be granted a class B certificate showing the results of the test.

Full details of the method of test and of the application of the above tolerances will be given in a circular of the bureau of standards which will be issued within a few weeks.

Watches may be submitted by manufacturers, by jobbers, importers, or wholesale or retail dealers in watches, or by the individual owner of a watch. Watches for test should preferably be delivered at the bureau of standards personally or by messenger, but may be sent by express or other means at the owner's risk. All watches submitted for test should reach the bureau of standards at least by the day before the test begins; that is,

on April 13 for class A and April 27 for class B. Application for the test of a watch must be made upon a form which will be furnished upon request directed to the bureau. A separate application form must be filled out for each watch submitted for test. Watches will be returned at the close of the test in accordance with directions given in the application for test.

A fee of \$5.00 will be charged for the test of each watch under class A, and of \$3.00 for each watch under class B. A refund of half the fee will be made if the watch stops from accidental cause during the test, or if the watch is withdrawn from test before period 11 of class A or period 7 of class B. The fees should be paid when application for the test is made as the watch

will not be returned nor the certificate or report mailed until the fees are paid. All correspondence and shipments should be addressed to bureau of standards, Washington, D. C.

Compressed Air Method of Mixing and Placing Concrete.

By this method the concrete is mixed by compressed air and then piped to points about the work, thereby very much facilitating the handling of the material after it leaves the machine. It readily does the work heretofore commonly handled with dump cars or carts in placing large masses of concrete. Crushed rock as large as 2 ins. may be passed through the machine.

The compressed air method of mixing and placing concrete has been in process of evolution for ten years or more, but within the last two years has become more widely known through

from the machine down a shaft 35 ft. deep and then horizontally about 300 ft. Later on at the O. K. Creek Sewer Tunnel, in Kansas City, the machine was placed at the bottom of the shaft and the materials for concrete were dumped into the machine through a chute from the top of the shaft. The greatest distance which concrete has been delivered up to the present time was at Tallulah Falls, Ga., on a large hydroelectric development where concrete was discharged through a pipe about 1200 ft. long.

In small tunnels where the shafts are long distances apart the machine is taken into the tunnel and sunk by blasting out a place for it, so that the top of the machine is low enough for the narrow-gage cars to dump into it. In this way a tunnel of any length may be concreted by using pipe about 500 ft. long and moving the machine back for each 500-ft. section of tunnel.

For concreting large railroad tunnels the most economical way is that used by the Chicago, Burlington & Quincy R. R. on

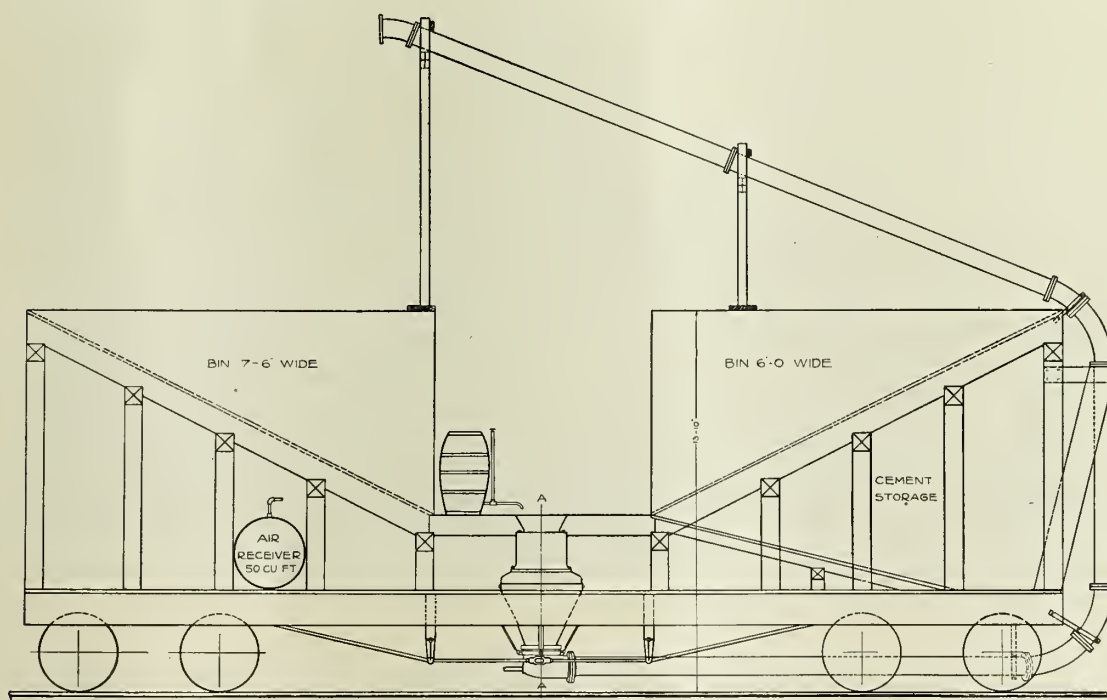


Fig. 3.—General Arrangement of Car Equipped with Pneumatic Concrete Mixer for Tunnel Lining, C., B. & Q. R. R.

the large works upon which it has been used. The method was first used for tunnel lining work, but the scope has now been extended to heavy concrete work of all kinds, such as are found in dams, retaining walls, bridges and foundations.

The mixer (Fig. 1) consists of a hollow cone with an air-tight door at the top and a pipe connection at the bottom. After each batch is placed in the machine the door is closed by the small air cylinder shown and the air is admitted to the machine in such a way as to thoroughly mix the batch and discharge it through the pipe to the forms. In this way the concrete is mixed and placed without other hand labor and with no other equipment than pipe for transporting the concrete. Within ten seconds after water has been added to the cement the concrete is in the forms at rest.

The amount of air which is required to operate the machine depends upon the length of the delivery pipe. This will also vary with the number of turns in the pipe line, with the kind of material used for aggregate and with the vertical distance involved in the delivery. It is demonstrated, however, that for general purposes of calculation the amount of air will not exceed one cubic foot of free air compressed to 80 lbs. for each lineal foot of 8-in. delivery pipe for each batch of concrete.

One of the first tunnels upon which this machine was used was the La Salle Street tunnel, in Chicago, where the machine was set up on the bank of the river and the pipe was extended

the Alkali Summit tunnel, in Wyoming. This outfit is illustrated in Figs. 2 and 3. The Pneumatic mixer and conveyor is mounted on a standard 40-ft. flat car and bins are erected on the car which contain about 26 cubic yards of material. The cement is stored in bags under one of the bins which slope to the center of the car and discharge through chutes into a measuring hopper. This measuring hopper is lifted and tilted to discharge into the mixer by means of a cable operated by a small air cylinder. The pipe which conveys the concrete from the mixer to the tunnel forms runs from the mixer under the car and up at the end of the top of the bins, which are 14 ft. above the rail, and then on an incline above the car to a point about 24 ft. above the rail, where it is in a position to discharge concrete through the bulkhead of the tunnel form. This pipe may be raised and lowered to clear the braces of the tunnel forms. It requires but four men to operate the car and the 26 yards of concrete materials which the bins hold may be mixed and placed in one hour.

A good illustration of the use of this machine on outside mass concrete construction is the work at the plant of the Ontario Power Company at Niagara Falls, N. Y. On a portion of this work were three separate retaining walls; one was 20 ft. below the elevation of the mixer and about 100 ft. to the west. The other two walls were at an elevation of 30 ft. above the mixer

and 80 ft. to the east. To concrete these walls the labor cost was only 30 cents per cubic yard.

In the construction of the Otis Steel Co.'s plant at Cleveland, Ohio, about 300 piers, averaging 15 ft. in height and containing from 10 to 19 cu. yds. of concrete each, were placed at a cost of approximately $34\frac{1}{2}$ cents per cu. yd. for labor. These piers were placed by blowing the concrete through a "goose-neck" arrangement which was moved along as the work progressed

city, has been extended so as to add an additional ferry slip.

On the Newark Rapid Transit line, the Fourth Street passenger station, Harrison, was completed and placed in operation during the year.

Work is satisfactorily progressing on the eastern section of the six-track system for the New York division between Colonia, N. J., and Waverly, N. J., including the elimination of fifteen grade crossings by the elevation of the four existing main



Fig. 4.—Mixing and Placing Concrete in High Piers by Compressed Air at the Otis Steel Co.'s New Plant at Cleveland.

and attached to the extended pipe. The "goose-neck" was made to swing so that four piers could be filled each time the pipe was extended.

These pneumatic concrete mixers and conveyors are furnished by the Concrete Mixing & Placing Co., 123 W. Madison street, Chicago.

Improvements and Betterments of the Pennsylvania R. R.

The sixty-seventh annual report of the Pennsylvania R. R., covering the calendar year ended Dec. 31, 1913, contains a statement by President Samuel Rea relative to improvement and betterment work completed or in progress during 1913, or proposed for the current year. The following is extracted therefrom:

Property acquired during the year was chiefly for additional right of way to eliminate grade crossings, for station and yard improvements and additional facilities at Broad Street station, and Thirty-second and Chestnut streets, Philadelphia; Coatesville, Lancaster, Altoona, Karns, Brackenridge, Coleman and Erie, for second track through Norristown on the Schuylkill division and second track and change of line on the Allegheny division.

Work was continued on the automatic block signal system on the Philadelphia and Middle divisions so that the automatic signal system on the main line between New York and Pittsburgh might be completed in 1914.

Reconstruction of Cortland Street ferry and dock, New York

tracks and the construction of two elevated tracks. Two east-bound tracks are now in operation, and grading and masonry for two more tracks will shortly be completed and the additional tracks placed in service. The two remaining tracks, it is expected, will be finished by the end of 1914, thus completing the work between Colonia and Elizabeth.

Passenger facilities in and around Philadelphia have been improved during the year as follows: The concourse in Broad Street station was enlarged; on the Connecting Railway two tracks of the new bridge over the Schuylkill river and approaches thereto, at Girard avenue, Fairmount Park, were placed in operation during the year. The old bridge is being removed and masonry for three additional tracks will be completed during 1914, thus making a five track reinforced concrete and stone arch bridge at this point. The enlargement of the North Philadelphia passenger station is progressing, the platforms and shelters on the part of the station used for the Chestnut Hill branch, and the inbound New York division high level island platforms, with the adjoining tracks, now being in operation.

To relieve congestion by increasing the yard and track capacity at Broad Street station, Philadelphia, the electrification of the main line to Paoli, for suburban passenger trains, is under way, and will be followed by the electrification of the New York division to North Philadelphia and thence to Chestnut Hill. About one mile of overhead construction on the main line has been completed between Radnor and St. Davids, which will enable the company to decide by actual tests the type of overhead construction best adapted to its train service.

At the West Philadelphia stock yards extensive repairs and

additions were completed during the year, and the Delaware River piers at Greenwich, Philadelphia, were improved and extended.

The reconstruction of the bridge at Glen Loch, Philadelphia division, was completed during the year, and the bridges at Highspire, Philadelphia division, and at Auburn and Norristown, Schuylkill division, which are also being rebuilt, will be placed in service in 1914.



Fig. 5.—Spouting Concrete by Compressed Air in Extensive Foundation Work.

The work of improving the grades and alignment and double tracking between Pittsburgh and Buffalo, via the Allegheny division and the Western New York & Pennsylvania Ry., which was referred to in your last annual report, is proceeding satisfactorily, and it is expected that the three tunnels at East Brady, Wood Hill and Kennerdell, which are being constructed as part of this improvement, will be completed in 1914.

The change of grades and extension of track facilities at West Brownsville yard, Pa., necessary to connect with the new double track Monongahela River bridge at that point, were completed and the old bridge removed during the year.

The changes of alignment and grades between Kiskiminetas Junction and Freeport on the Conemaugh division, including a double track bridge over the Allegheny river, are under way.

The extension of the Yukon branch from Bells Mills to Cowansburg on the Pittsburgh division, will shortly be completed.

The extension of the Hillman branch, Bellwood division, was placed in operation during the year, and the extension of the Shade Creek branch, Pittsburgh division, to new coal openings, will be completed in 1914.

A building for physical and chemical laboratories is being constructed at Altoona, to provide larger and better quarters for the laboratory testing and investigation work.

On the Bald Eagle Valley branch the revision of grades and extension of passing sidings were completed during the year, together with the new line between Mt. Eagle and Howard Rolling Mills.

The changes of grades and elimination of grade crossings at Homewood avenue, Pittsburgh, and in borough of Wilkinsburg, are in progress, and the grade crossing elimination work in the borough of Braddock was completed during the year.

To enable the company to handle an increasing traffic, the freight facilities are being enlarged at Newark, Roebing, Pottsville, Hazleton, Lancaster, Harrisburg, Lock Haven, Duquesne, Allegheny, New Kensington, Tarentum and Pittsburgh.

Electric motor baggage trucks have been furnished at Pittsburgh, Harrisburg, Broad Street station, Philadelphia, North

Philadelphia, Jersey City, and Pennsylvania station, New York.

The improvement of the roadbed standards is being continued, especially by increasing the depth of ballast and increasing the number of ties, and laying 100-lb. open hearth steel rails not only on the main line but also on the important subsidiary lines, so as to properly care for the heavier locomotives and trains.

The new steel rolling stock is of the most modern type, and

the efficiency of the existing locomotives is being increased by the installation of superheaters and other improvements.

The aggregate expenditures for construction and equipment during the year upon the owned and leased lines of this company was \$41,434,415.06, for which the company has been reimbursed by leased lines to the extent of \$1,661,074.08. The sum of \$1,815,624.61 was expended on the West New York & Pennsylvania Ry. and other branch roads and charged against income. The expenditures on the lines owned, including \$2,369,687.70 on the leased lines, viz., Harrisburg, Portsmouth, Mt. Jay & Lancaster R. R., and the lines of the United New Jersey R. R. & Canal Co., comprising the main line system between New York and Pittsburgh, amounted to \$37,957,716.37, which has been disposed of as follows:

Charged to income	\$ 6,387,325.11
Charged to reserve for additions and betterments..	6,347,432.63
Charged to capital account.....	25,222,958.63

\$37,957,716.37

In addition there was charged to property investment on account of acquisition of Cambria &

Clearfield Ry. and ground rents capitalized.....	6,774,573.00
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\$44,732,289.37

In keeping with the policy of your company to promote efficiency and economy in operations, the management has been considering the advisability of electrifying that portion of the main line between Altoona at the foot of the eastern slope, and Conemaugh on the western slope of the Allegheny mountains, a distance of about 35 miles, where there is a frequent and heavy train movement over heavy grades. From preliminary estimates it would appear that a saving could be effected which would compensate the company for making the expenditure, but the subject must still receive much further examination, and is also largely dependent upon an improvement in the revenues of the company to warrant raising the new capital required for this project.

In the city of Philadelphia the greater portion of your lines are constructed above or below the streets, except in the southern section of the city, between the Delaware and Schuylkill rivers. The necessity for the development of several square miles in this section of the city, including the improvement of conditions along the river front, caused the municipal authorities to decide upon the elimination of nearly all existing grade crossings of your railroad, and of the lines of the Philadelphia, Baltimore & Washington R. R., and of the Baltimore & Ohio R. R., and in asking the railroads to co-operate, the city has agreed to bear an equitable share of the large expenditure. Under this arrangement this company will be required to elevate and relocate the present running tracks, yards and facilities on the portion of the Delaware extension, with its Girard Point and Schuylkill river branches, from the Arsenal bridge over the Schuylkill river to Delaware avenue and Queen street, and use in lieu thereof the new tracks of the Delaware extension when elevated between the Arsenal bridge over the Schuylkill river and Twenty-fifth and McKean streets, and a new two-track elevated line extending generally along Point Breeze avenue, Twenty-ninth street, and the Back Channel north of the League Island navy yard to a terminal yard to be located between Broad street and the Delaware river, from which point the line will remain at grade along the north side of said yard and on Delaware avenue to Bigler street, and the present tracks and facilities on that avenue will be relocated as far north as Queen street. The Baltimore & Ohio R. R., which will likewise relocate and elevate its present tracks in that section of the city, will occupy a new location adjoining the relocated tracks of your company, from Passyunk avenue to and along Delaware avenue. This portion of the line will be operated as a joint four-track railroad, with provision for its use as a belt line. Under this agreement the tracks and facilities of the Philadelphia, Baltimore & Washington R. R. along Washington avenue will also be elevated as a three-track railroad to Broad street, and as a double-track line east thereof. It is expected that this important project will be completed in five years, as and when the city and the railroad companies provide the funds requisite therefor.

The construction of the New York Connecting R. R., owned jointly by this company and the New York, New Haven & Hartford R. R., and fully described in previous annual reports, is satisfactorily progressing, and it is expected will be completed by the summer of 1916.

As described in the annual report for 1912, the increasing traffic on the Chautauqua branch between Buffalo and Oil City on the line of the Western New York & Pennsylvania Ry., has, in connection with similar improvements on your Allegheny division, necessitated the revision of grades and alignment and longer passing sidings. During the year \$1,602,036 was advanced to the Western New York & Pennsylvania Ry. by this company to meet its construction and equipment expenditures, which sum was charged against the net income of the lessee company.

The construction of the Wilkes-Barre Connecting R. R., fully described in your last annual report, is proceeding satisfactorily, and should be completed in 1915.

The extension of the Pennsylvania, Monongahela & Southern R. R. south of Rice's Landing to near Davidson's Ferry was completed, and placed in service December 15, 1913. This company received a debenture certificate for \$226,750 to reimburse it for construction advances made to that company, and this certificate will later be retired by the issuance to your company of stocks and bonds of the Pennsylvania, Monongahela & Southern R. R. Co.

This company received the notes of the Monongahela Railroad Co., on account of advances made to it, principally for the extension of its line southward from Martin, Pa., along the Monongahela river to the West Virginia state line, a distance of 8.4 miles. Notes for similar advances were also issued to the Pittsburgh & Lake Erie R. R., which is a joint owner with your company of the capital stock of the Monongahela Railroad

Co. The principal of these notes is being gradually reduced, and those held by your company amount to \$325,000.

The new grain elevator at Girard Point, Philadelphia, for the Girard Point Storage Co., is nearing completion, and will be placed in operation this year. The reconstruction of pier No. 2 at this point is under way, and will be completed in 1914.

On the Northern Central Ry., additional property has been purchased, for freight terminals in Baltimore, piers 3 and 4 at Canton have been extended, and substantial progress has been made in the increase of freight facilities at York, Pa., which will be completed in 1914. The freight facilities at Highlandtown, Md., and Marysville, Pa., were completed during the year.

A new line, known as the Central Railroad of Maryland, extending from Keymar on the York, Hanover & Frederick R. R. to industries near Union Bridge, Md., was completed and placed in operation in 1914.

On the Philadelphia, Baltimore & Washington R. R. the long, re-inforced concrete bridges at Bush and Gunpowder rivers, and at Stemmers run, were completed and placed in service, and the bridges at Gwynns run and Back river will be completed in 1914. The No. 4 track has been extended from Wilmington to Newark, Del. Automatic block signals have been installed during the year between Wilmington and Pencader, and from Oakington to Bay View, so that the installation work on the main line between Philadelphia and Washington might be completed in 1914. The overhead bridges at Sixty-fifth and Seventy-second streets, West Philadelphia, are being rebuilt and will be completed early in 1914.

Under the act of congress, approved March 1, 1913, providing for the federal valuation of all property owned or used for railroad purposes, the railroads are required to co-operate with the Interstate Commerce Commission in making this valuation. Therefore, in view of the broad scope of this investigation and its far-reaching effect, your company has for this purpose appointed a valuation committee, consisting of officers from various departments of the service, to facilitate the preparation of the necessary data, and give the subject the consideration its importance requires.

Causes of Railway Fires.*

The following deductions are based upon an analysis of fire records of three large railroads covering a period of two years. These railroads report 4275 fires, with a loss of \$1,810,000. First eliminating 285 fires, charged to miscellaneous origin, such as boiler explosions, friction from brake shoes, hot journals, etc., as being due to isolated causes of infrequent occurrence, there remain 3990 fires, or 93 per cent of the total number, representing a loss of \$1,580,000, as having originated from the eighteen causes listed below in the order of their importance, based upon the ratio of fires originating from each cause to the total number of fires reported:

1. 1784 fires, 41 per cent, with a loss of \$52,000, were caused by loading hot cinders into the cars, which includes the slacking of lime in trash cars.

2. 707 fires, 17 per cent, with a loss of \$200,000, were caused by flying sparks.

3. 503 fires, 8 per cent, with a loss of \$298,000, were charged to an unknown origin.

4. 213 fires, with a property loss of \$136,000, were caused by the burning of adjacent property.

5. 156 fires, with a loss of \$46,000, were caused by defective heating appliances, or careless handling of same.

6. 68 fires, with a loss of \$23,000, were caused by defective lighting appliances, or the careless handling of same.

*From a report presented to the Railway Fire Prevention Association by E. B. Berry, chief insurance inspector, Southern Railway.

7. 148 fires, with a loss of \$240,000, were charged to wrecks.

8. 130 fires, with a loss of \$77,000, were caused by live coals dropped by engines.

9. 67 fires, with a loss of \$64,000, were charged to incendiarianism.

10. 59 fires, with a loss of \$57,000, were caused by the careless handling of torches and open lamps.

11. 47 fires, with a loss of \$66,000, were caused by tramps.

12. 42 fires, with a loss of \$13,000, were caused by spontaneous combustion.

13. 30 fires, with a loss of \$30,000, were caused by friction matches.

14. 16 fires, with a loss of \$34,000, were caused by smoking

15. 15 fires, with a loss of \$9000, were caused by careless burning of grass and rubbish around tracks and buildings.

16. 4 fires, with a loss of \$90,000, were caused by overheated boilers.

17. 2 fires, with a loss of \$140,000, were caused by oily waste and wooden lockers.

18. 2 fires, with a loss of \$9000, were caused by defective installation of oil-burning forges.

Of the 3990 fires attributed to the eighteen above mentioned causes, 76 per cent, or 3255 fires, originated from avoidable causes, which in the last analysis amounts to nothing more than carelessness.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

A Manufacturer's Protest.

"One after another demagogues have risen to high places in the gift of the people," he said, "because of their professed hostility to the business interests which have made the country great. Bankers who have done constructive and patriotic work for the public good, distinguished railroad men who have been intrusted with vast responsibilities, and business men who have built up industries giving employment to thousands and who have added no small share to the country's wealth and prosperity, have been called before the committee of Congress to be treated as malefactors.

"The whole power of the government has been expended to enforce policies contrary to economic law. The government has professed to be striving to bring about peace among the nations of the earth, while demanding that the war of destruction, unlimited, wasteful competition shall prevail among its own business interests."—Alba B. Johnson, president Baldwin Locomotive Works, in address before New Jersey State Chamber of Commerce.

The Tide Must Turn.

"Should the Interstate Commerce Commission long postpone its rate decision, or decide against an increase, there will inevitably be profound sympathy for the honest railroad managers in search of new capital who find themselves thus ground between the upper and the nether millstone. They also feel themselves seriously wronged when they appear only before the legislature to ask for the repeal of the full crew law, and find that neither the legislature nor the press pays any attention to their protest. It does not help the situation to point to the mismanagement of the New Haven, the St. Louis & San Francisco, and say that this sort of wrongdoing is responsible for the present situation. The presidents may admit this sorrowfully, yet wake up the next morning to find a bill in the legislature at Albany to revise commutation rates downward in a given county by 50 or 60 per cent."

Meanwhile, the government refuses to reimburse the railroads adequately for carrying the mails, and insists on different rates for heavy and light mail matter carried in the same car. Is it any wonder that uneasiness grows and unrest continues? And both are intensified by the situation of the express companies, however much they may owe their present plight to past stupidities. One does not have to be that worst of offenders, a "reactionary," or an investor in railway securities, to see how great is the opportunity for constructive statesmanship on both sides for the peace policy that Mr. Wilson outlined. That, we take it, is to be

peace with honor and justice, without mercy for corporate wrong-doers of the New Haven stripe, but with protection to those who would bury the dead past and play fair. Has not the time come, they ask, when they may be given a sailing chart to which they may adhere for at least a few years? Are they not to be freed from their present position of being under fire at once from all sides and at the mercy of demagogues, labor unions, experimenters, diversified government agencies controlling them without regard to one another's acts, and of the several legislatures?"—New York Evening Post.

Express and Parcels Post.

"More than two-thirds of the cost of ordinary express service is made up of the expense of collecting and delivering parcels. The Postoffice Department cuts off about one-half of this expense by refusing to collect and thus forcing shippers to do that part of the work for themselves. At present the Government is paying the railroads practically nothing for handling the extra parcel post matter. The express rate on a small case of goods from a southern New England point to New York city is seventy-five cents. Of this the railroad probably gets twenty cents, the pick-up service costs fifteen cents, the delivery service in New York city costs twenty cents and the remaining twenty cents goes to pay overhead charges and such profits as express companies make out of the business. Compared with this the Postoffice Department saves the fifteen cents for pick-up service, saves fifteen cents out of the twenty cents that should go to the railroads because it does not pay them for the service as it should, and it can therefore carry this parcel for thirty cents less than the express companies because the consignor does fifteen cents' worth of work for the post-office and the railroad is cheated out of fifteen cents that it should receive for transporting the goods. This sort of thing cannot last indefinitely, and the trouble is that the postoffice officials are completely in the dark regarding what the parcel post service is likely to cost the country after the remuneration the railroads are to receive has been adjusted equitably."—New York Commercial.

The Chicago Pneumatic Tool Co., Fisher building, Chicago, has issued for its mining department, bulletin No. 150, on Chicago coal drills. These drills may be operated by either compressed air or electricity, and may either be mounted on a drill frame or held by hand. They are claimed to be cheaper and quicker than hand labor.

The Locomotive Publishing Co., No. 3, Amen Corner, Paternoster Row, London, England, has issued as No. 23

of its series of souvenir locomotive booklets, one showing typical illustrations of the engines in use on Canadian railways, besides several of the original types which figured prominently in the early history of that country. The illustrations are made by the off-set process and are attractively mounted and bound.

* * *

A series of bulletins showing electric tool specialties manufactured by the Stow Manufacturing Co., Binghamton, N. Y., have been lately received. Those at hand show a bench grinder, a tool-post grinder, the "Gee Whiz" electrically-driven flexible shaft boring machine for carriage builders and pattern makers, and a 1/2-in. electric breast drill. The company will forward copies of these bulletins to those interested, on application.

* * *

In catalog 105, the Whiting Foundry Equipment Co., Harvey, Ill., illustrates a number of the electric locomotive jacks which the firm has installed. These machines are now used on some 12 or 15 roads. Their details of construction, methods of operation, and the advantages arising from their use, are outlined in the catalog, copies of which may be had by making application to the address above given.

* * *

The Westinghouse Electric & Mfg. Co., Pittsburg, Pa., has issued catalogue Section DS843, covering catenary line material for electric railways. This publication describes and illustrates with considerable detail the different types of insulators, hangers, strain ears, etc., together with diagrams showing the spacing for wheel trolleys and pantagraph trolleys.

* * *

A novel type of car seal and its method of attachment is described in circulars issued by the Edgar Car Seal & Mfg. Co., 836 Transportation building, Chicago. This seal is made of steel strips of such composition and so perforated that tampering therewith destroys the seal. It requires no special devices for its application and its compactness permits of handling and storing in quantities without inconvenience.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The Western division of the Association of Railway Telegraph Superintendents held its regular annual meeting at the La Salle hotel, Chicago, March 18. It was a large and successful gathering, there being a total attendance of about 100 superintendents of telegraph. The discussion was confined

mainly to four subjects: The use of telephone for dispatching trains and handling messages; the use of motor cars; the use of the automatic telephone for railroad intercommunicative service, and wire crossings over railroad property.

In regard to the use of the telephone for dispatching and railroad purposes, figures were presented showing that of the total railroad mileage in Canada and the United States, 36 per cent has been covered by dispatchers' telephone, which is now generally agreed by railroad men to be the best method of handling train orders, it being considered safer, more convenient and more economical than the Morse. The Canadian Pacific Ry., as well as the roads controlled by the government of Canada, have adopted the telephone. From reports made it was shown that undoubtedly all of the railroads in this country and Canada will use the telephone eventually for handling trains, it simply being a question of how soon the money can be obtained for the installation.

The use of motor cars by telephone and line men was shown to be very economical, as well as efficient. This paper was read by F. F. Riefel, superintendent of telegraph of the Lake Shore & Michigan Southern Ry., and some very good points were brought out in the discussion.

The automatic telephone was reported upon by four members of the association who are using this system for intercommunicating, and some interesting facts were brought out. The papers on this subject were contributed by J. J. Ross, superintendent of telegraph of the Michigan Central R. R. at Detroit, who operates one board with 260 line automatic telephones; R. R. Hobbs, superintendent of telegraph of the Louisville & Nashville R. R., who operates a total of 375 lines; and F. T. Wilbur, superintendent of telegraph of the Illinois Central R. R., who operates two automatic boards with approximately 150 lines.

The subject of wire crossing was covered in a general discussion, based on specifications recommended by the association.

The Association of Transportation and Car Accounting Officers has changed the place of its June meeting from Savannah, Ga., as previously announced, to Atlantic City, N. J., same to be held on Thursday and Friday, June 18-19, 1914. The meeting will be held at the Hotel Chalfonte. More complete details will be made the subject of a later announcement.

The Railway Supply Man's Point of View

While existing conditions in the railway supply business are not exactly heartening, there is good reason to believe that a change will come within the next few months. "Hope deferred maketh the heart sick" and there seems to be a general feeling that the railways will not get any relief from Washington. A study of the case, however, makes it difficult to see how the government can eventually decide in that way. The argument against the railways has developed nothing new or pertinent. In fact the disposition of the Interstate Commerce Commission seems to be to afford relief and the question is how best to do it. Should this relief come within the next three months and crop prospects develop favorably, there will be a business revival of great magnitude in the early summer. The amount of work and orders planned and held up is enormous—never more so.

"A person has invented a very good device for the benefit and convenience of the public. But no money can be realized on this invention until the railroad officials consent to use it.

"If an article is a benefit and a convenience to the public, can the railroads be forced to install it? Some persons have

said that if the public demands it, the railroads would be forced by the government to use it. Others have said that the government cannot force the railroads to use anything unless it has to do with the safety of the public.

"Who has the most to say, the people or the railroad officials? Are not the trains for the benefit of the public and should not the railroads use articles which are of benefit to their patrons?"

A WOMAN.

The above letter is published in one of the daily papers of Chicago, and no answer is made to it by the editor. It is a woman's letter, to be sure, but it voices the idea which very many people have, in these days of government interference in railway management. Some inventors and promoters have even succeeded in getting their congressmen to introduce bills requiring the use of specific devices; but these have never got beyond that point. Such laws as those requiring the use of electric headlights, are largely responsible for this idea; and inventors and promoters have sold stock on such argument. Of course every inventor believes that his

device is for the benefit of the public, and some people seem to think that the government by issuing a patent sets the seal of its approval upon the article covered.

There are a million fish eggs and spawn to every one which matures. The wastage is not so large in patents; but they are probably a thousand to one. The sensible man understands that the men who operate railways are the final arbiters of what is good, and what is worth experimenting with. This ought not to need saying, but those who have to do with such matters know that a great deal of time and money is spent in chasing patent will o' the wisps.

Resolutions on George Westinghouse.

ADOPTED BY THE BOARD OF DIRECTORS OF THE WESTINGHOUSE AIR BRAKE COMPANY AT A MEETING HELD IN PITTSBURGH, PA., WEDNESDAY, MARCH 18TH, 1914.

"The board of directors of this company has been called upon to record the death of not a few of its members during the forty-five years of its history. Of the board as originally constituted in 1869, Mr. George Westinghouse, the founder of the company and its first and only president, alone survived and retained his active connection with the company until March 12th, 1914, when he, too, passed away.

"The public press has been filled with generous and well deserved tributes to his character and ability; his achievements as an inventor, an engineer and a manufacturer are a part of the industrial history of his country, the great loss which his death has inflicted upon the community, the nation, and that greater commonwealth—the federation of mankind—will be more clearly recognized and more keenly felt as the present recedes into the past, for, as Emerson has well said, 'Genius has no successor.'

"The natural pride he took in the early and continued success of the Air Brake company,—due in large part not only to his inventive ability but to his wise direction of its commercial and financial affairs,—gave it a peculiar place in his regard, and this affection was reciprocated by a personal loyalty on the part of its employees which was most gratifying to him and highly honorable to them. It is a pleasure for this board to testify to the sustained interest he took in every measure that related to the welfare of his co-workers, especially the establishment and later extension of the relief and pension departments. It is likewise a pleasure to record his deep concern in the commercial and industrial progress of the country at large. While he seldom referred to his personal service to the nation, the patriotism which led to the enlistment in the United States army at the early age of seventeen was always in evidence when political matters were discussed by him or in his presence.

"The charm of his personality was no less notable than his vigor of mind and strength of purpose. A born leader of men, his forcefulness, generally speaking, was persuasive rather than demonstrative. His high standards of individual purity and business integrity have been and will long be an inspiration to those who were privileged to know him best, and no tribute to his worth than can be expressed in words will serve to indicate the sorrow with which his former associates on this board place on its records the solemn fact that he is no longer with us."

Railway Service on a Training School for Railway Supply Business.—VIII.

J. M. FITZGERALD.

J. M. FitzGerald, general manager of the signal department of the Railroad Supply Co. since May 20, 1913, came into the manufacturing and sales side of the game with a ripe experience and knowledge of the signal work on the railroad. Born in New Britain, Connecticut, in 1880, he was educated in the public schools of Philadelphia and Boston, and graduated from the Massachusetts Institute of Technology in 1902 with the degree

of Bachelor of Science in mechanical engineering. He entered the Boston & Albany shops of the motive power department in June 1902, and in November of the same year was made mechanical engineer on the same road. From May, 1903 to March, 1910, he was signal engineer of the Boston & Albany, from March, 1910 to April 1911, assistant signal engineer of the New York Central & Hudson River and the Boston & Albany; and April 1st, 1911 to May 20, 1913, engineer maintenance of signals of the New York Central & Hudson River.

As signal engineer of the Boston & Albany, Mr. FitzGerald organized and put on an efficient basis the signal department of that road. As assistant signal engineer of the N. Y. C. &



J. M. FitzGerald, General Manager Signal Department, Railroad Supply Co.

H. R. R. Co. and B. & A. he had complete charge of engineering and installed several million dollars worth of signalling. As engineer of maintenance of signals he made an enviable record in the reorganization and increasing the efficiency of the signal maintenance department especially in the reduction of stock on hand. Mr. FitzGerald is especially proud of the fact that he was a charter member of the famous and much respected New York Central Lines signal committee.

As general manager of the signal department of the Railroad Supply Co., Mr. FitzGerald has completely reorganized his departments, surrounding himself with experienced and efficient assistants—rebuilding the company's Chicago factory so as to attract and hold the highest class of help as well as to give more efficient arrangement for manufacturing. At the Coliseum exhibit this year, the Railroad Supply Company attracted very great attention on account of the many new devices shown proving that the railroad public appreciate the concrete results of material manufactured and presented as a result of actual experience with the railroad problem.

Supply Trade Notes.

—The Laconia Car Co. has passed the usual quarterly dividend of $1\frac{3}{4}$ per cent, due April 1.

—The Barco Brass & Joint Co. announces that they have engaged the services of Clarence L. Mellor, who was formerly with the United States Metallic Packing Co. and in charge of their western sales, and have appointed Mr. Mellor western representative. Mr. Mellor has been in the

railway supply business a number of years. From 1897 to 1899, he was in the London office of Edward Mahoney; he at that time represented the Baldwin Locomotive Works, Harlin & Hollingsworth, Edgemore Bridge Works, etc. He returned to the United States in 1899 and was with the Baldwin Locomotive Works as foreman in various departments until 1909, when he went with Alfred Lowell, as chief inspector. He remained there a few months and then went with the United States Metallic Packing Co., whom he has represented in the west ever since. The Barco Brass & Joint Co. recently purchased a new four-story factory building 125 x 100 ft., at 212 West Illinois street, Chicago.

—At the meeting of the American Wood Preservers' Association held in Chicago on March 18, E. O. Faulkner was elected an honorary member. The association was formed in 1904 and Mr. Faulkner was one of the charter members, taking an active part in the organization of the association. Mr. Faulkner is so well known over this country and equally as well in Europe as one of the best authorities on wood preservation that the association has taken this opportunity of recognizing his worth and the value of the services he has rendered, on his retirement from active membership in the Association on account of his time being devoted to other branches of railway service.

RAILWAY NEWS.

Atlantic Coast Line.—After twelve months work on the double-tracking by the Atlantic Coast Line R. R. between Pleasant Hill, N. C., and Petersburg, Va., construction was completed last week, according to report, on 29 miles, 12 of which is between Pleasant Hill and Emporia, thus closing the gap between North Carolina and Virginia. The double track between Emporia and Stoney Creek, a distance of 20 miles, was thrown open some time ago. The other 17 miles of the double-tracking just completed is between Stoney Creek and Petersburg, and is the last link of Atlantic Coast Line double-tracking between Richmond and Selma, N. C., a distance of 162 miles. In addition to the double trackage that has already been laid, a contract for 63 miles more of the same kind of work was let recently, and the work will begin shortly. This new trackage will be laid from Selma, N. C., to Parkton, and when completed will give the railroad a double track system out of Richmond for 225 miles.

Canadian Pacific.—Steel has been laid 20 miles south of Spillimacheen, B. C., on the Kootenay Central Ry. from Golden, which when completed will afford a direct link between the main line of the Canadian Pacific Ry. and the Crows Nest branch near Fort Steele. It is expected that the new section of line will be ready for operation by July 1. A service on the Kootenay Central is now being operated between Golden and Spillimacheen, a distance of 40 miles. More than 83 miles of new line are under construction south of the present southern terminus of the branch, including the section on which steel has been laid and which is now being ballasted ready for traffic. Good progress is being made with the construction of the route north from Colvalli, more than 40 miles of track having been laid on that section.

Chicago & Illinois Western.—The Chicago & Illinois Western R. R. expects to complete construction of a three-mile extension from Hawthorne, Ill., to Western avenue, Chicago, about June 1. Work has been delayed by bridge work over various streets. The road now operates between Willow Springs and Hawthorne, about 17 miles of track. It is planned to eventually extend the line southwest to Joliet, Ill., and rights of way for a part of the distance have been secured. Work may be begun late this year.

Intercolonial Railway.—Orders are said to have been issued by the Canadian government for a survey of the Intercolonial Ry. from Moncton to Halifax, with the view of eliminating present heavy grades, replacing light bridges with heavier steel structures, and determining the cost of a cut-off.

Kootenay Central.—See Canadian Pacific Ry.

New Iberia & Northern.—See Railway News under St. Louis & San Francisco.

New York, New Haven & Hartford.—Developments in the affairs of the New York, New Haven & Hartford R. R. are reported elsewhere in this issue.

Philadelphia & Reading.—The Philadelphia & Reading Ry., it is said, will replace all its wooden poles with concrete and steel poles.

Pittsburgh, Cincinnati, Chicago & St. Louis.—In view of the decline in the gross and net revenues of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. in the latter part of 1913, and so far in the present year, and as there are still large expenditures to be made in the current year for the flood damage of 1913, the directors have decided to reduce the dividends, and therefore have declared a 1 per cent on the preferred and three-quarters of 1 per cent on the common stock for its first quarter of the fiscal year. This is at the rate of 4 per cent per annum for the preferred and 3 per cent for the common, as against 5 per cent declared on each class of stock in previous years.

St. Louis & San Francisco.—United States Judge W. H. Sanborn at St. Louis, Mo., has approved an agreement reached between creditors of the St. Louis & San Francisco R. R., members of the syndicate which built the New Iberia & Northern R. R. and the receivers of the St. Louis & San Francisco R. R., rescinding the purchase of the New Iberia. The road will be turned over to the syndicate. This is in accordance with the plan noted in the Railway Review of February 14. The indebtedness against the road is reduced approximately \$4,600,000.

Seaboard Air Line.—The Seaboard Air Line Ry. announces the opening of the South Carolina Western Extension Ry., from a connection with the South Carolina Western Ry. at Florence, S. C., to Poston, S. C., a distance of 32 miles. The intermediate stations are Fendall, Poyner, Claussen, Perrot, Pamlico and Savage, S. C.

According to a report from Fort Meade, Fla., the Seaboard Air Line has completed its extension into that region as far as the Pembroke mines, three miles north, while the grading work has advanced as far as the city limits.

Wabash Railroad.—Plans for the reorganization of the Wabash Railroad, as brought up to date, are said to provide for the raising of a sum in excess of \$30,000,000, instead of the \$20,000,000 originally proposed. Instead of a sale of \$6,000,000 or \$7,000,000 new first and refunding mortgage 5 per cent bonds, the revised plan proposes to sell \$14,000,000 new refunding 5 per cent bonds to provide for the payment of a like amount of receivers' certificates outstanding. These bonds, it is said, will be underwritten by bankers at 85, and provide not less than \$11,900,000 for the retirement of the receivers' certificates. An assessment of \$20 a share on both classes of stock will provide \$18,480,000.

PERSONALS.

Joseph F. Gould has been appointed general counsel of the Bangor & Aroostock R. R., with office at Bangor, Maine, effective March 20.

C. C. Huff, of Wichita Falls, Tex., has been appointed general attorney for the Missouri, Kansas & Texas Ry. of Texas, with headquarters at Dallas, Tex., succeeding Alexander S. Coke, resigned to engage in private practice.

Kepler Johnson, trainmaster of the Chicago, Rock Island & Pacific Ry. at Haileyville, Okla., has been appointed trainmaster of the Southern division of the Chicago, Rock Island & Gulf Ry., with headquarters at Fort Worth, Tex., succeeding H. Fairmon, who has been appointed trainmaster of the Oklahoma division, with headquarters at El Reno, Okla.

D. B. Carson, assistant general manager of the Nashville, Chattanooga & St. Louis Ry., effective April 1, is appointed acting general manager, with headquarters at Nashville, Tenn. **E. M. Wrenne**, assistant superintendent at Nashville, is appointed assistant superintendent of transportation; **G. D. Hicks**, assistant superintendent of the Nashville division, with headquarters at Nashville; **Theodore Spieden**, assistant superintendent of the Chattanooga division, and **W. G. Templeton**, trainmaster at Nashville, acting superintendent of the Huntsville division, with headquarters at Tullahoma, Tenn.

James Russell, general superintendent of the western district of the Great Northern Ry., with headquarters at Seattle, Wash., has been appointed assistant to vice-president of the Denver & Rio Grande R. R., with headquarters at Denver, Colo., effective April 1.

J. H. O'Neill, assistant general superintendent of the Great Northern Ry. at Spokane, Wash., has been appointed general superintendent of the western district, with headquarters at Seattle, Wash., succeeding James Russell, resigned to take service with another company. **C. E. Leverich**, assistant general superintendent at Grand Forks, N. D., is ap-

pointed assistant general superintendent at Spokane, succeeding Mr. O'Neill. L. W. Bowen, division superintendent at Spokane, is appointed assistant general superintendent of the eastern district, with headquarters at St. Paul, Minn. G. S. Stewart, division superintendent at Havre, Mont., succeeds Mr. Bowen at Spokane; J. M. Doyle, division superintendent at Marcus, Wash., is transferred to Havre in place of Mr. Stewart, and W. A. Carswell, trainmaster at Havre, is appointed superintendent at Marcus, succeeding Mr. Doyle.

P. C. Allen has been appointed superintendent of the Philadelphia division of the Baltimore & Ohio R. R., with headquarters at Philadelphia, Pa., succeeding J. T. Alhauser, assigned to other duties.

O. C. Haines has been elected treasurer of the Florida East Coast Ry. President W. H. Beardsley was formerly vice-president and treasurer. Mr. Beardsley succeeds the late J. R. Parrott as president and not H. M. Flagler as stated in these columns last week.

F. T. Rutherford has been appointed trainmaster of district 26, Grand Trunk Ry., with headquarters at Battle Creek, Mich., succeeding Robert Kelley, transferred.

Stanton Ennes who has been appointed general superintendent of the Western Maryland Ry., with office at Baltimore, Md., was born March 19, 1862, at St. Louis, Mo. He received a public school education, and in 1881 entered the service of the Texas & Pacific Ry. as telegraph operator. He served in various capacities with that road, the Southern Pacific Co., and Missouri Pacific Ry., in July 1, 1902, becoming division superintendent of the latter. He resigned this position in April, 1904, to become superintendent of the Western Maryland, a position he held until December, 1905. From the latter date to April 1, 1907, Mr. Ennes was assistant superintendent of the Grand Trunk Ry. at Ottawa, Ont.; from April 10, 1907, to November 1, 1912, superintendent of the Great Northern Ry. at Breckenridge, Minn., and since 1912 until he resigned to go with the Western Maryland, superintendent of the Mesabe division, Superior, Wis. Mr. Ennes' recent appointment was effective March 20, 1914.

J. A. Gordon, whose appointment as general manager of the Chicago Great Western R. R. has been noted in these columns, was born at Cincinnati, Ohio, November 10, 1865. He was graduated from St. Xavier College, Cincinnati, Ohio, in 1884. Mr. Gordon then entered railway service, and until 1887 was operator and clerk in the local freight office of the Cincinnati, Hamilton & Dayton Ry. at Cincinnati. Following a year of travel he returned to the same road in 1889 as clerk in the auditing department. He was then successively chief clerk, to superintendent, Cincinnati division, 1890 to November, 1893; trainmaster of the same division, 1899 to March, 1896, and superintendent of the Wellston and Southern divisions from 1896 to 1904. Mr. Gordon became general superintendent of the Cincinnati, Hamilton & Dayton in November, 1904, resigning in September, 1909, to become division superintendent of the Chicago Great Western. Three years later he went with the Pere Marquette R. R. as general superintendent. That road was divided into two districts in August, 1913, and Mr. Gordon was made general superintendent of the western district at Grand Rapids, Mich. He assumed his new duties at Chicago on March 16.

L. H. Phetteplace, whose appointment as general manager of the Carolina, Clinchfield & Ohio Ry. has been noted in these columns, was born at Smithburg, Md., April 30, 1871. He received a public school education and entered railroad service in 1890 as an operator for the Western Maryland Ry. He served in the same capacity with the Norfolk & Western Ry. from June, 1890, to November, 1893, was then dispatcher for about eight years, and from July, 1901, to June, 1904, chief dispatcher of the same road. Mr. Phetteplace was made assistant trainmaster in June, 1904, and in October of the following year was promoted to trainmaster of the Pocahontas division, at Bluefield, W. Va. He resigned his position with the Norfolk & Western and from November 1, 1908, to November 1, 1911, was superintendent of the Carolina, Clinchfield & Ohio Ry. at Erwin, Tenn. He was appointed general superintendent of the same road on the latter date. His appointment as general manager of the Carolina Clinchfield & Ohio in charge of operation and maintenance was effective February 24, 1914.

C. R. Craig, who was recently appointed purchasing agent of the Southern Railway as announced in a previous issue of the Railway Review, was born in Richmond, Va., in 1872. He entered the service of the Richmond & Danville Railway in 1889 and remained with it and the Southern Railway in the supply department at Richmond until 1897, when he was

made storekeeper at Selma, Ala. In 1898 he was made storekeeper at South Richmond, and in 1903 was detailed to the assistant general manager's office in Washington in charge of material and supplies. In 1905 he was made purchasing agent of the Lenoir Car Works, which position he held until 1909, when he was made purchasing agent of the Mobile & Ohio R. R. and Southern Railway Co. in Mississippi.

TRAFFIC.

Morris Vinson is appointed traveling passenger agent of the Erie Railroad, with office at San Francisco, Cal., vice R. T. Hughes, resigned, effective April 1.

F. W. Kirkland, general freight agent of the Florida East Coast Ry., has been appointed freight traffic manager, with office at St. Augustine, Fla. W. P. Boger will succeed to Mr. Kirkland's present position.

A. H. Proudfoot has been appointed assistant general freight and passenger agent of the Liberty-White R. R., with office at McComb, Miss.

G. J. Mitchell has been appointed commercial agent of the Carolina, Clinchfield & Ohio Ry., with office at Columbia, S. C., succeeding E. F. Elwell, resigned to engage in other business. W. N. Bass succeeds him as traveling freight agent at Spartanburg, S. C. J. E. Scott has been appointed traveling freight agent at Columbia.

Claude P. Wilson has been appointed commercial agent of the Missouri, Oklahoma & Gulf Ry., at Houston, Tex., vice F. S. Sleight, transferred.

W. B. Morgan has been appointed commercial agent of the Central of Georgia Ry., with office at Macon, Ga., succeeding D. F. Brady, resigned.

C. B. Sudorough, division freight agent of the Vandalia Railroad, at St. Louis, Mo., has been appointed assistant general freight agent at St. Louis, succeeding H. R. Griswold. B. H. Dally succeeds Mr. Sudorough as division freight agent at St. Louis and F. S. Montgomery becomes division freight agent at South Bend, Ind., in place of Mr. Dally.

J. C. Murray has been appointed general freight agent, and Jay Kerr general passenger agent, of the Missouri & North Arkansas R. R., with headquarters at Eureka Springs, Ark., assuming the duties of E. E. Smythe, traffic manager, who has been granted leave of absence on account of ill health.

ENGINEERING.

E. K. Mentzer has been appointed supervisor of bridges and buildings of the Boston & Albany R. R., Boston division, with headquarters at Worcester, Mass., succeeding W. P. Whitney, resigned.

A. M. Traugott has been appointed division engineer of the Third and Deepwater divisions of the Virginia Railway, with headquarters at Princeton, W. Va., succeeding B. T. Elmore, who has resigned to become engineer of roadway and track for the eastern district, Division of Valuation, Interstate Commerce Commission.

C. N. Beckner, signal supervisor of the Louisville & Nashville R. R. at Louisville, Ky., has been appointed assistant signal engineer at Louisville, succeeding R. H. White, who has resigned to become editor of the Signal Engineer, Chicago. F. H. Bagley succeeds Mr. Beckner and W. F. Hudson is appointed signal inspector at Louisville in place of Mr. Bagley.

Christian S. Heritage, whose appointment as engineer of the Washington Terminal Co., Washington, D. C., has been noted in these columns, was born at Glassboro, N. J., September 15, 1873. He was educated in the public schools, Pemmington seminary, and Princeton college, 1892 to 1896, where he graduated as a civil engineer. Mr. Heritage entered the service of the Pennsylvania Railroad July 13, 1896, and from then until March 20, 1900, served as rodman, levelman and transitman. From March 20, 1900, to November 20, 1902, he was assistant supervisor at various points on the Pennsylvania. He was appointed supervisor of the Shamokin division, Shamokin at Irvona, Pa., in the same capacity from April, 1905, to December 14, 1905, and at Blairsville, Pa., for two years. He resigned August 14, 1907, and from then until December 26, 1907, was with the Carnegie Steel Co., track appliance department, Pittsburgh, Pa. On the latter date he accepted appointment as supervisor with the Washington Terminal Co., which position he held until his recent promotion, February 1, 1914, when he was made engineer of the company.

MECHANICAL.

I. M. Ramsdell, master car builder of the Chicago & Alton R. R., at Bloomington, Ill., has resigned to take a

similar position with the Oregon-Washington R. R. & Navigation Co., with headquarters at Portland, Ore.

R. Preston, master mechanic of the Manitoba division of the Canadian Pacific Ry. at Winnipeg, Man., has been appointed assistant superintendent of motive power of the lines west, with headquarters at Winnipeg.

OBITUARY.

William Apps, former master car builder of the Algoma Central & Hudson Bay Ry., died at his home in Toronto, Ont., March 21, aged 67 years. Previous to his connection with the Algoma Central & Hudson Bay, 1902 to 1903, Mr. Apps had been master car builder of the Canadian Pacific Ry. from 1895 to 1902.

John M. Turner, former general manager of the Georgia & Florida Ry., died suddenly March 21, at Maxton, N. C., aged 55 years.

William Henry Underwood, assistant to passenger traffic manager of the New York Central Lines with office at Chicago, died at his home in that city March 28, aged 55 years.

NEW ROADS AND PROJECTS.

Alberta.—The Calgary & Fernie R. R. will commence work on its proposed line from Calgary, Alta., to Fernie, B. C., within the next twelve months and is to have the line completed in three years. Legislation to this effect was recently passed at Ottawa, as a condition to the extension of the life of the company's charter. Five parties of engineers are reported now in the field surveying for extensions north and south and branches east and west in connection with the proposed line. This company is said to have plans for a much larger project than has been publicly announced. A Canadian press report says that in addition to railway development the syndicate of English capitalists which is behind the enterprise have important hydro-electric schemes and mining developments in contemplation. The sum of \$10,000,000 is said to already be available for this program of railway construction and related works. The charter for the Calgary-Fernie line was secured by the Grain Belt Co., which is said to have since transferred its interests to a syndicate in which Mr. Childs of Childs Bank, London, England, is understood to be one of the principals.

Arizona.—Articles of incorporation were filed with the Arizona corporation commission March 17 for the Tucson, Phoenix & Tidewater R. R., with San Diego, Cal., as the ultimate terminal. James Douglas of Douglas, Ariz., is said to be the heaviest stockholder, having subscribed \$135,000. The road is to be financed by Arizona capital and is said to be an independent project.

British Columbia.—See Railway News under Canadian Pacific Ry.

See also New Roads and Projects under Alberta.

Illinois.—Articles of incorporation have been filed with the circuit clerk of Williamson county, Illinois, for the Fredonia & Reeds Ry., to run between Fredonia, on the Paducah branch of the Illinois Central R. R., and Reeds, Ill., which is on the Johnson City branch. The company which will build the new line is composed of Illinois Central R. R. officials. The capital stock is given as \$2500. The road, it is said, will be used exclusively for coal traffic.

Louisiana.—T. H. Mandell, chief engineer of the Calcasieu Construction Co., Lake Charles, La., the company which is to build the proposed Orange & Northeastern R. R., says in part, with reference to the enterprise: "This railroad will begin at Port Orange, on the Sabine river, at the head of the deep-water channel, now under construction by the United States government, and on the boundary line of Louisiana and Texas, where there will be ocean connection. Thence it will extend northeastward to Natchitoches, on the Red river, about 125 miles, passing through Vinton, Starks, Merryville, Leesville and Provencal, and crossing the Kansas City Southern Ry. at Starks, and again at Leesville, the Southern Pacific Co. at Vinton, the Atchison, Topeka & Santa Fe Ry. at Merryville and the Texas & Pacific Ry. near Provencal, connecting with the latter and the Louisiana & Northwest R. R. at Natchitoches. The headquarters of the railroad is at Natchitoches, and the persons interested in its promotion are chiefly citizens of that place. Gen. J. Alphonse Prudhomme is president; J. G. Gray, Vinton, La., vice-president; S. H. Hill, cashier of the People's Bank, Natchitoches, treasurer; D. W. Breazeale, of the law firm of Breazeale & Breazeale, secretary; and the board of directors includes L. Caspari, president of the People's Bank; J. B.

Tucker, a real estate operator; M. Aaron and A. Kaffie. E. Kennedy is general manager. The offices of the Calcasieu Construction Co. are located in Lake Charles, La., and the officers are C. B. Richard, president; L. L. Moss, secretary, and T. H. Mandell, chief engineer.

The Tioga Gravel Co., Alexandria, La., will begin soon the construction of a railroad 10 miles long from its gravel pit to Alexandria. A. H. Stille, P. O. Box 953, St. Louis, Mo., is president and general manager.

Minnesota.—Work is soon to be begun on the Red Lake Northern R. R., which is to connect Lake Itasca with Red Lake and Lake of the Woods, giving easy access to the Itasca state forest and also to Red Lake. The proposed line will use the logging road of the Red River Lumber Co. from Crooked Lake Junction, near Akeley, Minn., northeast to Lake Itasca, and an abandoned spur of the same company extending south from Fletcher Junction near Shevlin, almost to the state forest. The track already laid will be put in shape and about ten miles of new track built to connect the two lumber lines. J. E. Coon, Youngstown, Ohio, is reported interested. See Railway Review of July 5, 1913.

The Minneapolis, Mille Lacs & Northern Ry., according to expectations, will begin construction of its proposed line this summer or fall. The company was organized under the laws of Maine and contemplates the construction of a steam line from Anoka, Minn., to Ogilvie, Minn. L. H. Bolduc, 3900 Washington avenue, north, Minneapolis, Minn., is vice-president and treasurer.

Oregon.—The Portland & West Coast Railroad & Navigation Co. is reported to have received a franchise from the town of Newport, Ore. The contemplated road will run from Newport to Willamina, where it will connect with the Portland, Eugene & Eastern Ry. It follows the coast to Salmon river and there enters the Siletz forest. B. B. Lutten is secretary of the company.

Texas.—The Quanah, Seymour, Dublin & Rockport Ry. has filed amendments to its charter changing its name to Central Railway of Texas and increasing its capital stock from \$500,000 to \$550,000, divided into 5,500 shares of \$100 each. The places from and to which it is intended to construct the proposed railway and the intermediate counties through which the road will run are as follows: Commencing at a point at or near the northwest corner of Hardeman county, on the south bank of the Red river, and running thence in a southerly direction through Hardeman, Ford, Wilbarger, Baylor, Throckmorton, Young, Stephens, Palo Pinto, Eastland, Erath, Comanche, Hamilton, Bosque, Coryell, Bell, Williamson, Travis, Bastrop, Hays, Caldwell, Guadalupe, Gonzales, Karnes, DeWitt, Goliad, Refugio, Nueces and Aransas counties to deepwater terminals on the harbor frontage of Harbor Island, in Nueces and Aransas counties, a distance of 550 miles, with authority to construct port and harbor works at Harbor Island. See Railway Review of March 14.

Pecos & Northern Texas R. R., has been authorized to issue and register \$2,320,000 of bonds, and, according to reports, extensions are contemplated.

Virginia.—The Ganaway-Hudgins Co., Hampton, Va., will build a railroad eight miles long, it is reported, from Hampton via Fox Hill to Grand View on Chesapeake bay. Construction will begin about May 15. C. E. Potts is interested.

Wyoming.—Persistent rumors say that the Chicago & Northwestern Ry. is preparing to extend its line from Lander, Wyo., to Idaho Falls, Idaho, and a recent report says that contracts are to be let within 30 days. Similar reports recently met with official denial.

O. O. Baker, Edgemont, S. Dak., and Pennsylvania oil and coal interests are reported as preparing to organize a company to build a line of railroad from Casper, Wyo., north and east through the Black Buttes, Sundance and into Belle Fourche, S. Dak. It is intimated that the Chicago & Northwestern Ry. is also interested.

Electric Railways.

The Fort Worth-Denton Traction Co., Ft. Worth, Tex., expects to begin construction work immediately. The road will parallel the tracks of the Atchison, Topeka & Santa Fe Ry. and besides the Texas cities in the title will pass through Justin, Saginaw and Haslet. The directors of the Fort Worth-Denton line are: E. E. Baldrige, M. Sansom, J. H. Paine, J. R. Christal, W. E. Connell, N. Harding, Ben O. Smith, Sam Davidson, W. C. Stripling, Ben J. Tillar, George T. Reynolds, John P. King, B. H. Deavenport.

The promoters of the Cincinnati, Indiana & Louisville electric-gasoline railway announce that work upon the new line will start in the next few days and work will be far enough advanced to allow the laying of tracks in July.

Application has been made by the Sudbury, Kippawa & Bell River Ry. to build an electric or steam railway from Sudbury, Ont., to the foot of Lake Timiskaming and from Kippawa Junction, in Quebec, to connection with the National Transcontinental Ry. at the point where it crosses Bell river.

F. S. Granger, president and general manager of the Fresno, Clovis & Academy Interurban Ry., Fresno, Cal., is quoted as saying that construction work on his line would start April 1. He expects to have the line in operation by July 1.

Receivers' certificates of the Southern Traction Co., to the amount of \$500,000 issued at the order of Federal Judge Francis M. Wright, were signed and delivered last week to Receiver William Lorimer of Chicago, who is quoted as saying that the road would be rushed to completion.

The Olathe, Winfield & Arkansas City Ry. is reported incorporated to build a 175-mile electric or steam railway between Olathe, Kan., and Arkansas City. Capital stock is \$1,000,000. The incorporators are J. W. Gettel, W. A. Powell and F. A. Nickel, Enid, Okla.

The Sacramento Valley Electric Co. has let contract to the J. Hughes Construction Co. for grading the roadbed of the company's line from the tracks of Oakland, Antioch & Eastern Ry. to Dixon, Cal., a distance of 11 miles.

The Niobrara, Sioux City & Omaha Ry., a 420-mile electric line projected by the Baker Construction Co., Omaha, Neb., will begin construction work in June. The plans contemplate a line from Omaha to Elk City and thence on to Norfolk, with a branch from Elk City to South Sioux City, from South Sioux City to Niobrara and from Niobrara to O'Neill, with a cross line from West Point to Decatur. The company also contemplate the expenditure of \$1,000,000 to \$1,500,000 in Omaha on terminals and a passenger and freight depot. C. W. Baker is president of the construction company.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Union Pacific R. R. reported as taking bids on 58 locomotives is said to be in the market for 25 Pacific (4-6-2-S), 15 mikados (2-8-2-S) and 14 six-wheel (0-6-0-S) switching locomotives.

—The Inland Steel Co. has ordered one six-wheel (0-6-0) switching locomotive from the American Locomotive Co. This engine will have 20x24 in. cylinders, 50 in. driving wheels and a total weight in working order of 126,000 lbs.

Freight Cars.

—The Virginian Railway has ordered 475 steel underframes from the Ralston Steel Car Co.

—The American Smelting & Refining Co. has ordered 60 ore cars for shipment to Chile from the Pressed Steel Car Co.

—The Atlantic Coast Line R. R. has ordered 200 underframes from the Cambria Steel Co.

—The order of the St. Louis Southwestern Ry. to the American Car & Foundry Co. for 2000 cars, reported in the Railway Review of March 14, consists of 1500 40-ft. 80,000 lbs. capacity box cars, 400 40 ft. 80,000 lbs. capacity flat cars and 100 100,000 lbs. capacity general service cars for delivery during July and August.

—The Central Vermont Ry. is reported as preparing specifications for 500 cars.

Passenger Cars.

—The Atlantic Coast Line R. R., as previously reported, has ordered 15 all steel passenger cars from the American Car & Foundry Co. This order comprised 6 70-ft. coaches, 4 combination mail and baggage cars with 40-ft. baggage compartment, and 5 60-ft. express cars. The contracts for specialties are said to have been practically closed.

—The Pittsburgh Traction Co. has ordered 50 cars from the Standard Steel Car Co. and 50 from the Pressed Steel Car Co.

—The Great Northern Ry. is in the market for 100 express refrigerator cars.

Signals and Interlocking.

—The Southern Railway will immediately install automatic electric block signals on 150 miles of double track, including the following lines: Amherst to Whittles, Va., 57.3 miles; Atlanta to New Holland, Ga., 53.46 miles; Howell (Atlanta) to Austell, Ga., 15.5 miles; Citico (Chattanooga) to Ooltewah, Tenn., 13.4 miles; and Danville, Va., to Pelham, N. C., 9.3 miles.

Iron and Steel.

—The New York, Ontario & Western Ry. has awarded contracts for 5400 tons of rails.

Bridges.

—The Missouri Pacific Ry. has awarded contract for the proposed Nicholas street viaduct, Omaha, Neb., 436 tons of steel, to Frankman Brothers & Morris, St. Paul, Minn.

—The Delaware, Lackawanna & Western R. R. has awarded contract to the Pennsylvania Steel Co. for 600 tons of steel for a Strauss bascule bridge to be erected at Buffalo, N. Y.

—The Lehigh Valley R. R. has awarded contract for 400 tons of steel for a bridge at Weedsport, N. Y., to the American Bridge Co.

—The Northern Pacific Ry. is reported in the market for about 600 tons of bridge steel.

—The Northern Pacific Ry. has prepared plans for concrete bridges at Helena, Napa, Erie and Madelia street, Spokane, Wash. These will be erected within three years at a cost of \$125,000, and the city has agreed to pay the railroad for work done in 1906 in opening subways at Helena and Napa streets.

—The West Jersey & Seashore R. R. expects to complete track elevation on the Atlantic City division by April 1. This company and the Pennsylvania Railroad will then commence work in Camden, N. J., eliminating all grade crossings in that city, except the East Side, at an estimated cost of \$1,000,000.

—The Puget Sound & Willapa Harbor Ry. has awarded a contract for the construction of bridges along the line from Firdale, Wash., to Raymond, Wash., to Guthrie, McDougal & Co., Portland, Ore.

—It is reported that the Southern Railway will build a reinforced concrete bridge at its Madison avenue crossing, Memphis, Tenn., to cost \$50,000.

—Contract is reported awarded by the Ericson Construction Co., Downs block, Seattle, Wash., for constructing tracks and bridges on the line of the Seattle, Port Angeles & Lake Crescent Ry. to Guthrie, McDougal & Co., of Portland, Ore.

—The Northern Pacific Ry., according to report, will build a subway under Roberts street in Helena, Mont., at a cost of about \$45,000.

Buildings, Terminals, Etc.

—The Roberts & Schaefer Co. were awarded contract on March 25 by the Elgin, Joliet & Eastern Ry. for a two-track, 300-ton capacity, reinforced concrete, counterbalanced bucket, locomotive coaling station for installation immediately at Dyer, Ind., to replace the wooden structure recently destroyed by fire. Contract price approximately \$13,600.

—The Pennsylvania Lines West of Pittsburgh have awarded contract for structural steel, 1500 tons, for a new shop building at Indiana Harbor, Ind., to the Riter-Conley Co.

—The Canadian Pacific Ry., it is said, will complete its new depot and other terminal improvements at Vancouver, B. C., early this summer. The Burrard street overhead bridge is practically completed, also the substructure of the Granville street viaduct.

—The terminal commission of Buffalo, N. Y., has received from the New York Central Lines plans for a new passenger terminal for itself and other lines, which, if finally approved, would locate the terminal on "The Terrace," west of Main street. This choice of location is contrary to expectations. It was generally believed that the company would rebuild on the site of the present station, acquiring some additional land.

—It is said that the Oregon-Washington Railroad & Navigation Co. will spend \$50,000 at Walla Walla, Wash., during 1914 for a proposed concrete round house, shops, etc.

—The Chicago, Rock Island & Pacific Ry. is reported to have let contract to J. A. Adams Construction Co., Chicago, to erect a freight and passenger station at Searcy, Ark., to cost \$12,000.

—The Chicago, Rock Island & Pacific Ry. has let contract to T. S. Leake & Co., Chicago, to erect a passenger and freight station at Calvin, Okla.

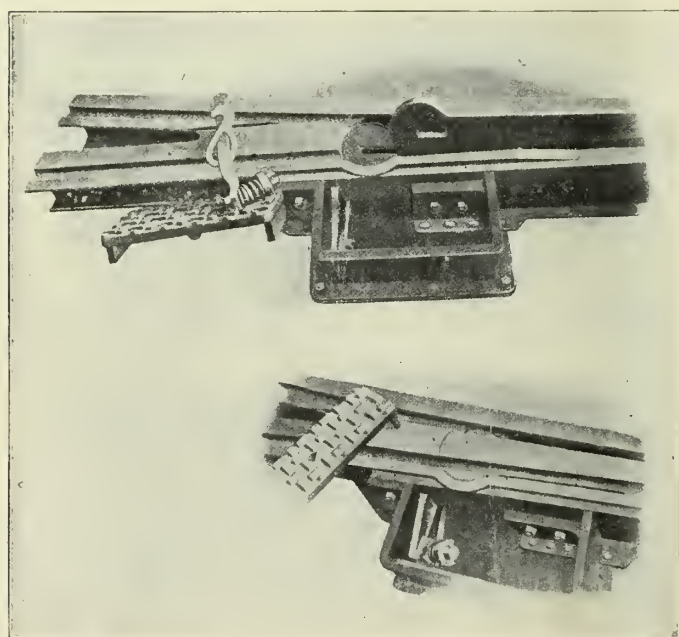
—The Chicago union depot ordinances were passed by the city council March 23. The three ordinances permit the construction of terminal improvements which involve a total expenditure of \$65,000,000. In the program are four projects—the construction of a new union passenger station at an estimated cost of \$40,000,000, a new freight terminal for

the Chicago, Burlington & Quincy R. R., another for the Pennsylvania Lines West of Pittsburgh, and the elevation of the Pennsylvania and Chicago, Milwaukee & St. Paul tracks between Ashland avenue and Curtis street.

The Hook Heel Switch.

The most recent development of the tongue switch has been to produce a device with a circular bearing at the heel in the same plane as the entire length of the tongue. This type tends to eliminate the pound under traffic and, therefore, wears better and lasts longer. All circular heel switches have, to a degree, overcome many of the undesirable features of the old small pin switch. By the advent of the "Hook Heel" tongue switch, as designed by The Pennsylvania Steel Company, there was put forward a switch embodying all the desirable features that engineers were striving to obtain, and yet it was composed of the fewest possible number of parts.

The tongue of this switch has a circular heel, $7\frac{1}{4}$ in. in diameter. This gives a large bearing area at the heel and



Views of Hook Heel Switch and Tongue Fastenings.

in the same plane as that of the entire bearing surface of the tongue. A hook applied to the under side of the tongue exerts a constant downward and rearward pull, which holds the tongue firmly down on its bed, and eliminates the possibility of a forward thrust of the tongue as the switch begins to wear. This hook receives its pulling power through the action of a heavy lever which is constantly receiving its force from a strong spring held under compression, and which may be readily adjusted, if necessary, by the turning of a nut.

The heel of the tongue is not so large that the forward wheels of a large double-truck car will develop a leverage sufficient on leaving it to cause it to kick. This switch will admit, because of its simplicity of construction, of much abuse and neglect, without effect on its working condition. An aluminum model is on exhibition at the booth of The Pennsylvania Steel Company, space 243-254.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, MARCH 17, 1914.

Railway roadbed, 1,090,140—Clifton Alvado Faron, Los Angeles, Cal.

Draft and buffing appliance for railway cars, 1,090,143—George H. Forsyth, Chicago, Ill., assignor to Waugh Draft Gear Co., Chicago, Ill.

Center plates for railway cars, 1,090,168—John A. Pilcher, Roanoke, Va.

Railway car, 1,090,174—Albert W. Sullivan, Poughkeepsie, N. Y., and William Renshaw, Chicago, Ill.

Rail joint, 1,090,175—James L. Thomas, Wilmington, Del.

Yielding coupling support, 1,090,185—Harry F. Woernley, Pittsburgh, Pa., assignor to The Westinghouse Air Brake Co., Pittsburgh, Pa.

Railway switch, 1,090,188—Wilson A. Austin, Omaha, Neb.

Electric track-connecting device, 1,090,190—Robert James Bell, Harvey, Ill.

High speed railway, 1,090,213—Tom L. Johnson, Cleveland, Ohio.

Hand brake ratchet, 1,090,230—Franklin T. Reese, Pittsburgh, Pa.

Insulating and supporting mechanism for third rails, 1,090,234—Joseph W. Rogers, Woodbury, N. J.

Railway tie and fastener, 1,090,258—Harmon Watson, Cullman, Ala.

Roller center bearing for cars, 1,090,265—John C. Barber, Chicago, Ill., assignor to Standard Car Truck Co., Chicago, Ill.

Lateral motion roller bearing for cars, 1,090,266—Lee W. Barber and Edwin W. Webb, Chicago, Ill., assignors to Standard Car Truck Co., Chicago, Ill.

Safety air brake appliance, 1,090,274—Alfred A. Carpenter, Sherman, Tex.

Method of uniting rails, 1,090,296—Hans Goldschmidt, Essen-on-the-Ruhr, Germany.

Rail tie and fastener, 1,090,315—Stephen M. Lewis, Argenta, Ark.

Electric signaling and controlling systems for railroad trains, 1,090,358 to 1,090,363—Harry J. Warthen, Washington, D. C.

Railway signal operating mechanism, 1,090,378—Jasper Blackburn, Kirkwood, Mo.

Automatic train stop, 1,090,396—Albert R. Heath, Norfolk, Va.

Packing guard for journal boxes, 1,090,414—Nathaniel J. Rogers, Tuscaloosa, Ala.

Train pipe coupling, 1,090,453—Proctor O. Cole, Gould, Okla.

Railway signaling apparatus, 1,090,455—William J. Cook, Denver, Colo., assignor to The Cook Railway Signal Co., Denver, Colo.

Railway signaling torpedo, 1,090,458—Frank Dutcher, Versailles, Pa., assignor to Central Railway Signal Co., Pittsburgh, Pa.

Switch actuating mechanism, 1,090,467—George W. Fisher and Frederick Hoyland, Jackson, Mich.

Railroad tie, 1,090,482—George M. Laudermilch, Derry Church, Pa.

Rail joint, 1,090,504—Edgar M. Smith, Chicago, Ill.

Car-unloading apparatus, 1,090,510—George D. Williams, Durhamville, N. Y.

Combined steam and compressed air engine, 1,090,523—Hiram G. Farr, Melrose, Mass.

Car step, 1,090,534—George W. Hersey, Loggiewille, New Brunswick, Canada.

Manufacture of superheater units, 1,090,551—Columbus K. Lassiter, Richmond, Va.

Uncoupling mechanism for cars, 1,090,591—Arthur J. Bazley, Cleveland, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Unit section side frame for cars, 1,090,594 and 1,090,595—Francis M. Brinckerhoff, Englewood, N. J., assignor to Forsyth Brothers Co., Chicago, Ill.

Pivotal connection for locomotives of theallet articulated type, 1,090,631—Harry T. Krakau, Cleveland, Ohio, assignor to The National Malleable Castings Co.

Radial draft gear, 1,090,656—Ernest H. Schmidt, Cleveland, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Steam superheater for boilers, 1,090,688—Millard F. Cox, Louisville, Ky.

Grain door, 1,090,695—George William Drake, Chicago, Ill.

Rail joint, 1,090,699—Hector G. Evans, Pittsburgh, Pa.

Berth attachment for railroad cars, 1,090,705—Louis W. Geerekey, Douglas, Ariz.

Railway tie, 1,090,723—Noah M. Kinsey, Farmersville, Ohio.

Locomotive diaphragm and spark arrester, 1,090,754—Edward M. Roberts, deceased, Ashland, Ky.

Tie, 1,090,768—David J. Weigel, Platteville, Wis.

Tongue switch, 1,090,822—Edwin H. Steedman, St. Louis, Mo.

Railway signaling system, 1,090,825—Michael H. Collins, West Hoboken, N. J.

RAILWAY REVIEW

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Vol. 54.

Cancellation of Privileges of Industrial Railways Suspended.

The Interstate Commerce Commission entered an order, March 31, suspending until July 30, all new tariffs filed by the railroads eliminating allowances to industrial railroads, with the exception of those affecting the United States Steel Corporation and other iron and steel companies, which are permitted to stand. Approximately 4000 tariffs were suspended. These would have become effective April 1, and were submitted in compliance with the commission's findings in the industrial railways case, in which it was held that allowances and divisions of rates made by trunk lines with certain industrial railways operated by iron and steel companies in eastern territory were, in effect, rebates and should be discontinued. No tariffs affecting the industrial railways covered by the decision in the industrial railways case were suspended. Only those industrial railways whose cases have not been before the commission, are granted a suspension of the tariffs affecting them. Elimination of allowances and divisions with the industrial roads operated by the United States Steel Corporation and other iron and steel companies in the east were permitted to stand. The order issued in the matter provides for hearings, although no date is fixed. It is scarcely likely they will be held before next autumn, in which event it will be necessary for the commission before July 30 to further suspend the tariffs. A few days prior to the action of the Interstate Commerce Commission, the Public Utilities Commission of Illinois, entered an order suspending similar rates for the same length of time. The Public Service Commission, of New York state, had been hearing evidence on the same question, and had written to the Interstate Commerce Commission requesting it to suspend certain of the rates applying to lines in New York.

Injunction Refused in Union Pacific Distribution.

The petition in which the Equitable Life Assurance Society asked for an injunction to restrain the Union Pacific R. R. from distributing as a special dividend to holders of common stock, \$80,000,000 in cash, and stock of the Baltimore & Ohio R. R., was denied by the New York Supreme court, in New York city, April 2. The Equitable sued to restrain the railroad on the ground that the holders of preferred stock in the Union Pacific were entitled to share in the dividend or else have the \$80,000,000 regarded as an asset and held by the road. The Baltimore & Ohio stock was acquired by the Union Pacific from the Pennsylvania Railroad in a deal whereby the Union Pacific released its Southern Pacific holdings as required by the Supreme court decree dissolving the Harriman system. It is understood that the Equitable will appeal from the present decision.

Terminal Association of St. Louis Asks Help in Contesting Decree.

The Terminal Railroad Association of St. Louis, has sent a letter to each of 165 industries located along its line, asking aid of the other corporations in its efforts to obtain a modification of the recent federal court decree which limits the activities of the Terminal to handling cars delivered to it by other railroads. The Terminal filed a protest

against the form of the decree last week. The decree, included the following language: "The defendants are therefore perpetually enjoined from in any wise managing or conducting the said Terminal Railroad Association or any of constituent companies and from operating any of the properties belonging to it or its constituents otherwise than as terminal facilities for the railroad companies using the same." W. C. Stith, traffic manager of the Terminal, was the author of the letter sent out. In it he said, in reference to the foregoing quotation: "Said section further provides that this association may continue as a lawful unification of terminal facilities upon abandoning all operating methods and charges as and for railroad transportation and confining itself to the transaction of a terminal business such as supplying and operating facilities for the interchange of traffic between railroads. Giving this language a literal construction this association would be enjoined from performing switching services for industries located upon its tracks, which would involve purely local movements, such as hauling a car from one point on its tracks to another point on its tracks, where such car was received from an industry and delivered to an industry. This company at present switches a great many cars for you not connected with the services performed by it for the railroad companies, and therefore unless this language in the final decree be modified services of this character now performed by us may be unlawful and must be discontinued. We have filed a petition addressed to the United States Circuit judges asking that the decree be so modified as to permit us to do local switching for industries, and we attach hereto a copy of said petition. Since you will be so much concerned in this matter I would respectfully suggest that you call the attention of the Hon. Edward C. Crow, counsel for the government in these proceedings to this matter, in order that no condition may arise whereby your company will be deprived of our switching services."

Hearings Concluded in Private Car Line Investigation.

Taking of testimony in the Interstate Commerce Commission's inquiry into the ownership and operation of private car lines was concluded in Chicago, this week, before Special Examiner E. W. Settle, Jr. The inquiry began in Chicago last January, and since then sessions have been held in Jacksonville, Fla., and Washington, D. C.

Telephone Train Dispatching.

The telephone is now in use for train dispatching and for sending messages on the entire line of the Cincinnati, New Orleans & Texas Pacific Ry., (Queen & Crescent route), between Chattanooga, Tenn., and Cincinnati, Ohio, the line between Chattanooga and Oakdale, Tenn., having just been completed and put in service. Work is progressing on a telephone line from Chattanooga to Meridian, Miss., covering the entire line of the Alabama Great Southern R. R. upon the completion of which the telephone will be used exclusively from Cincinnati to Meridian.

Examinations for Junior Civil Engineer in Valuation.

The United States Civil Service Commission has announced an open competitive examination for junior civil engineer, for men only, on May 6, 1914, at the usual places. From the register of eligibles resulting from this examination certification will be made to fill vacancies as they may occur in this position in the Interstate Commerce Commission under the act providing for the valuation of property of common carriers. The salaries of these positions will range from \$1200 to \$1500 per annum, with necessary expenses when absent from headquarters in the discharge of official duties. Applicants must show in their applications that they have had at least two years' (24 months) practical

field experience in civil engineering in railway work. At least six months of this experience must have been in the running of instruments. Special weight will be given to experience in charge of grading or other railway construction work. Applicants must have reached their 21st but not their 36th birthday on the date of the examination. Persons who meet the requirements and desire this examination should at once apply for application Form 2039 to the United States Civil Service Commission, Washington, D. C., specifying the title of the position as Junior Civil Engineer (male).

Effective Safety Work on Grand Trunk Ry.

The safety committee of the Grand Trunk Ry. are doing effective work in the prevention of personal injuries. This is shown by a statement just issued by George Bradshaw, safety engineer of that system. From September, 1913, to February, 1914, inclusive, there was a decrease of 46 per cent in the number of employees killed, and a decrease of sixteen per cent in the number injured, including all classes of injury serious or trivial, as compared with the corresponding months of 1912 and 1913. The safety movement was put into effect on the Grand Trunk in August, 1913.

Anthracite Dust Not Explosive.

At the conclusion of two weeks of experiments at the experiment mine at Bruceton, Pa., the United States Bureau of Mines announced, on March 26, that anthracite dust is not explosive even when fire damp is present, and that the dust tends to limit rather than extend the flame. British experiments have indicated that Welsh anthracite is inflammable. This prompted the experiments at Bruceton.

Fair Pay Denied the Railways for Carrying Mail.

The railroad companies of the United States claim that data compiled by the United States postoffice department, properly interpreted, shows the railways to be underpaid by \$29,000,000 annually for carrying the mails. This statement is made in a pamphlet with the title quoted above, issued by the Committee on Railway Mail Pay, representing 264 railroads handling mails on 218,000 miles of line, through its chairman, Ralph Peters, president of the Long Island Railroad. The railroads point out that whereas postoffice revenues increased over \$63,000,000 from 1907 to 1912, the railway mail pay in that time actually decreased over \$300,000, before the parcel post was established. The pamphlet also directs attention to the fact that the postoffice department estimates a further increased annual revenue of about \$60,000,000 on account of the parcel post, and in spite of this, no practical action has as yet been taken adequately to compensate the railroads for carrying the increased burden.

Hearings of the Commission on Industrial Relations.

The United States Commission on Industrial Relations has announced the names of witnesses who will testify at the public hearings to be held in Washington, D. C., on the subject of collective bargaining, conciliation and arbitration. The hearings will be held in the assembly room of the Shoreham hotel beginning Monday morning, April 6, and will continue for four days. Frank P. Walsh, chairman of the commission, will preside, and all of the nine commissioners will be present. Each of six large industries in which trade agreements or other forms of collective bargaining have been in operation during considerable periods will be considered separately. On Thursday, April 9, the final session of the hearing will be devoted to testimony on the general subject without reference to particular industries. Witnesses at the final session

will be Samuel Gompers, president of the American Federation of Labor, J. A. Emery, counsel for the National Association of Manufacturers, Seth Low of New York city, president of the National Civic Federation, C. P. Neill of New York city, former United States Commissioner of Labor, Judge W. C. Chambers of the United States Board of Conciliation and Mediation, Louis D. Brandeis of Boston, and J. E. Williams of Streator, Ill., chairman of the board of grievances in the cloak, suit and skirt industry of New York city. The session of Monday morning, April 6, will be devoted to the coal mining industry. Frank Peabody, of Chicago, one of the largest operators in the bituminous field, and another operator still to be named will testify for the employers. Witnesses for the employees will be John Mitchell, of New York, and John P. White, of Indianapolis, president of the United Mine Workers. The Monday afternoon sessions will be devoted to the molders' trade. On Tuesday morning witnesses from the clothing industry will appear, and the hearing Tuesday afternoon will be on the printing trades. On Wednesday morning witnesses from the building trades will be heard. The hearings as to particular industries will be concluded Wednesday afternoon, with the testimony of railroad officials and employees. The witnesses will be Daniel Willard of Baltimore, president of the Baltimore & Ohio railroad, and Elisha Lee, of Philadelphia, third vice-president of the Pennsylvania Railroad, for the employers; W. G. Lee, of Cleveland, O., president of the Brotherhood of Railroad Trainmen, and H. B. Perham, of St. Louis, president of the Order of Railway Telegraphers, for the employees.

Report of Texas Railroad Commission.

The Texas railroad commission has issued its annual report for the year ended June 30, 1913, compiled from the reports of 102 railroad corporations. The report shows that there were on June 30, 1913, 15,823 miles of main line and branches, a net increase over 1912 of 342½ miles; yard track and sidings, 3970 miles, increase of 212 miles, and a net increase of all classes of track of 554 miles. Of this mileage 22.50 is narrow gage. The total capital stock and bonds of these 102 railroads is \$483,298,424, of which \$128,540,728 is stock and \$334,757,696 is bonds. The general averages per mile of road are \$8409 capital stock and \$23,206 bonds. Indebtedness other than stock and bonds, \$6459 per mile, making the total liabilities \$38,074 per mile. The total passenger earnings of these railroads in Texas were \$24,366,817; increase \$3,528,697 for the year. The total gross freight earnings were \$116,460,375, an increase of \$10,107,074. The total increase in gross earnings was \$13,678,844. The operating expenses totaled \$90,991,943, which is an increase of \$9,273,821, or 11.35 per cent; increase in income from operation is \$4,405,022, the total operating expenses being \$90,991,943. The net operating revenue is given at \$23,171,847; the gross corporate income is \$28,743,021, showing a decrease of \$1,601,378. The total assessed valuation of Texas railroads, including rolling stock and intangible assets for 1913, is given at \$344,635,318, as against \$334,573,512 for 1912. The total number of tons of commercial freight carried was 57,241,529, against 49,693,884 for 1912.

Mayor Harrison, of Chicago, signed this week the ordinances which give to the group of railroads now using the Union station, authority to construct the extensive passenger and freight terminals involved in the project described in these columns last week. The ordinances now become effective with their formal acceptance by the railroads, of which there is practically no doubt.

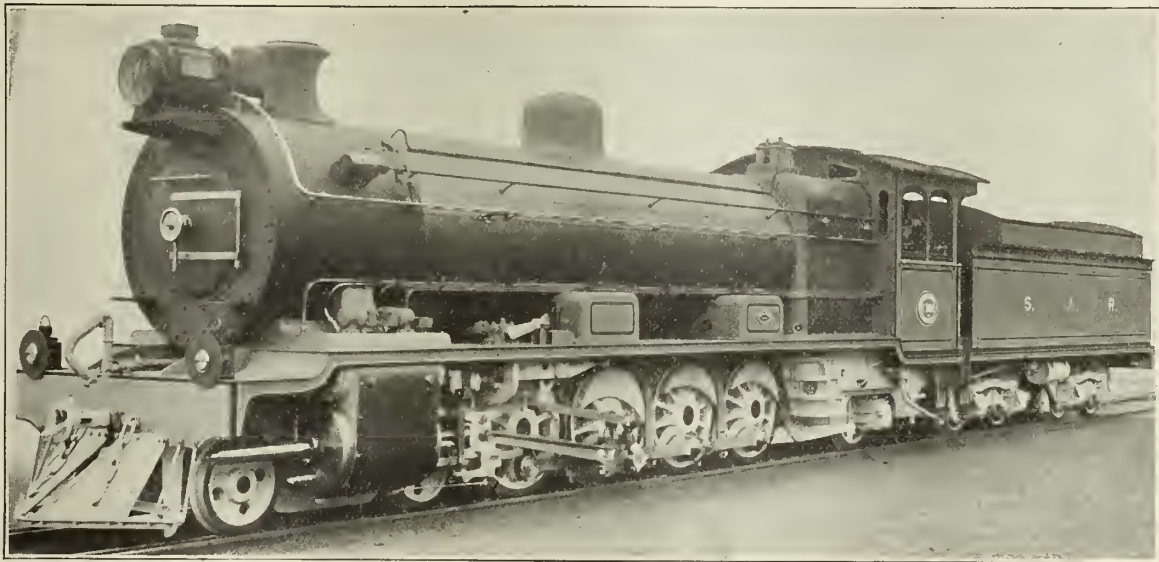
The annual report of the United States Steel Corporation contains a comparison of employees' stock subscriptions

during the past year with subscriptions during the preceding year, under terms which were substantially the same as those in effect since 1903. Subscriptions were received last year from 46,498 employees for an aggregate of 42,926 shares of preferred and 47,680 shares of common stock, as against subscriptions the previous year from 36,119 employees for an aggregate of 34,551 shares of preferred and 25,793 shares of common stock.

Mountain Type Locomotives for the South African Railways.

By F. C. COLEMAN.

Messrs. Robert Stephenson & Co., Ltd., of Darlington, England, have commenced the delivery of 20 powerful freight locomotives which they have on order for the South African Railways. These locomotives, the heaviest ever built by the above firm are of the 4-8-2 wheel arrangement, the leading truck wheels being 2 ft. 4½ in., the trailing wheels 2 ft. 9 in., and the driving wheels 4 ft. 6 in. in diameter. The fixed wheelbase



Mountain Type Locomotive for the South African Railways.

is 12 ft. 9 in., and the total wheelbase 30 ft. 7 in. The cylinders are 22 in. diameter, with a piston stroke of 26 in., and the total heating surface is 2360.96 sq. ft., to which the tubes contribute 2211.96 sq. ft. and the fire-box 149 sq. ft. The superheating surface is 503.04 sq. ft. and the grate area 36 sq. ft.

The total mean effective pressure at 75 per cent of the boiler pressure amounts to 36,375 lb. In working order the engine weighs 89 tons 10 cwt., of which 14 tons 8 cwt. are on the front truck, 64 tons 8 cwt. on the driving wheels and 10 tons 15 cwt. on the rear truck. The maximum axle load is 16 tons 3 cwt. The tender, carried upon two 4-wheeled trucks having wheels 2 ft. 9½ in. diameter, has a fuel space of 400 cu. ft. and a capacity for 4250 gallons of water. The total wheelbase of the tender is 16 ft. 9 in. and the weight in working order, 50 tons 7 cwt. The engine and tender have a total wheelbase of 56 ft. 11¼ in., a total length over buffers of 66 ft. 5½ in. and a weight of 139 tons 17 cwt. The maximum width is 8 ft. 10 in. and the maximum height 12 ft. 7½ in.

These engines, built for the standard South African gage (3 ft. 6 in.), are fitted with the Schmidt superheaters, steam reversing gears, Hasler speed indicators, Walschaerts' valve gears, two No. 10 injectors, and steam brakes on the engines and vacuum brake on the tenders. They have been built to the designs of Mr. D. A. Hendrie, chief mechanical engineer of the South African Railways, and under the supervision and

to the inspection of Mr. H. G. Humby, consulting engineer to the high commissioner for the Union of South Africa.

Retrenchment.

Railroads in the eastern territory made public this week drastic policies of retrenchment which have been in view for some time past, and which have now culminated in the laying off of thousands of employees, and the curtailment of schedules and maintenance work. On the Pennsylvania Railroad thousands of men have been suspended, and it is planned to increase that number so that eventually 25,000 men will be laid off, and at least 118 trains will be eliminated from the schedules, cutting down the service to some extent over the entire system.

Concerning this situation, Samuel Rea, president of the Pennsylvania Railroad, authorized the following statement:

"The decision to reduce train service and working forces of the Pennsylvania system, while apparently sudden, should not be considered surprising, as the published monthly

statements of the system furnished to both state and interstate commerce commissions have shown the large decreases in net operating income the system has sustained. Higher wages, extra crew and other laws, higher taxes, and other expense items caused these decreases, which are not peculiar to the Pennsylvania Railroad. These causes still exist, and in addition the gross revenues of the system have been steadily decreasing since last October. While many other railroad systems began to reduce forces in the middle of 1913, the Pennsylvania system continued its usual train service and working force as long as possible. In view of the fact, however, that in the four months ended Feb. 28, 1914, compared with the same period of the previous year, operating revenues decreased \$8,815,991, and net operating income decreased \$6,652,671, the company is compelled to reduce operating expenses."

Vice-President Hardin of the New York Central authorized a statement concerning retrenchment on that system. He said that the total number of men laid off by the New York Central lines in recent months was 27,600. Of these 15,000 were employed on the lines east of Buffalo. The system is now employing approximately 145,000 men and there is no intention of further reduction in the working force, although, as is customary in the spring, there will be decreases in the number employed in the operating departments and increases in the maintenance departments.

Mr. Hardin emphatically denied the assertion made by Clifford Thorne in the rate hearing before the Interstate Commerce Commission, that men had been laid off for the purpose of influencing decision of the railroad rate cases. The reduction, he said, had been gradual and necessitated by decreases in the gross volume of business.

The Erie Railroad is employing 6000 less men than at this time last year. By the middle of the summer the management expects to have a further curtailment of 9000, making 15,000 in all. This further reduction will not be due so much to the business depression as to the fact that a large number of men were employed last year in double tracking.

The Norfolk & Western Ry. is putting into effect a program of economy that is inspired by the same reasons that have actuated the other roads, namely, declining gross receipts and advancing "unit" costs of operation. President L. E. Johnson, in reply to an inquiry, stated that his policy is at all times to hold his expenses to meet business con-

\$4,800,000. This vivid reflection of the excessive rise in railway operating costs is based by the Bureau of Railway News and Statistics on figures of the Interstate Commerce Commission just made public. Whereas the Commission's figures, however, cover only 225,000 miles those of the Bureau take in the entire 253,000 miles of operated mileage in the United States. In its current report, moreover, the commission for the first time has abandoned comparisons of total figures with corresponding revenue and expense items of the previous year. Comparisons have been made, however, from the records of the Bureau.

What the recent rise in expenses means may be gathered from the fact that in January, under operating conditions probably as favorable as ever experienced in winter, the railways were able to make only a slightly better showing than in January, 1912, one of the worst months of what was without exception the hardest winter ever experienced by United States railways. The ratio of expenses and taxes to revenue in January, 1914, touched 82.4 per cent against 78.3



Steel Sheathed Box Car, Pennsylvania R. R.

ditions, and there have been constant and continuous retrenchments since July 1, 1913. "All work possible has been retarded and a considerable amount of additions and betterments work has been suspended and will be held in suspense until business conditions are very decidedly improved. Passenger train service will be maintained to meet requirements. The property will not be permitted to depreciate either as to track or equipment. The gross earnings of this company have increased from July 1, 1913, to March 1, 1914, \$444,000, as compared with the same period a year ago, while net earnings for the same period have decreased \$1,211,000. From Nov. 1, 1913, to date there have been suspended and relieved from service a total of 8000 men in round numbers, and still further reductions will be necessary unless business revives."

\$80,000,000 Loss in Income for Seven Months.

TOTAL RAIL MILEAGE OF UNITED STATES, UNDER MILDST JANUARY WEATHER, ALMOST FALLS BELOW SHOWING FOR JANUARY, 1912, IN WORST WINTER OF HISTORY.

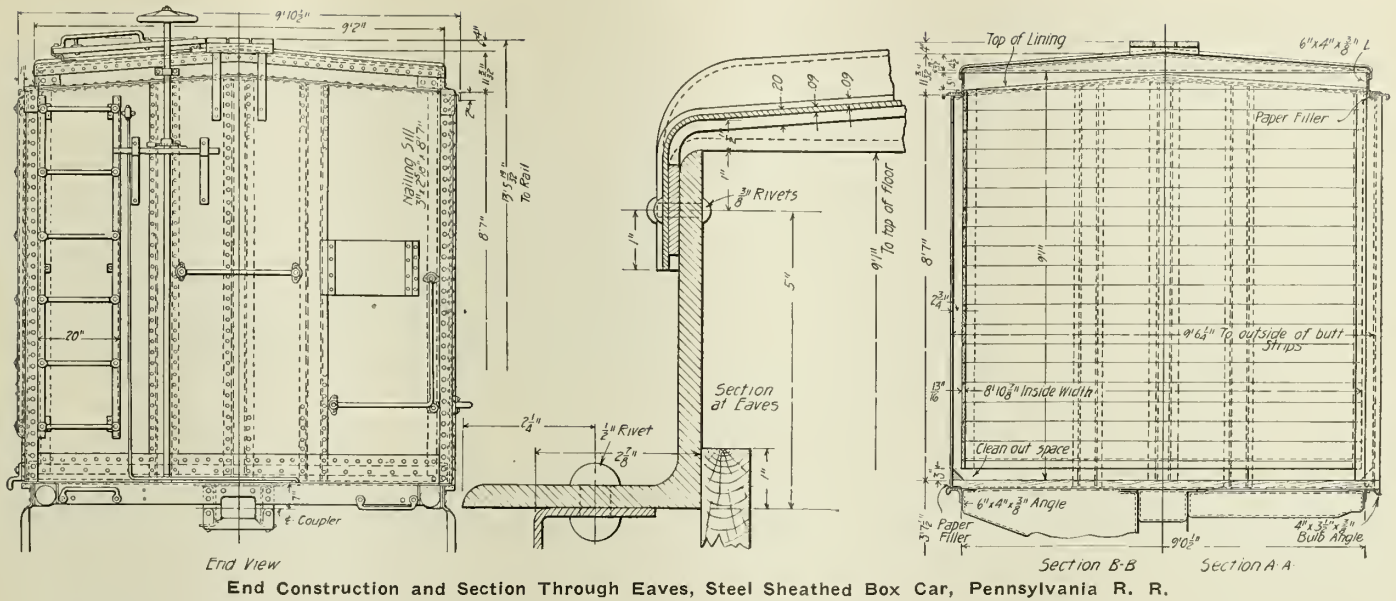
Despite the fact that 4000 miles of new line had been added during the year, the total railway mileage of the United States during the seven months ended January 31, 1914, lost in net income after payment of taxes almost \$80,000,000 compared with the same months a year ago. Total business in the same time had fallen off only

per cent a year ago. This January's performance under mild operating conditions therefore was only a shade better than that of January, 1912, when snow blockades and freezing weather were cutting down traffic and piling up expenses and the ratio reached 83.0 per cent.

Gross business for the seven months, at \$1,904,600,000, was \$4,800,000 under that of a year ago, yet operating expenses rose \$65,000,000, causing a net loss of \$69,800,000. Outside operations, which last year resulted in \$2,300,000 profit, sustained a deficit this year of more than \$500,000, so that total net revenue was \$72,600,000 below last year.

At this point enters a rise of more than \$1,000,000 a month in taxes, the accruals for seven months being \$81,600,000, or \$7,200,000 more than a year ago. This deducted from total net leaves a loss of \$79,800,000 in net income for 253,000 miles, compared with 4000 miles less a year ago doing practically the same business. The figures for January and the seven months, expressed in millions, are as follows:

January—	1914	1913	Loss
Gross	\$ 234.8	\$ 250.7	\$15.9
Expenses	181.8	185.7	3.9
Net	53.0	65.0	12.0
Seven Months—			
Gross	1904.6	1909.4	4.8
Expenses	1341.8	1276.8	*65.0
Net	562.8	632.6	69.8
Outside deficit.....	.5	†2.3	2.8
Total net	562.3	634.9	72.6
Taxes	81.6	74.4	*7.2
Income	480.7	560.5	79.8
*Increase			
†Profit			



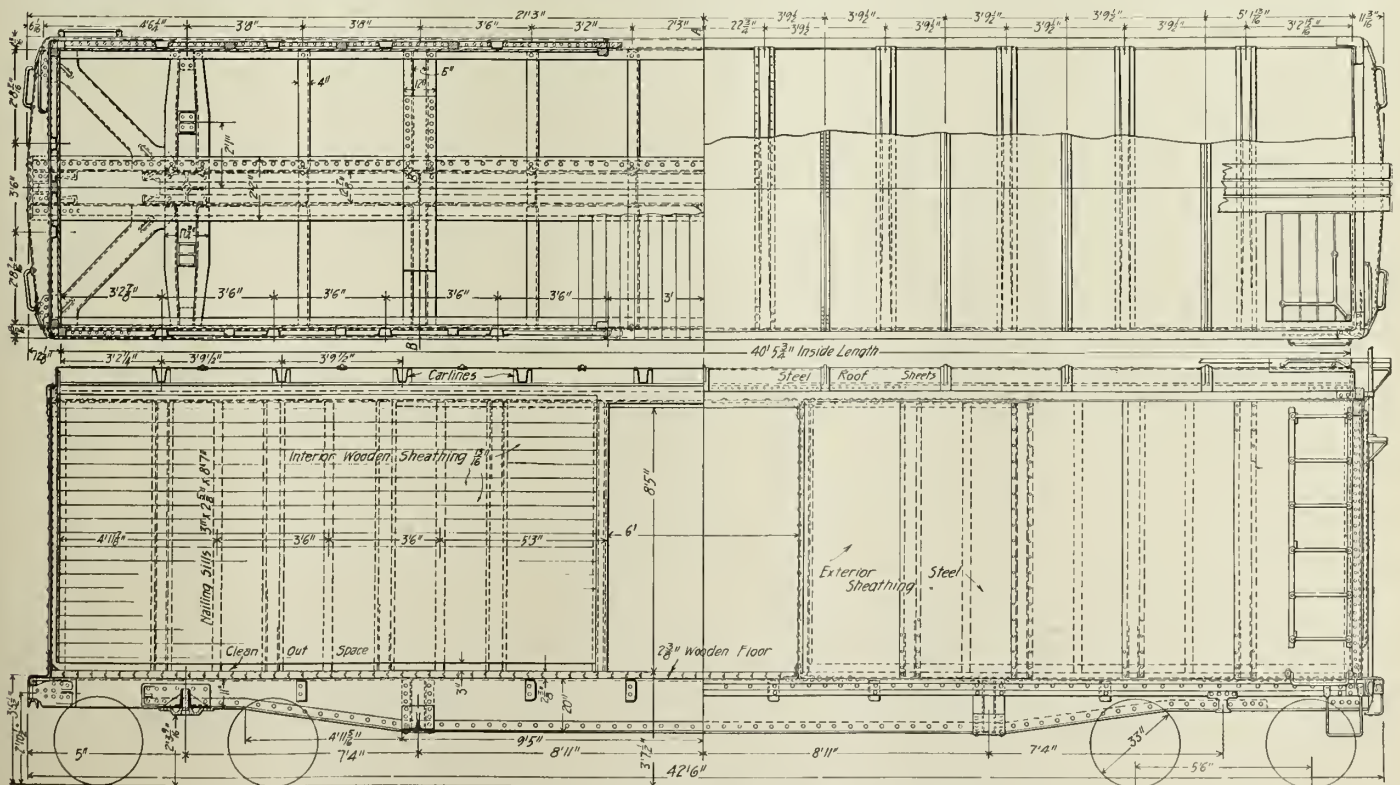
That such a showing should result despite the mild winter which was prevalent almost universally through last January raises misgivings as to what would have happened had the railroads this year been compelled to face conditions even approaching in severity those of the record winter two years ago. What the more recent storms of February did to railway earnings still remains to be seen. That the fiscal year, due to excessive expenses, will be exceedingly unfavorable is beyond doubt, with January the third successive month to show a smaller gross, and even the months of July, August and September, which gained liberally in gross, showing losses in net.

Steel Sheathed Box Cars, Pennsylvania R. R.

In the Railway Review for Nov. 2, 1912, there was described the then new designs of the Pennsylvania R. R. steel frame

stock, box, and refrigerator cars. A striking feature of those cars was the external pressed steel superstructure framing which, in a later design, has been considerably modified and concealed from view by $\frac{1}{8}$ -in. outside steel sheathing, as shown in the halftone illustration of the car herewith.

The trucks and the underframes of the later design are practically the same as in the older, except that the side sills are modified by the addition of a 4 by 3½ by ¾-in. bulb angle on which to mount and to which to secure the trough-like vertical channels comprising the side posts. The channels have supplemental flanges parallel to their webs and it is to these flanges that the ⅝-in. steel sheathing is secured by means of rivets. Alternating with the side posts are 3 by 2½-in. nailing strips to which the 3-16-in. interior sheathing is secured. It will be noted that diagonal members are omitted from the side and end frames, the rigidity of the side posts in combination with the steel sheathing



Superstructure Construction, Steel Sheathed Box Car, Pennsylvania R. R.

being considered sufficiently strong to obviate the necessity for such members.

A further modification of the original design is to be noted in the inverting of the 6 by 4 by $\frac{3}{8}$ -in. angle side-plate. The short leg of this angle thus rests on and forms attachment with the side posts and the roof-sheets are folded over and riveted to the upwardly extending 6-in. leg of the angle. The principle involving the use of solidly riveted roofing sheets is still adhered to; likewise as in the earlier design, the absence of a ridge pole, purlins, and floor beams is also

to be noted. In the latter case, the $2\frac{3}{8}$ -in. tongue and grooved flooring strips extend from side sill to side sill, being supported thereon as well as on the cover plate of the center sills and are considered sufficiently strong to require no further support.

The cars in question are some 14 ins. higher than their predecessors, being 9 ft. 1 in. high by 40 ft. $5\frac{7}{8}$ ins. long by 8 ft. $10\frac{7}{8}$ ins. wide inside and having a capacity of 3243 cu. ft. The load carrying capacity is 100,000 lbs. and the light weight is 49,100 lbs.

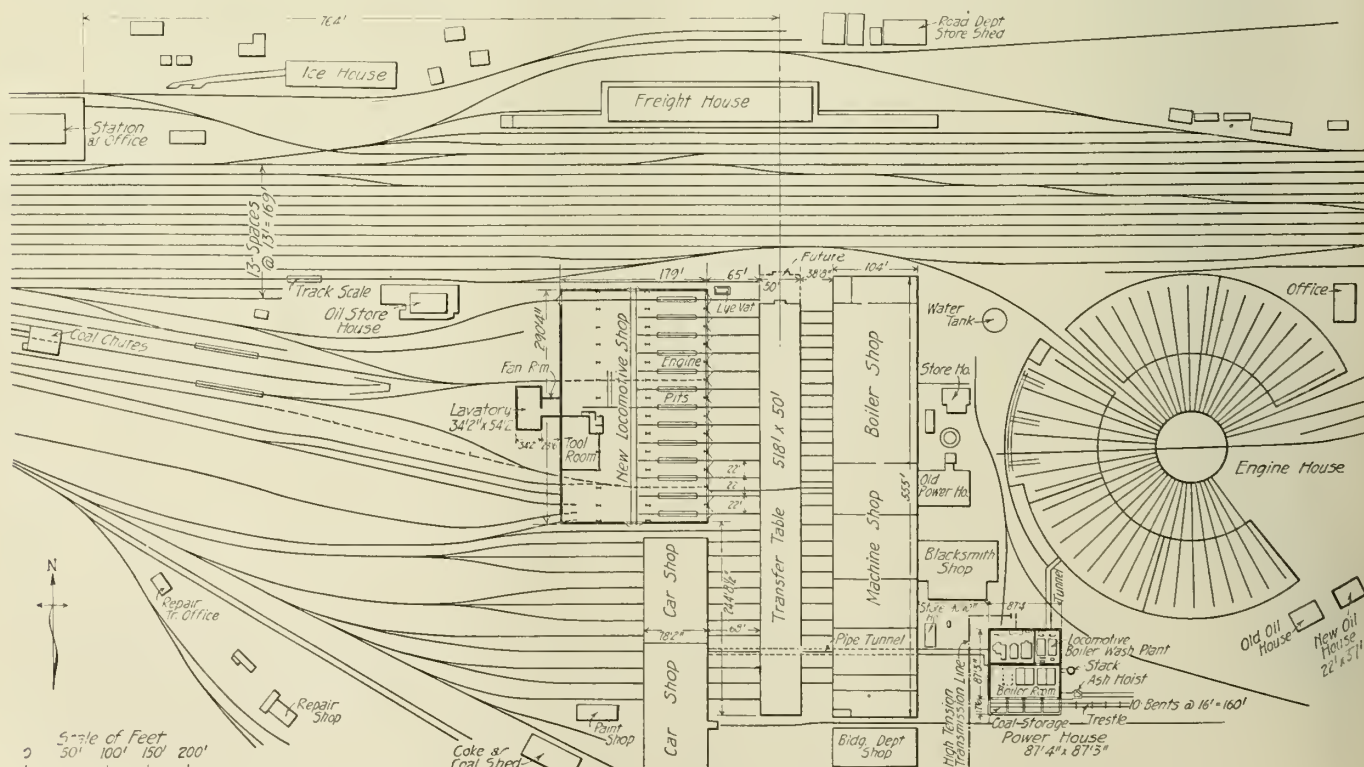
Shop Improvements of the Michigan Central R. R. at St. Thomas, Ont.

The improvements referred to in this article constitute a further step in the enlargement of the Michigan Central's shop and terminal facilities at St. Thomas. An earlier step was taken about two years ago in the construction of a new 40-stall engine house. With this and the latest additions, the plant has undergone practically a 100 per cent increase in capacity and has been thoroughly modernized. A feature of the power equipment is the supplementary service derived from a local power company, the roads own plant being made of such size only that all of the exhaust steam derived therefrom in winter, can be utilized for heating purposes.

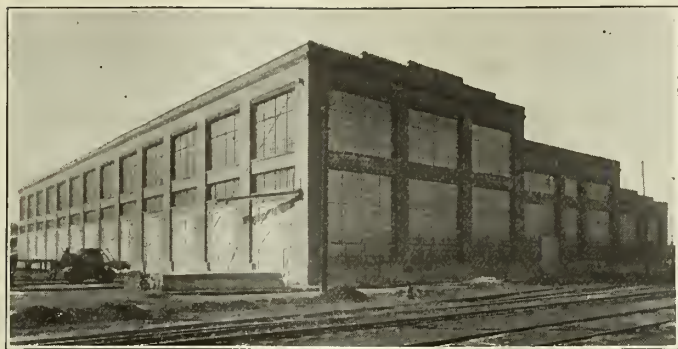
The Michigan Central R. R. is now completing, at St. Thomas, Ontario, a new locomotive shop and power plant, together with extensive alterations and additions to the drainage, water, heating and piping, lighting and power systems, combined with the installation of additional machine tools and equipment, which are needed to maintain the rolling stock on their lines in Canada. These improvements were made necessary by the inadequacy of their facilities at that point, and also by the constantly increasing size of locomotives, and number of cars to be maintained and built on this division and branches. The road operates 226.18 miles of double track lines and 168.64 miles of single track lines

in Canada, not including 181.37 miles of side track, and maintains approximately 155 locomotives, 84 passenger cars, 1826 freight cars, and builds approximately 145 new freight cars annually. The present additions when completed are intended to fulfill the requirements now, and provide for a limited future period. The work has been carried out under the direction of Geo. H. Webb, chief engineer, and J. F. Deimling, assistant chief engineer, all mechanical details being subject to the approval of W. H. Flynn, superintendent of motive power, and electrical details to the approval of J. C. Mock, electrical engineer.

Locomotive Shop: The new locomotive shop covers the site just west of the transfer table pit, and is 179 ft. by 290 ft. 4 in., outside dimensions. It is divided into three longitudinal bays, the locomotive erecting bay being 72 ft. in width from center to center of columns, and 40 ft. from top of rail to underside of roof truss. The heavy machine tool bay is 60 ft. in width from center to center of columns, and 30 ft. from floor line to bottom of the roof truss. The light machine tool bay is 45 ft. from center to center of columns, and 20 ft. in the clear under the roof truss. Over the erecting bay there is a monitor extending over eleven of the transverse bays, same being 36 ft. wide by approximately



General Layout of Shop and Locomotive Terminal Facilities, Michigan Central R. R., St. Thomas, Ontario.



New Locomotive Shop from Erecting-Bay Side, Michigan Central R. R., St. Thomas, Ontario.

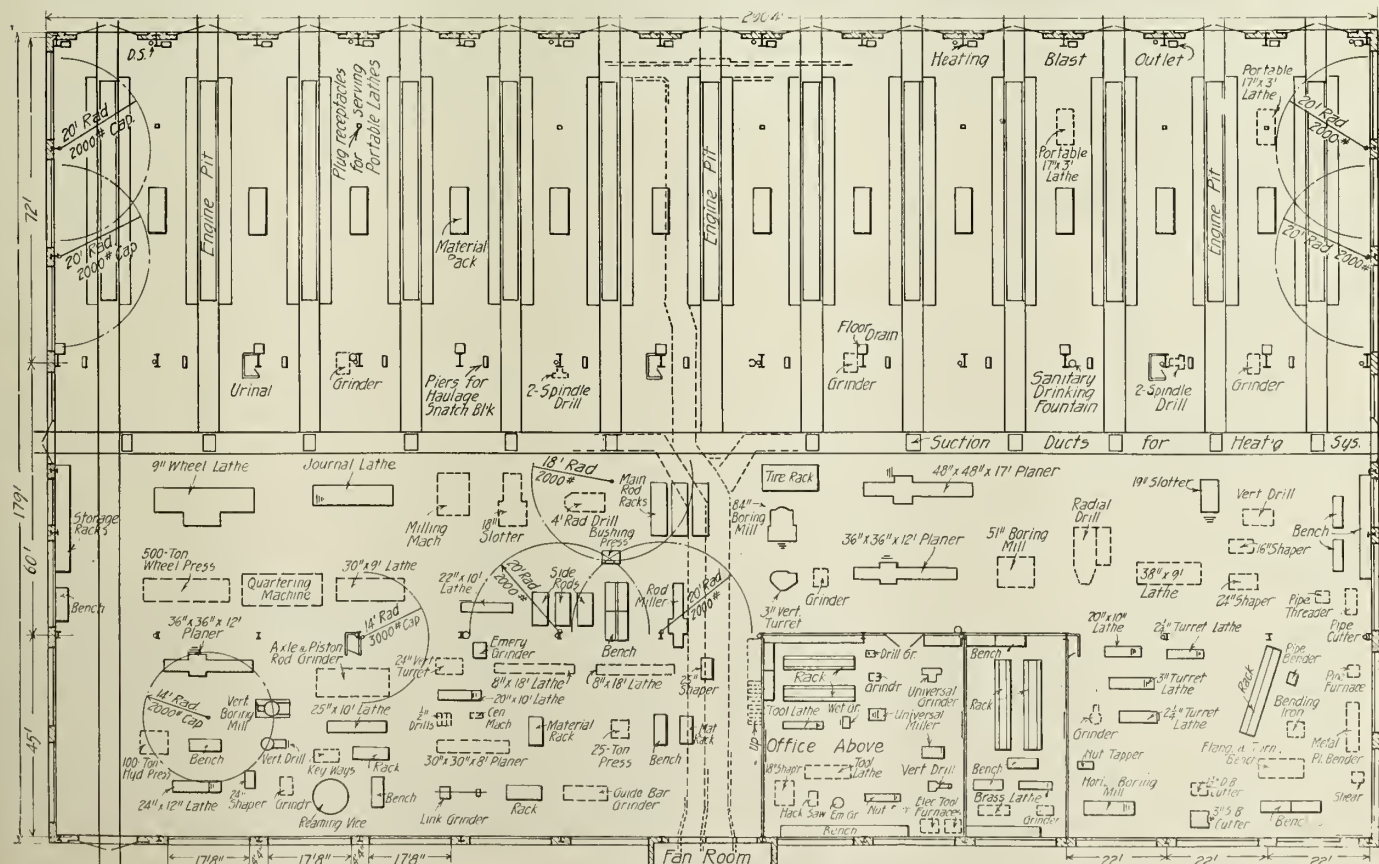
8 ft. high. Both sides of this monitor are provided with continuous steel sash, glazed with $\frac{1}{4}$ -in. ribbed wire glass, there being two rows of sash on each side, each 3 ft. high. The upper row of sash is hinged at the top and provided with operators for ventilating purposes. Over the heavy machine tool bay, there is a similar monitor 24 ft. wide, which is provided with the same amount of glass area and ventilated sections. The building is divided into thirteen transverse bays, each 22 ft. wide from center to center of columns and contains 13 concrete engine pits, 48 ft. long by 3 ft. 11 in. wide, 2 ft. 6 in. deep at the shallow end, and 2 ft. 10 in. deep at the opposite end. Each pit is connected with the drainage system. The rails are secured to the pits on creosoted cross ties anchored into the concrete side walls of the pit. These pits are served by a transfer table on the east side of the building. Should it be necessary to increase the size of this building in the future, it is intended to extend it to the south.

The building has foundations of concrete, reinforced where required to take excessive loads; skeleton steel frame work; brick side walls; concrete window sills; steel lintels; and concrete tile roof slabs, incorporating the American Steel &

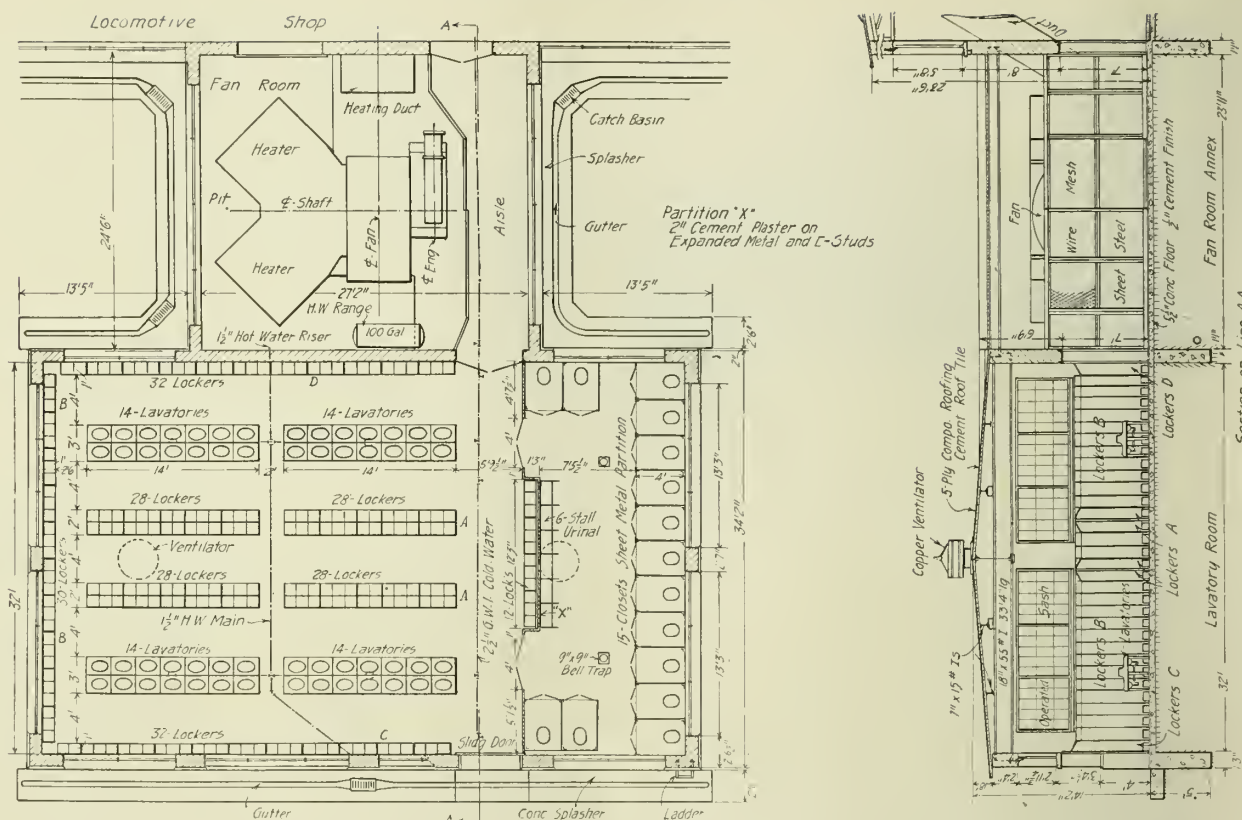
Wire Co.'s special tile reinforcement and covered with five-ply Barrett specification roofing. The side walls are provided with steel sash glazed with $\frac{1}{4}$ -in. factory ribbed glass, with ample ventilated sections, which sash, as well as the continuous sash in the monitors, were furnished by Steel and Radiation, Limited, of Toronto, Ontario. The track doors, as well as the pass doors, are of heavy wooden construction, reinforced with wrought iron hinges and truss rods. The concrete foundations are carried $4\frac{1}{2}$ ft. above the floor line to the lower sill line, at which point the brick work starts. The floors consist of 3-in. creosoted pine blocks over a $\frac{1}{2}$ -in. sand cushion, expansion joints being provided around all concrete column bases, engine pits, and machine tool foundations by means of a narrow gap filled with a good grade of paving pitch. This floor is supported by a concrete sub-floor five inches thick.

The brick for facing the side walls are a dark red, vitrified brick, from Ohio, the backing up brick being furnished by Canadian concerns in the vicinity of Ridgetown, Ontario. The reinforced concrete tile roof slabs are of the flat slab construction one and seven-eighths inches thick and were made at the site. A small plant was built in which to construct these slabs, and they were manufactured, cured and completed well in advance of the time they were needed, to be placed on the roof.

The north, east and south walls of the building are carried approximately 2 feet above the roof line and capped with a 7-in. concrete coping. The roofing is carried well up the parapet walls to serve as flashing, and is calked into vitrified raggle blocks with tempered cement mortar, making a construction highly impervious to water. The eaves on the west side of the building overhang. The west eaves of the erecting bay and heavy machine tool bay are provided with 16-oz. copper gutter and gravel guard, with copper conductor heads connected to wrought iron downspouts for conducting storm water to the drainage system. Copper gravel guards have been used throughout at all roof eaves where required, and same are secured to the concrete tile



Tool Layout of New Locomotive Shop, Michigan Central R. R., St. Thomas, Ontario.



Plan of Lavatory and Fan-Room Annex to New Locomotive Shop, Michigan Central R. R., St. Thomas, Ontario.

roof slabs by means of a specially designed copper wire clip and brass screws.

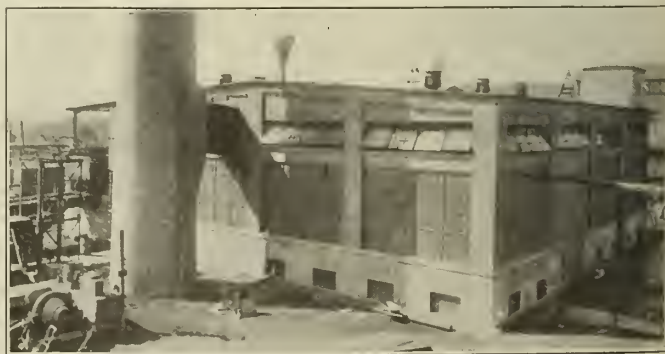
The monitors are provided with longitudinal steel walkways with hand rails, which are reached by means of iron ladders at the ends of the building. These walkways serve for cleaning the monitor windows and afford access to the sash operating apparatus. Steel doors lead from the ends of these walkways to the roof of the building. The ends of the monitors are constructed of steel framing covered with cement plaster on "Hyrib" metal reinforcement.

A foreman's and timekeeper's office has been provided at the center of the shop, just at the side of the heavy machine tool bay. This office is built on a concrete platform elevated 9 ft. 4 in. above the floor line, which is reached by steel stairway. The sides of the foreman's office are provided with windows, affording a view over the entire shop. The lower portion of the side walls are constructed of cement plaster on metal reinforcement. Just below and adjacent to the foreman's office is located the tool room, which is enclosed in sheet metal and wire mesh partitions. At the south of the tool room there has been allotted an area of 22 ft. wide by 45 ft. long, partitioned off with steel and wire mesh partitions, for the storage of small materials, such as stud bolts, special bolts and brass work.

The erecting bay is served by a 150-ton electrically-operated traveling crane, with two 75-ton hoists, one of the trolleys being provided with an auxiliary 10-ton hoist. This crane has a span, center to center of rails, of 67 ft. 11 in. It travels on a runway 27 ft. 6 in. above the floor line. The heavy machine tool bay is served by a 10-ton electric traveling crane with span from center to center of rails of 57 ft. 3 in., the height of runway being 24 ft. 3½ in. Both cranes operate on 3-phase, 25-cycle, 550-volt, alternating current. These cranes were furnished by the Whiting Foundry Equipment Co., of Harvey, Ill. There will also be located at each end of the erecting bay two 1-ton capacity, 20-ft. radius, jib cranes, these being attached to the columns at the ends of the building. Each of the jib cranes will be provided with air hoists. In the machine tool bay there will be

two 1-ton, 20-ft. radius, jib cranes equipped with air hoists for handling the side rods. Jib cranes are also provided for serving some of the individual tools, where it was found that they would prove economical. High pressure steam and compressed air and water outlets have been provided throughout the building at points where such service is required, drinking fountains also being conveniently located. Modern sanitary plumbing fixtures and steel lockers are located in the lavatory and fan room at the west side of the building near the center.

The heating for the building is supplied by means of a steam-driven fan and indirect, cast iron "Vento" radiators. Heated air is forced through underground concrete ducts, as well as overhead sheet metal ducts being systematically distributed so as to produce a uniform temperature throughout the building at the same time hot air does not blow directly on the workmen. The underground ducts are connected with sheet steel outlets, which discharge the air approximately 8 feet above the floor line. A return air duct is provided, and collects the air at certain points in the shop, conducting it back to the heating fan. This air is mixed with fresh air drawn from the outside before passing through the heating coils. The heating fan and engine and radiation



New Power House, Michigan Central R. R., St. Thomas, Ontario.

were supplied by the Canadian Sirocco Co., of Windsor, Ontario.

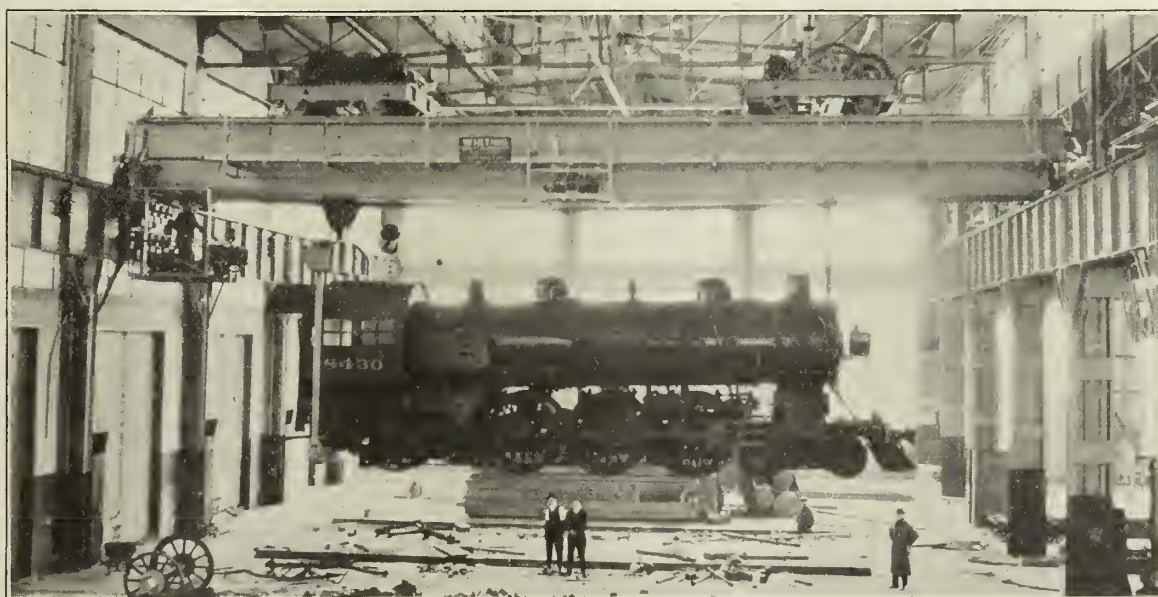
Power House: The power house occupies a site adjacent to and just southwest of the railroad company's new round house. This building is 87 ft. 3 in. wide by 87 ft. 4 in. long, outside dimensions. It is divided into two rooms: viz., boiler room and engine room, each 42 ft. wide inside. A basement extends under a portion of the engine room; an ash tunnel extends the full length of the boiler room and connects with a pneumatic elevator just outside of the power house, which is provided to hoist the ashes for loading into cars. A concrete coal bin of 300 tons capacity extends the full length of the building on the boiler room side. Loaded cars are switched directly up a wood trestle over this coal bin, allowing coal to be dumped directly into the bin from drop bottom or side dump coal cars.

The building is constructed with concrete foundations, extending up to the lower sill line; brick side walls supporting steel roof trusses and purlins, over which is laid reinforced concrete tile roof slabs. The roof is of the same

22-in. by 42-in. Corliss engine, manufactured by E. Leonard & Sons, Ltd., of London, Ontario. This engine is direct connected to a 375-k.v.a., 575-volt, 3-phase, 25-cycle generator, furnished by the Canadian General Electric Co., Ltd. The exciting current is furnished by an 18½-k.w. belt driven generator. Compressed air will be supplied by an air compressor which the company now has and which will be moved into the new power plant.

In the northeast corner of the engine room is located the locomotive boiler washing apparatus, consisting of filling tank, washing tank, pumps and auxiliaries. Just back of the boiler washing apparatus there are placed two boiler feed pumps, one fire pump and an open feed water heater. Three 225-k.v.a. transformers 13,200-575 volt transformers are placed in the basement. In the northwest corner of the engine room is located a 9-panel switchboard which controls both the incoming lines from the Hydro-Electric Commission, the generator, and all of the outgoing feeder circuits for power and light.

A careful study was made of the electrical and steam



Erecting Bay Showing 150-Tons Capacity Crane. Locomotive Shop of the Michigan Central R. R., St. Thomas, Ontario.

construction as that of the locomotive shop. The side walls are provided with steel sash glazed with ⅛-in. factory ribbed glass, same containing approximately 50 per cent ventilated sections. Just above the roof at the northeast corner there is built a compartment 10 ft. 6 in. wide and 6 ft. 4 in. long and of suitable height to enclose the high tension lightning arresters and switching apparatus. This compartment is constructed of cement plaster upon metal reinforcement. The high tension transmission line from the Hydro-Electric Power Commission enters this compartment. The high tension switches are controlled from the engine room floor, making it unnecessary for the operator to enter this high tension room unless it is necessary to make repairs or alterations.

Power Plant Equipment: The power plant equipment consists of four 250 h.p. Goldie and McCulloch water tube boilers carrying steam at 160 lbs. pressure. The furnaces are equipped with Green Engineering Co.'s traveling chain grate stokers arranged for hand firing. A steel smoke breaching connects these boilers with an Alphons-Custodis radial brick chimney 7 ft. 6 in. inside diameter by 150 ft. high. The ashes are discharged from the traveling grates into compartments directly underneath, from which they can be raked into an industrial car and transferred out through the ash tunnel and raised on a pneumatic elevator and dumped directly into gondola cars. There is installed a

power requirements for this shop before the power plant was designed. The result of this study indicated that the company would be justified in purchasing from the Hydro-Electric Power Commission of Ontario a large block of power and installing in their own plant a steam driven electrical unit of such capacity that all of the exhaust steam could be utilized in the winter period for heating. This scheme provides two sources of electrical power, which are quite important to the operation of these shops, it being necessary to have an uninterrupted power service for operating transfer table, turn-table and coaling station as well as lighting. The Hydro-Electric Commission brings its lines into the company's switches located in the above described compartment just over the engine room. Current is supplied at 13,200 volts. This is reduced to 575 volts for power transmission throughout the shop premises. There are duplicate bus bars on the switchboard which are so arranged that the power and lighting feeder circuits may be switched to either the company's generator or the Hydro-Electric lines. The branch lighting circuits are taken from the secondaries of transformers which reduce the voltage from 575 volts to 127-254 volts.

Forty-seven new flaming arc lamps have been installed for lighting the shops and yards. The locomotive shop is lighted with flaming arc lamps in the erecting and heavy machine tool bays, the light machine tool bay being lighted

with tungsten lamps located where required. The power house building is amply lighted with tungsten lamps. Additional lighting has also been installed in some of the old shop buildings. All wiring inside of the buildings is in conduit. The outdoor circuits for power and light are, in general, carried on poles.

A concrete pipe tunnel 4 ft. wide and 6 ft. high inside, excepting where it passes under the transfer table, connects the new power house with the present car shops. Through this tunnel is carried steam and compressed air pipe lines from the power house to the car shops and new locomotive shop; these lines running overhead in the roof trusses through the present car shops. The electric power feeder circuits to the locomotive shop are carried in clay conduit along the outside of tunnel. A steam line also connects with the piping in the locomotive shop and is carried some 1200 feet west and across the main line to the passenger station; same being used for heating the passenger station.

A new shavings, collecting and blowing system is being installed in the present woodworking shops for collecting the refuse and discharging it into two of the furnaces in the new power house, refuse having been previously handled by hand. A new reinforced concrete oil house, enclosing three 4000-gallon capacity fuel oil tanks has just been completed, together with fuel oil piping for conveying and distributing the oil to the forge shop furnaces.

The Arnold Company, 105 South LaSalle Street, Chicago, Ill., served the railroad company as engineers and constructors, and prepared complete plans and specifications for the work, including an analysis and report upon the power plant requirements, as well as entire supervision and construction of the buildings and installation of the equipment herein described.

"Superheat."

By E. J. NICHOLSON.*

The paper herewith was prepared for presentation before a class of firemen up for promotion as engineers. While the information given is already a matter of record in the files of technical railway publications and in the proceedings of various railway mechanical organizations, its manner of presentation is thorough and practical to an extent that should make it more than ordinarily acceptable to those of our readers who may be more or less closely identified with that class of men for whom it was originally intended.

*Boiler foreman, Chicago & Northwestern Ry., Milwaukee, Wis.

No scheme or device of recent introduction into railroad work in this country is looked upon with as much favor as is the use of superheated steam. It was adopted by the railroads of this country about five years ago and now we have about 8000 engines so equipped. Those of the railroads which have adopted this principle are adapting it to their heavy power as fast as it goes through the shops for repairs. Some roads have even equipped switching locomotives with superheaters so one can readily see that the roads are very much pleased with results obtained. This practice had its origin in England some eighty-five years ago, when it was attempted in a crude way on stationary engines with very gratifying results. In Belgium twenty years later, it was tried experimentally on locomotives, but the results were never published and it is unlikely that any appreciable saving was effected, owing no doubt to the nature of the device, which consisted of an annular space surrounding the smoke box and stack. The designer attempted to arrest the waste gases and thus increase the temperature of the steam before it entered the cylinders. Many attempts had been made on stationary and locomotive engines from that time until the year 1898, when the Prussian State Railways equipped two locomotives with Dr. Schmidt's design, which is the one now most generally used in this country.

Steam generated in a boiler is known as saturated steam and remains as such so long as its temperature remains the same as the water from which it is generated. Superheated steam is steam re-heated to a higher degree of temperature than that at which it was generated, after it has been cut off from direct contact with water. Thus by passing through the superheater it absorbs additional heat, increasing its temperature and volume, but not its pressure. It has been determined that when maximum power is obtained upon a locomotive using saturated steam, it requires the burning of from 120 to 130 lbs. of coal per square foot of grate area per hour, whereas when superheated steam is used and when approximately the same power is developed, only from 85 to 90 lbs. of coal per square foot of grate area is burned. This difference in coal consumption while operating with saturated and superheated steam respectively, represents about a 25 per cent saving in coal. The efficiency of the cylinders at 160 lbs. and 200 lbs. is practically the same, so that it is possible to decrease the pressure to 160 lbs. and get the same hauling power with a superheated engine that can be gotten with a saturated engine carrying 200 lbs. pressure. The efficiency of the power is also considerably increased with an increase of superheat and the higher degrees of superheat are obtained when the engine is traveling at high rates of speed and under heavy load, on account of the increased activity thus produced on the fire.



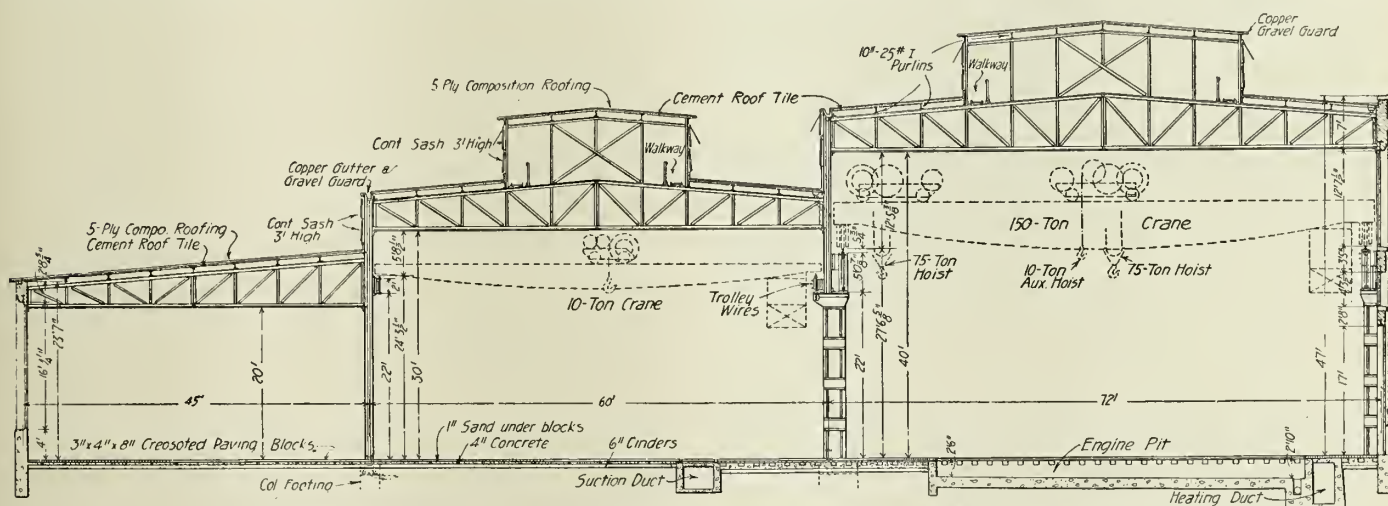
Heavy Machine Tool Bay, Tool Room, Foreman's Office, and 10-Ton Crane, Locomotive Shop, Michigan Central R. R. St. Thomas, Ontario.

The Schmidt superheater consists of several large flues located in the upper part of boiler and containing a system of tubing known as the superheat units. These units are suitably connected to a header which is located in smoke arch of engine. The superheater flues are seamless steel tubes extending from back to front flue sheets. The flues vary in size from $4\frac{1}{2}$ inches at the back to $5\frac{3}{4}$ inches at front flue sheet. This enlargement begins about six inches from back flue sheet and is provided for the purpose of allowing the superheater units to rest therein. The superheater flues are situated within the upper one-half portion of flue area, which enables them to derive the greatest amount of heat from the fire. The superheater units which are contained within the superheater flues are each a set of independent tubes $1\frac{1}{2}$ inches in diameter, with a double return, each having an outlet and an inlet from a common header which is connected with the dry pipe in the boiler and thus with the stand pipe and throttle box.

The steam header is so arranged by webs or walls on the interior that each and every unit is connected at one end with the opening from the throttle and to the outlet passage to the steam pipes and valves at the other end. The saturated steam

harmony with the engineer's throttle in the cab, since, by opening the throttle, steam enters the valve chamber and in turn passes through a $\frac{1}{4}$ -inch copper pipe which makes connection with the damper operating cylinder attached to smoke arch. The necessity of enclosing the forward ends of the superheater units and flues in this manner arises from the fact that in drifting with an engine not so equipped, the superheater units would become so hot that there would be danger of burning them. Also from the fact that by attaining so great a degree of heat, there is danger from the sudden influx of saturated steam when the throttle is again opened. This would cause contraction and would result in a tendency to rupture the unit pipes or open the joints at the header, and would without a doubt, cause engine failures.

The superheater units are connected to the header by means of clamps and bolts; the connections on recent locomotives being ground ball joints, which are a great improvement over the flat joints containing copper and asbestos gaskets which were tried a few years ago. Though the ground ball joint is an improvement it does not always entirely eliminate the leakage at the header-unit joints, and very often when an en-



Cross Section of New Locomotive Shop, Michigan Central R. R., St. Thomas, Ontario.

admitted by the throttle to the superheater travels through the double return $1\frac{1}{2}$ inch pipes contained within the superheater flues, and is reheated from about 330 to 600 degrees by the absorption of the heat of the gases passing through the superheater flues. It is in these units then that the superheating of the steam takes place.

Great care must be taken with regards to keeping the superheater flues clean, as any unburned coal, cinders or other foreign substances very easily collects in them, owing to the obstructions of the superheat units, which retards the passage of the gases through the flues, and when such obstructions are formed, they prevent the superheater units from performing their functions and they also interfere with the free steaming of the engine. Care should also be taken with regards to shaking grates violently while the engine is working, for by so doing cinders and foreign substances are more apt to lodge about the units, further hampering the steaming qualities as stated before. If one or more flues becomes stopped up the effect would be that of saturated steam mixing with superheated steam at the outlet of the header, thereby reducing the temperature of the superheated steam before it enters the cylinders.

The forward ends of the superheater units as well as the outlets from the superheater flues, are enclosed by a box-like form of construction in front end. The passage of the gases through this box is controlled by means of a damper operated by the admission of steam to a small cylinder attached at one side on the exterior of the smoke arch. The action of the superheater damper is controlled automatically and operates in

gine is not steaming, it is possible to trace the cause to the leaking of these joints. These leaks serve to overcome the vacuum that is required in front end to produce the draft, and also as is often the case, blow back into the fire box and prevent the engine from burning a bright fire, but cause a dull red one instead, indicating that the heating value of the coal is not being fully realized.

The lubrication of superheater engines is of vast importance. As there is no moisture in superheated steam to assist in lubrication, it is generally necessary to use a little more oil than with saturated steam and owing to this, there is or seems to be a tendency on the part of some engineers to use too much oil, the results of this practice are that there is trouble from the carbonization of the oil on the cylinder heads, on the pistons, and in the steam passages. The carbon also diminishes the life of the piston rod packing. Because of this feature in superheated steam, enginemen should never shut off entirely, but should keep the throttle open, enough at least, to overcome atmospheric pressure, and to supply a measure of lubrication while drifting. It is always advisable to use a good grade of mineral oil having a high flash point. Some roads use oil with a flash point as high as 585 degrees. One can readily see that this is necessary as superheated steam sometimes attains a temperature of 600 degrees. Enginemen must always know that the oil feed to the valves and cylinders is constant. Where the cylinders are equipped with an independent feed, about 75 per cent of the oil should be fed to the valves and 25 per cent to the cylinders. When cylinders are not equipped with independent feeds and all of the oil is delivered

in the steam-way or to the steam chests, no reduction should be made in the total amount of oil used.

Another feature of importance is boiler feeding. A superheater engine consumes about one-third less water than does a saturated engine doing the same work and the engineer should regulate his boiler feed accordingly. Water should never be carried so high that it will be drawn over into the superheater pipes, as they would then become merely an auxiliary boiler and deliver only saturated steam instead of superheated. Water should never be too high when starting as, under this condition, the engine is very slow in getting under way. The location of the water should be ascertained

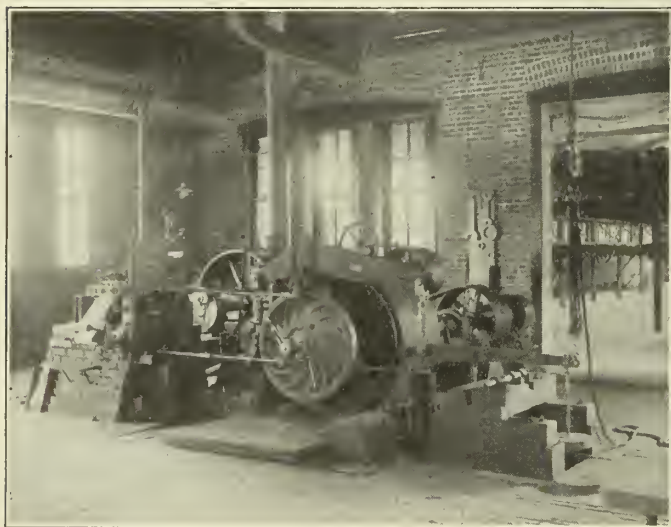


Fig. 1—Brake Shoe Testing Machine, Purdue University, Lafayette, Ind.

very closely before taking the engine out as water is quite frequently carried very high owing to the fact that engine house forces are sometimes inadequate, and the engine watchers do not dare to take too many chances with low water.

Reports should always be made by engineers when the damper fails to work or when any other condition arises that may indicate something wrong in the front end which retards the steaming of the engine. Cases have been known where very bad conditions have existed in the front ends without appearing to have bad effects on the steaming qualities of the engines. Should the superheater damper become disconnected while on the road, it can be tied up, and whenever this is necessary, care should be taken when going into stations that the throttle is not entirely closed for the reasons previously stated. Engineers should bear in mind that the application of the superheater serves to materially increase the boiler capacity, as a result of which the superheater locomotive can be worked much harder than is possible with the saturated steam engine as, for instance, in going up heavy grades.

Rigidity vs. Flexibility In Locomotive Boilers.*

If analysis were to be made of staybolt structure and their action when in use, possibly some other remedy than that of corrugated furnaces for boiler troubles might be obvious. The trouble with the staybolt question primarily, has been that some of us have gone wild on sizes. We should appreciate the fact that with four by four spacing in a boiler carrying two hundred pounds pressure, the tensile load on each staybolt is but thirty-two hundred pounds. If staybolts of one inch body diameter, which are quite common, are used, the result is a tensile load per square inch on that section of 4074 pounds, giving a factor of safety of about 12, which

seems excessive and contributes to stiffness rather than flexibility, and that stiffness, perhaps, invites early failure. Similarly, a seven-eighths inch minimum diameter staybolt, with the same spacing will have a tensile load of 5321 pounds to the square inch and a factor of safety over 9, and a three-quarter inch minimum diameter staybolt will have a load of 7243 pounds per square inch and a factor of safety of near 7,—a very considerable amount over the factor of safety which is called for in boiler seams and plates.

It might be of interest to analyze the subject if we can, and find out when a staybolt begins to break, in order to seek a remedy. Staybolt breakage generally originates at the time when the boiler is being fired up, or possibly when cold water is used in the washing out, or by the cold drafts when fires are knocked out. The greatest variation in the temperature of different portions of the fire box will account for the extreme angularity which staybolts must assume in following the resulting expansion and contraction of the fire-box sheets. I believe also that after steam has been raised and the circulation has been established, that the amount of the angular movement is very greatly reduced, but the trouble has already been caused by the checking, possibly, of the outer fiber of the staybolt at the time of the greatest angularity which has been caused by the uneven temperatures. The reason for the checking is very simple. One might, for instance, take a piece of wire, six inches long, anchor it solidly at one end and move the other end a quarter of an inch laterally

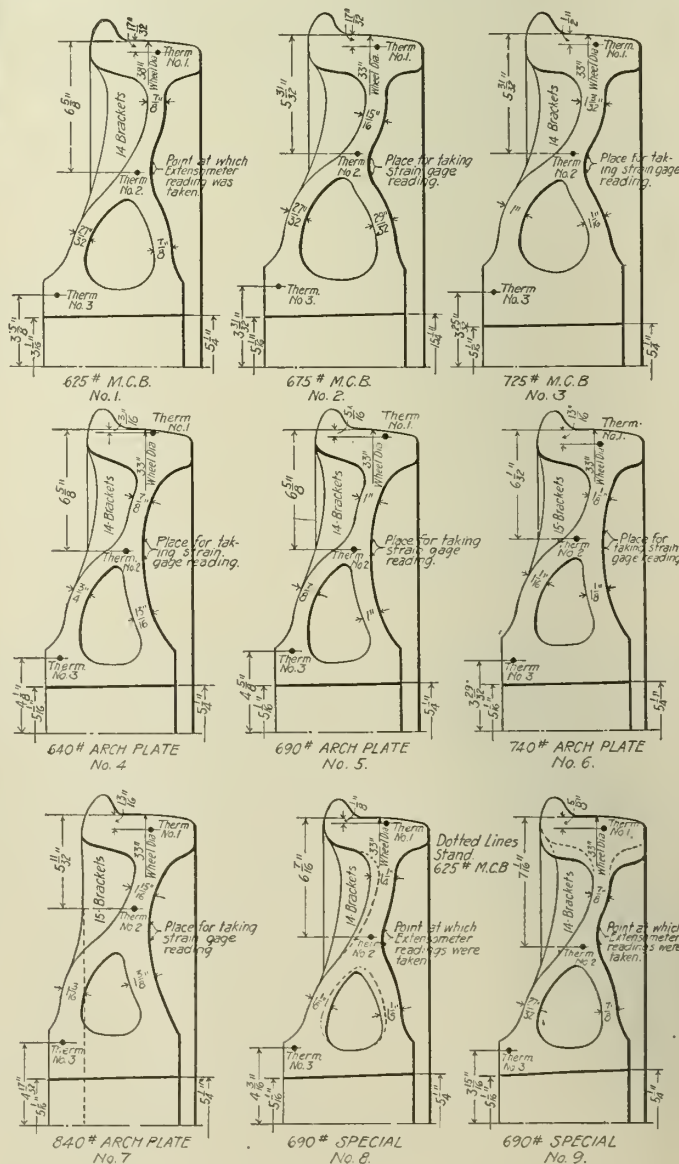


Fig. 2—Designs of Wheels Tested for Stress in Plates.

*Discussion by C. A. Seley, before the New York Railroad Club.

and perhaps be able to do this almost indefinitely. As the size of that wire is increased, the number of times it can be vibrated decreases. So it is the larger sizes of staybolts, and

there are sizes in use even larger than those that have been mentioned, which serves to account for the large number of breakages.

Stresses in the Plates of Cast Iron Car Wheels

By LOUIS E. ENDSLEY.*

An interesting series of tests is herein reported, same having been made to determine the stresses in the plates of several designs of chilled iron car wheels, resulting from the heat generated by the action of the brakes. These stresses were determined by Berry strain gage measurements, and involved a most painstaking program of experiments and observation. The utility of the strain gage in arriving at the results of these tests offers a forcible suggestion as to the value of its use in other lines of investigation in the railway mechanical field, where, unfortunately, comparatively little use of this novel instrument has hitherto been made.

The tests herein described were conducted upon the Master Car Builder's testing machine, located at Purdue University, Lafayette, Indiana, for the purpose of determining the stresses set up in the plates of different designs and weights of cast iron wheels under the varying conditions of brake shoe pressure and application. A description of this machine is given in detail in the proceedings of the Master Car Builders' Association for 1894 and is supplemented in proceedings for 1907. In preparation for the test, precautions were taken to insure good contact between the shoes and the wheel. The process consisted in making repeated applications of the shoes to the wheel under comparatively light pressure until a 90 to 95 per cent of the full bearing surface of the shoe was obtained. This accomplished, the record tests were made.

Description of Wheels: As shown in the illustration, Fig. 2, the wheels tested were of cast iron and there were nine in number. They were given for the purpose of the test, laboratory numbers from one to nine inclusive. No. 1 was a standard 625 pound M.C.B. wheel; No. 2 was a standard 675 pound M.C.B. wheel; No. 3 was a standard 725 pound M.C.B. wheel; No. 4 was a 640 pound wheel having an "arch plate" and is hereafter in this report, referred to as an "AP" wheel; No. 5 was a 690 pound wheel also of the arch plate design; No. 6 was a 740 pound "AP" wheel. No. 8 was a wheel having the same dimensions as the M.C.B. 625 pound wheel, except that metal had been added to the plate of the wheel to make it weigh 690 pounds; and No. 9 was a 690 pound wheel having the same dimensions as the 625 pound M.C.B. wheel, with the exception that metal was added to its rim to bring the weight up to 690 pounds.

Description of Shoes: There were five shoes used in the tests. These were given for the purpose of this work, laboratory numbers 400 to 409 inclusive. Shoe No. 400 was a soft cast iron shoe and was only used in a special test to determine the effect on the stress in the plate of the wheel by placing the shoe in contact with the throat and then with the rim. This was accomplished by grinding away about half of the face of the shoe on the side where the contact was not desired. Shoe No. 406 was a Streeter shoe, having two L-shaped steel inserts. Shoe No. 407 was a cast iron shoe with chilled ends. Shoe No. 408 was a Diamond "S" shoe, having an expended metal insert. Shoe No. 409 was a cast iron shoe with the ends chilled and it also had two "V" shaped inserts.

Method of Testing to Determine Stress in Plate of Wheel: For the purpose of determining the stress in the plate of the wheel a Berry strain gage was employed. The gage is so con-



Fig. 3.—Method of Applying the Berry Strain Gage.

structed that elongation in a two-inch gage length can be determined to .0001 of an inch. The strain gage as applied, is shown in Fig. 3. The points at which strain gage readings were taken are shown in Fig. 2 as are also the location of three thermometers which were used in each of the wheels to determine the temperature in the rim in the hub and in the plate. The temperature as determined by the thermometer in the plate was used to correct the elongation as read on the Berry strain gage, i. e., the elongation due to the expansion of the metal heat and also elongation caused by the strain set up through the difference in temperatures of the wheel rim and its hub. The procedure in testing for this elongation was as follows:

Only one test was made on any one wheel per day, so that before a test began the temperature throughout the entire wheel was uniform. Before each test, readings of all three thermometers were taken and there were found to be always the same; thus, when the test began there was no stress in the wheel plate due to heat. At the beginning of a test a reading of the Berry strain gage was also taken, after which the brake shoe machine was started and a speed of approximately 20 miles per hour was maintained. Readings of the temperatures and strain gage were taken at stated intervals by stopping the machine, such stops occupying from 40 to 60 seconds.

During the test of wheel No. 5 or the 690 pound "AP" wheel all shoes were tested at the following pressures: 800 pound continuous, 2808, 4152 and 6840 pound intermittent. Under the 800 pounds pressure the shoe was left on the wheel the entire time. Under the other three pressures the shoe was in con-

*Professor of Railway Mechanical Engineering Purdue University, La Fayette, Ind.

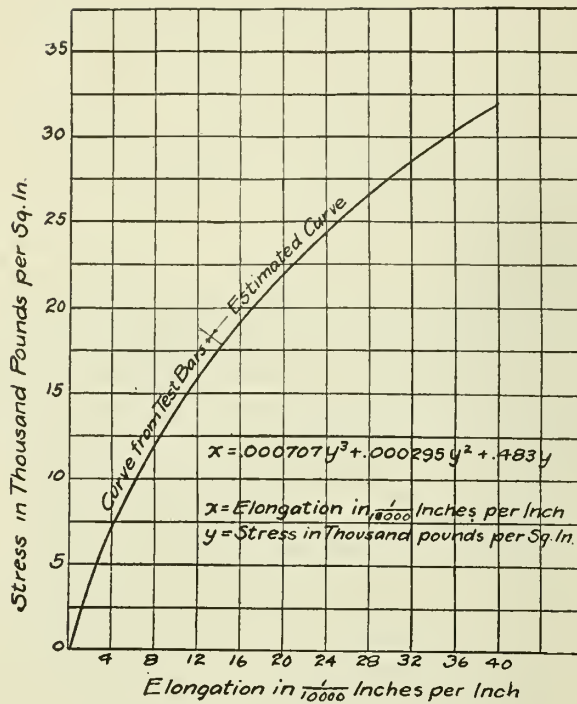


Fig. 4—Stress-Elongation Curve for Cast Iron.

tact for 610 revolutions. The three heavier pressures were carried on until 100 applications of the brake shoe had been made. Readings were taken after the 2d, 4th, 8th, 10th, 15th, 25th, 30th, 40th, 50th, 60th, 70th, 90th and 100th applications.

In the case of the 800 pound pressure in which the shoe was in contact with the wheel the entire time, the tests were continued through the same length of time or until the same number of revolutions of the wheel had been made as during the tests at the heavier pressures. Readings of the temperatures and strain gages were taken at approximately the same interval, i. e., after 1600, 3200, 4800, 6400, 8000, 12,000, 16,000, 20,000, 24,000, 30,000, 40,000, 48,000, 56,000, 64,000, 72,000 and 80,000 revolutions of the wheel. Wheel No. 5 was also tested under a continuous brake shoe pressure of 4152 pounds. This test continued until the plate of the wheel cracked. The other chilled iron wheels were each tested under brake shoe pressures of 800, 2000 and 3000 pounds continuous application. During the testing of the above mentioned wheels the machine was stopped every five minutes and a reading of the temperatures and the strain gage were taken. The tests under the above pressures were continued until the stress indicated by the elongation was approximately constant. This, however, did not require the same

time for the different pressures. Wheel No. 2 was tested under a brake shoe pressure of 4152 pounds which was continued until the plate of the wheel was cracked.

Method of Calculating the Stress: In order to determine the relation of stress to strain, i. e., the relations between elongation and stress, three test bars of wheel iron, were cast and tested in tension at the testing laboratory at Purdue University. These bars were approximately 18 inches long and for a distance of 11 inches in the center the diameter was 1.8 inches and the ends were approximately $2\frac{1}{4}$ inches in diameter. From the average results of two of these bars which showed about the same results, the third one having a flaw in it, the lower portion of the curve shown by Fig. 4 was plotted. In this figure the elongation in .0001 inch per inch is plotted against the stress in thousand pounds per square inch. The upper end of the curve is estimated as shown and was obtained by continuing the curve in accordance with the equation of the test bar curve, the equation of which is also shown in Fig. 4.

From the readings taken of the strain gage throughout the test the elongation in inches per inch could be determined. As it was known that some of the elongation was due expansion from heat, a correction was made from the total elongation by obtaining the rise in temperature from thermometer No. 2, the rise being figured in each case from the original reading before the test began. By using the coefficient of expansion of cast iron which is .0000556 and multiplying this by the rise in temperature of thermometer No. 2, the elongation in inches per inch due to heat was determined. This heat elongation was subtracted from the total elongation and the elongation due to stress was obtained. By the use of this elongation and the curve in Fig. 4, the stress in pounds per square inch was obtained. The relation of stress to strain in cast iron, is a curve, as shown in Fig. 4. This is typical of cast iron. It is well known that there is always some set produced in a test bar of cast iron after it has been tested, that is, the bar does not return to its original length after the load is released. This, however, was not shown to be true after the plates of the wheel had been subjected to a strain due to the heat produced by the brake shoe, as it was shown that the reading of the strain gage was the same after the wheel had cooled as it was before the test began. This was true of all wheels tested, so there must be some difference in the effect of straining a plate in regards to its set. For this reason it was felt that this curve would not only show the relation of stress to elongation for the first test on any wheel, but could be used for repeated tests on the same wheel. This also was proved by repeating tests under the same condition, in that the same elongation was obtained.

Discussion of Results: It was found in these tests that in

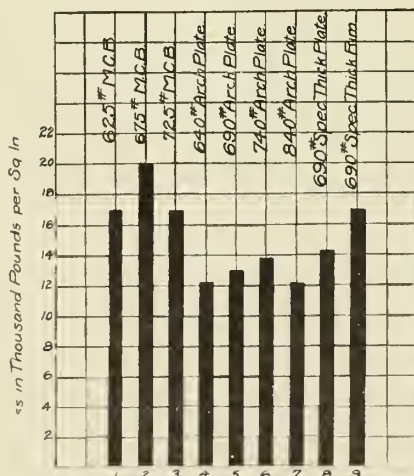


Fig. 5—Stresses Developed in Plates of Wheels after 3200 Revolutions at 800 Pounds Pressure.

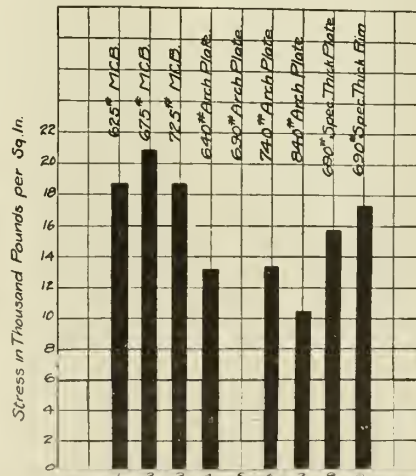


Fig. 6—Stresses Developed in Plates of Wheels after 3200 Revolutions at 2000 Pounds Pressure.

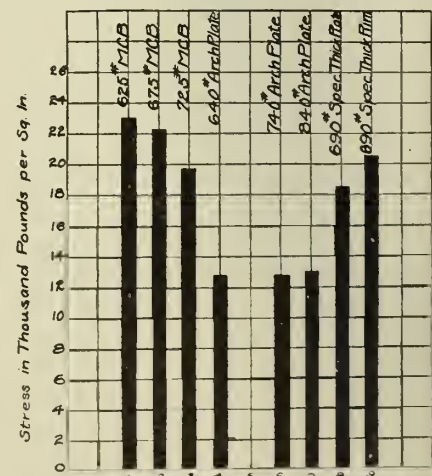


Fig. 7—Stresses Developed in Plates of Wheels after 3150 Revolutions at 3000 Pounds Pressure.

most cases this stress for any given wheel is nearly proportional to the difference in temperature between the hub and the rim. This holds true whether the rim temperature be high or low, the difference in temperature being the controlling factor. Also for any given test, this difference in temperature becomes a constant, and after it has become a constant the stress also remains constant.

By comparing the results for any wheel while using 800 pounds continuous pressure with that of the same wheel under 6840 pounds intermittent pressure, practically the same amount of work being done in both cases, the resultant maximum stress is for all practical purposes the same. That is, for any given wheel, the stress set up in the plate of the wheel is almost proportional to the amount of work done by the brake shoe in a given time. The thing which affects this stress in the plate most is the design of the wheel. This is well shown by comparisons given in Figs. 5 to 7. Fig. 5 gives the comparison of the stress developed in the plate of the nine wheels under a continuous brake shoe pressure of 800 pound after the test on each wheel had continued for 32,000 revolutions or at a point when the stress in each wheel had practically become constant. It will be seen from this figure that the stress varies from about 12,000 pounds in the 840 pound arch plate wheel to 20,000 pounds in the 675 pound M.C.B. wheel.

It will also be seen that the three arch plate wheels Nos. 4, 5 and 6, weighing respectively, 640, 690 and 740 pounds, had a much lower stress than wheels Nos. 1, 2 and 3 of the 625, 675 and 725 standard M.C.B. wheels. That is, the average stress obtained is indicated in this figure on the three M.C.B. wheels was 17,900 pounds and on the arch plate wheels, namely, 4, 5 and 6 designed for the same service, the average stress was 13,000 pounds or the reduction in stress was 4900 pounds. Wheels Nos. 8 and 9 which were made by increasing the weight of the 625 pound wheel to 690 pounds show some interesting results. Wheel No. 8 which had 65 pounds added to the plate showed considerably less stress than the standard 625 pound wheels, but wheel No. 9 which had the 65 pounds of metal added to the rim of the wheel did not show any less stress with a continuous brake shoe pressure of 800 pounds. That is, this metal added to the rim was practically of no value in reducing the stress in the plate of the wheel due to brake shoe friction.

The comparison in stress of the different wheels as shown in Fig. 6 under a constant brake shoe pressure of 2000 pounds after the wheel had made 3200 revolutions indicates practically the same conclusions as those drawn in Fig. 5. Here it will be seen the difference in stress between the low and high stress wheels is greater than in the 800 pound tests due to the rapid rise in temperature of the rim. Also the results shown in Fig. 7 giving a comparison of the several wheels under a continuous brake shoe pressure of 3000 pounds after the wheel had revolved 3150 revolutions, indicate the same relative difference, and likewise show the difference between the low and high stress wheels. In view of these results it would seem that the M. C. B. 675 pound wheel, which gave the highest average stress, must be the most poorly designed of the several wheels tested.

An examination from which to determine the exact difference in results of applying the shoe to the throat of the wheel and then to the rim of the wheel, showed that while the final stress is practically the same under both conditions, the stress set up in the plate during the early part of the application is much greater when the shoe is applied to the rim than when it is applied to the throat.

From a careful study of these results it would seem that the plate of the M.C.B. design of cast iron wheel might be improved by making the inside of the plate a smooth curve with a comparatively large radius instead of using reverse or ogee curve in the plate as at present.

The Supreme Court of Indiana has held, in the case of Southern Railway Co. et al. vs. Bretz, Receiver, that where

a railroad contractor partly performed his contract and defaulted, the amount due him from the railroad was a fund in its hands to save it from loss by reason of the default; that where the contractor defaulted owing laborers, their claims were first liens upon the funds; that where the labor claims were purchased by wage brokers the liens were lost, and the claims in the hands of the wage brokers became a common indebtedness of the contractor.

Free Storage, Unloading and Loading. Mr. Brandeis' Statement.

In a statement, which Louis D. Brandeis has filed with the Interstate Commerce Commission, he gives some illustrations of free service given to shippers in the way of storage unloading and loading, resulting in large loss to the railways. The information is doubtless derived from the answers to the 78 questions.

Mr. Brandeis claims that discrimination in favor of certain shippers is two-fold; first in having their freight unloaded and loaded on to the tracks without cost to them; second: in having through the warehouse four days free time, instead of two days free time, the ordinary period allowed to shippers who take their shipments on public team tracks or other private sidings.

"Besides the discrimination as between shippers, there is, furthermore, a discrimination between warehousemen. In the absence of specific instructions by the shipper, the Pennsylvania Railroad delivers these shipments in Philadelphia at one of the subsidized warehouse companies. A designation on bills of lading under which delivery would be made at specified warehouses, in the absence of designation to the contrary, would, in the practice itself, result in discrimination; but when that practice is coupled with a provision by which the service for passing certain warehouses and four-day storage is free to shippers, because paid for by the railroads, the discrimination becomes marked."

Among other illustrations he gives the following:

"For hauling one car of hay from Morea, Pa., (103 miles) the railroad company received \$9.52 and paid the warehouse company out of that amount, \$4.17, or 44 per cent of the revenue. For hauling one car of canned tomatoes from Quinton, N. J., (75 miles) the railroad received \$33 and paid the warehouse company \$11, or 33½ per cent of the revenue. For hauling one car of canned pears from Bridgeton, N. J., (74 miles) the railroad company received \$26.40 and paid the warehouse company \$9.60, or 36 per cent of the revenue. For hauling one car of straw from Mt. Holly, N. J., the aggregate revenue received was \$14.42, of which the railroads paid the warehouse company \$3.51, which was 25 per cent of the revenue."

Similar conditions are pointed out at Philadelphia and Buffalo, and free services of the Erie and Baltimore & Ohio are touched upon.

He says of free service at New York: "The depletion of revenues by the carriers through free unloading, storage, and similar terminal services is even more marked on certain shipments large in volume to New York city. One of the principal commodities shipped to New York is flour and much of it comes by lake to Buffalo. In the year 1913 there were over 6000 carloads of such flour coming over the West Shore to Weehawken. The commissions' examiners took the record of 25 cars on the West Shore to Weehawken. Their average loading was a little below 25 tons each. The aggregate revenue assessed on these 25 cars was \$1,092.87. The approximate cost of certain defined services was \$904.13; or in other words nearly 83 per cent of the gross revenue was consumed in these terminals charges. The apparent rate per ton mill on this shipment was four mills. The actual amount retained after deducting these specific terminal expenses was .7 of a mill, but if there be charged against the shipment also the amount per diem paid for foreign cars used in this service the whole revenue appears

to be consumed without leaving one cent for the service of hauling these cars 428 miles and the cars and maintenance of the tracks on which they moved."

Figures are also given showing storage charges at Locust Point on Baltimore & Ohio, which, it is claimed, are disastrous to railroads. The free services of the Erie to Standard Oil Co. are thus stated:

"Standard Oil Co.'s paraffine wax shipments—The Standard Oil Co. ships large quantities of paraffine wax to Weehawken for ultimate export. Under the Erie tariff, this paraffine wax remains frequently for a long time in storage, the freight charges not being paid until merchandise is removed. On forty-nine cars arriving between Nov. 3, 1912, and Aug. 28, 1913, which were on hand October, 1913, there was \$6,726.40 due for freight. If there had been made a cost for loading and unloading that paraffine wax, of lighterage into New York, the interest lost on the freight money on which payment was deferred, the cost of the storage at the customary rate prevailing at other places, they would together amount to a sum far exceeding the total freight revenue, and figuring the storage charges at actual cost to the carrier, the total freight received was practically consumed by these terminal charges at New York City, leaving nothing for the cost of transporting these cars 866 miles, from Whiting, Ind., to Weehawken.

"Other transactions of the Erie with the Standard Oil Co. appear to be a little more profitable. In May, 1911, the Erie erected a special warehouse for the business of the Vacuum Oil Co. at Weehawken, in which are stored oil and petroleum products coming in carload lots from Rochester and Olean, N. Y., an average distance of nearly 386 miles. The freight revenues received on these shipments in October 1913 were \$15,492.43. The mere cost of unloading and reloading that freight and of lightering it at New York harbor was about 33 1-3 per cent of the total freight received, and in that no allowance has been made for the storage; add a reasonable charge for the storage and over 40 per cent of the freight revenue is consumed in services at New York harbor.

A lot of thirty cars of iron pyrites arriving at Girard Point, Philadelphia, by vessel, are shipped from there to Marcus Hook by the Pennsylvania Railroad. The freight rate is 20 cents per gross ton. The amount paid the Girard Point Storage Company for taking the iron pyrites from shipside at Girard Point and loading into cars at Girard Point is exactly 20 cents per gross ton. There is consequently not one cent left out of this freight money to pay for the railroad's service in transporting these 30 loaded cars from Girard Point to Marcus Hook. In fact, the Pennsylvania paid out to the Storage Company more than it received, for, in addition to the 20 cents paid by the railroad to the Storage Company for each ton loaded on the cars, it pays also \$714.30 a month, or \$8,571.60 a year, for the use of the Storage Company tracks and the salary of billing clerks.

Pro-rating these payments over the year's business of the Pennsylvania with this storage company, a further saving of 6.6 mills per ton is attributable to this particular shipment of thirty cars of iron pyrites. In other words, for the pleasure of transporting 1314 gross tons of iron pyrites free the railroad paid a bonus of \$8.67, according to Mr. Brandeis.

This presentation of free services is a continuation of the line Mr. Brandeis has been developing before the Commission, and is supplemental to the conditions he adduced at the hearings early in February, when he went into the matter of ferry or trap-car service, the Chicago tunnel and lighterage service, spotting service, and special free services to shippers of live stock.

That yellow poplar, one of the finest and the largest of American broadleaf trees, can be grown profitably in the timber tracts of the southern Appalachians, is the conclusion set forth in a report written by W. W. Ashe of the United States forest service and recently published by the geological

survey of Tennessee. An investment in young yellow poplar stands will yield 4 per cent compound interest. In addition to this there is a probable, though indeterminate, return due to the natural increase in stumpage prices. This increase, based on average-sized yellow poplar trees, has amounted during the past twenty years to 13 per cent compounded annually. There is more lumber produced from yellow poplar than from any other southern hardwood except oak.

Heat Treatment of Steel Castings.

The following is a brief outline of what has been done by the Pennsylvania R. R. at its shops and test laboratories at Altoona, Pa., in the heat treatment of carbon steel castings, and is of material interest, as it indicates what may be done in the way of providing greater strength of cast-steel parts without any increase in weight or space. The comment herein was presented in the form of a paper before the American Institute of Mining Engineers at New York on February 18 by C. D. Young, engineer of tests of the Pennsylvania R. R., O. D. A. Pease, and C. H. Strand.

In an effort to employ cast steel of a stronger structure than that found in the annealed steel castings, the possibilities of heat treatment, which will increase the strength without materially decreasing the ductility may be resorted to. The Pennsylvania R. R. has for some time been experimenting on the effect of the special heat treatment of steel castings, particularly bolsters and locomotive frames, and the results of these experiments are given herewith. The obscurity formerly surrounding the heat treatment of steel has been for the most part removed by the development of a knowledge of the critical points of steel, pyrometers, furnace construction, and the testing of the finished product. The operations of the heat treatment proper are taken up under the heads of (1) heating for quenching; (2) quenching; (3) drawing.

Heating for Quenching: Heating for quenching is best conducted slowly, especially in the case of castings of variable thickness. Cracks may occur either in heating or in cooling, due to different temperatures at different points of the casting. The castings should be thoroughly soaked at the maximum temperature (generally 1500° to 1600° Fah.), one hour being sufficient for sections 1 in. in thickness. The minimum temperature which will produce the desired hardening effect will, in all cases, be found to be the most satisfactory, as the grain coarsens when the critical range is exceeded to too great an extent. All temperatures should be governed by a checked pyrometer with the hot junction to the heated object, and with several couples in a large furnace to ensure a uniform temperature.

Quenching: The casting should be transferred as quickly as possible from the furnace to the quenching bath, and in the case of large castings, such as locomotive frames, this is by no means a simple matter. The large castings are best handled by means of cranes and rollers. The quenching agent employed is generally water or oil, preferably the former, because of its cheapness and drastic cooling effect, more readily breaking up the coarse cast-steel grain. With intricate castings it is generally best to use oil. With water it is possible to have a large tank and a large running stream, serving to maintain a uniform temperature. Castings should never be thrown in to rest on the bottom of the tank, but should be agitated to prevent the formation of a coating of vapour, retarding the quenching effect. It is also best, whenever possible, to quench the thicker portions first.

Drawing: Whenever possible the drawing should be done in a bath of some kind, such as lead, barium chloride, a barium chloride-salt mixture, or oil. In the case of large



Fig. 1.

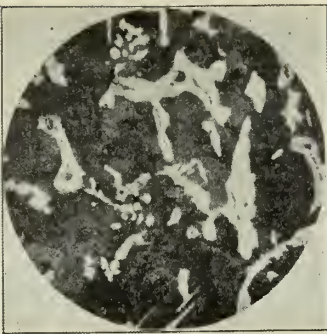


Fig. 2.

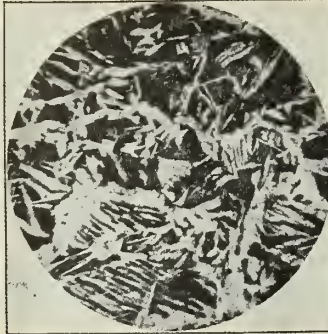


Fig. 3.

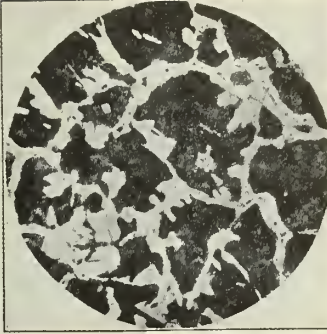


Fig. 4.

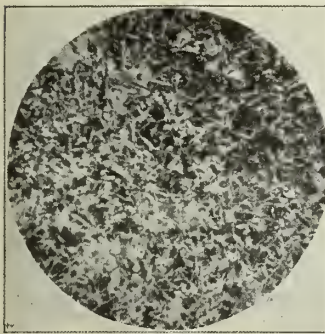


Fig. 5.

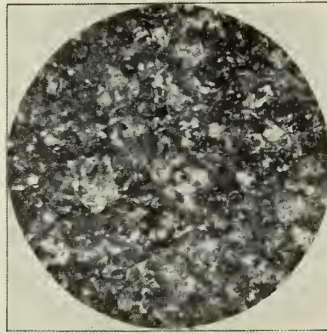


Fig. 6.

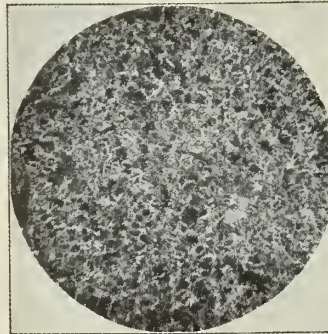


Fig. 7.

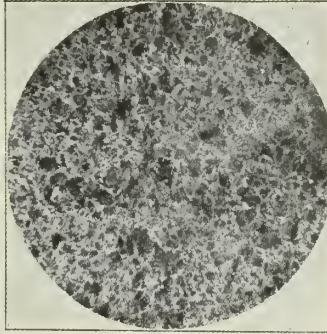


Fig. 8.

	Commercially annealed.				Heat treated			
	B43	B18	B2	B29	B10	B39	B15	BB
Bolster No.....	30,950	36,700	36,070	41,990	44,663	61,940	61,390	54,930
Elastic limit, pounds.....	57,610	78,665	74,020	69,783	80,393	87,890	92,750	84,290
Ultimate strength, pounds.....	14.8	6.0	12.3	5.3	13.2	4.3	11.7	17.3
Elongation in 2 in., per cent.....	26.8	4.5	16.0	5.9	19.0	7.7	15.4	27.3
Reduction of area, per cent.....	Analysis.							
Carbon, per cent.....	0.31	0.51	0.35	0.49	0.32	0.33	0.33	0.30
Manganese, per cent.....	0.82	0.68	0.63	0.70	0.62	0.88	0.76	0.62
Silicon, per cent.....	0.34	0.31	0.36	0.34	0.26	0.41	0.37	0.36
Phosphorus, per cent.....	0.016	0.045	0.036	0.036	0.042	0.014	0.041	0.032
Sulphur, per cent.....	0.010	0.030	0.016	0.042	0.030	0.025	0.029	0.018
Heat treatment.								
Annealed at (deg. F.).....	1,500	1,550	1,550	1,550	1,530	1,640	1,600	.....
Quenched in water at (deg. F.).....	.....	.....	.....	.....	1,600	1,600	1,600	1,600
Drawn to (deg. F.).....	.....	.....	.....	.....	900	900	900	900

castings this is manifestly impossible, and great care should be exercised in obtaining a uniform temperature in the drawing furnace. The use to which the casting is to be put determines the drawing temperature, railroad work, by reason of the shock and vibration of the road, requiring high ductility at the sacrifice of some strength.

The accompanying table shows the heat treatment and the results of tensile and chemical tests.

Examination of the accompanying photomicrographs, Figs. 1 to 8, inclusive, shows the inefficiency of the manufacturer's annealing, which is by no means uncommon. The contrast between the annealed samples and the treated samples is readily apparent. Figs. 1 and 3 show a coarse needlelike ferrite formation, traces of the casting structure, not obliterated by annealing. Figs. 2 and 4 show the structure of some experimental high-carbon bolsters, which are not sufficiently ductile. Figs. 5, 7 and 8 show excellent heat treated structures, with a very fine ferrite network. Fig. 6, while given the same heat treatment as the others, shows very little free ferrite, checked by the low elongation of the tensile test. This may be due to the high manganese and silicon content. The heat treatment of these castings would have been more satisfactory with a drawing temperature of 1100 degrees F. instead of 900 degrees F.

The plot, Fig. 9, shows the average results of a considerable number of tensile tests made from large castings. It will be observed that the heat treatment increases the elastic limit about 50 per cent and the ultimate strength about 25 per cent, without any material change in elongation. The

heat treatment to produce these results is also shown in the plot. In the event a fair amount of ductility is required, it is not desirable to have the carbon content above 0.35 per cent. Individual results will vary from 5 to 10 per cent from the average results.

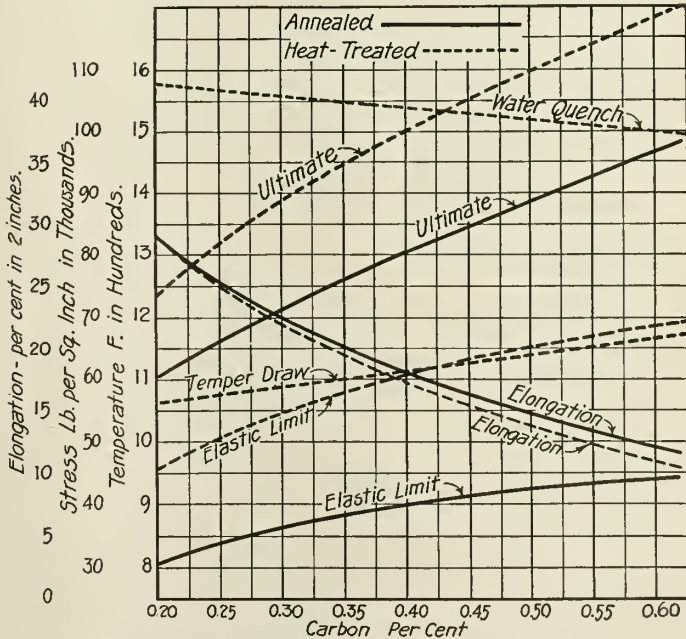


Fig. 9—Average Results of Tensile Tests, Heat-Treated and Un-Treated Specimens from Cast Steel Bolsters.

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Willard A. Smith, President.

Sworn to and subscribed before me this 15th day of March, 1914.

Robt. R. Greig, Notary Public.

(My commission expires Oct. 26, 1915.)

SATURDAY, APRIL 4, 1914.

It is true that railway maintenance accounts may be "manipulated" if that is the correct word to express a management which may be for the best. The word "manipulate" originally meant merely to handle, but it has come to mean handling insidiously or for motives of deception. In the original sense of the word practically all railways manipulate maintenance accounts; in the sense of handling with bad motive, there has not been presented the slightest evidence that anyone has manipulated them.

Maintenance expenses can at times be postponed. This does not eliminate them; it merely piles them up. Transportation and traffic expenses must be met day by day as the road is operated. Proper maintenance

expense may be reduced to low limits for a time—sometimes for a year or more when traffic is dull, and earnings light. But the expense has to be entered upon later and is unquestionably greatly increased on the average by this process of reduction and augmentation. As a policy this graduating of maintenance on the scale of traffic is utterly bad, as we have shown many times. But it may be a necessity at times or practically so. It may be better to postpone some maintenance rather than endanger credit by passing dividends. That is a matter of sentiment (although of a very practical kind of sentiment); while purely as a matter of real economy and good business, in the long run it pays to keep everything up right along. Accumulated maintenance work whether of track or equipment is done at greatly increased cost per unit. The taking on and laying off of large bodies of men is an absolutely unmixed evil.

But, as financial conditions are, and as business ebbs and flows, nothing is to be learned from the fact that maintenance accounts one year are greater than in another. The interest of the public as well as that of the owners of the property is in seeing that it is kept up in good condition. The concern of government should be lest railway managers neglect to spend enough on maintenance. If it can be shown that money charged to maintenance expense was not so expended, or was dishonestly used, that is another matter. But charges of that kind need proof; and insinuation is not proof.

Nobody's impression or guess as to what the rate decision will be, is of any value. It simply depends upon his own feeling regarding the weight of evidence and what ought to be done; and as much of the so-called evidence and argument reaches the public in piecemeal and distorted form it is misleading. Some scare-heads in the daily press declare that the "Rate Boost is Lost," simply because the commissioner asked some pointed questions of a witness or witnesses who had put things rather strong. Nothing is more deceptive than prognostications based on such premises.

Business Waits.

If the fact is that the results of the operation of the three large systems, Pennsylvania, New York Central, and Baltimore & Ohio, were reasonably satisfactory in the fiscal year 1913, as was suggested by some of the commissioners, in the hearing on Wednesday and Thursday, it is by no means conclusive. That year ended June 31st, 1913, and nine months of the current year have now elapsed bringing with them undeniable financial disaster. The fact that this application for advance was made during what is claimed to have been a fairly prosperous year has little bearing on the subject. It was based on the experience of three years, since the former rate decision, and the

three years should be taken together with the current year. A great many things happen in a year; and as it takes a year or more to get a decision from the commission it is manifestly unfair to limit such decision to a state of things prevailing at the exact time application was made. Railway managers wisely look ahead; they know that a large flow of business is followed by an ebb, and they can prognosticate the inevitable results of high expenses and low tariff rates on a declining business. The Interstate Commerce Commission is not a court; it can and should take broad views and be governed by conditions as they actually exist and not by the accident of a date.

But the commission has heretofore laid down the proposition that it is not to be governed by the prosperity of the strongest roads nor the desperation of the weakest. It must draw some kind of an average, and consider especially the needs of the entire country. It cannot say for instance to a section served directly by the Wabash, "You must be deprived of reasonable transportation facilities and the road which serves you driven into bankruptcy, because the Pennsylvania Railroad is making enough money and we cannot allow it to charge higher rates." The more prosperous roads must be allowed rates which pay them more, provided such rates are not detrimental to the public, in order that the poorer lines may live and serve their own districts efficiently. The province of the commission is not to prevent successful enterprises from making larger profits, but merely to protect the public against exorbitant charges.

Judge Prouty says that "railway transportation is the cheapest thing in the United States today." So there is little danger of the public having to pay more than it ought.

If this case is to be decided on the situation of the great trunk lines only, and on the point that they are perhaps not "going to the devil" across lots, what is to become of the forty roads in the territory "whom unmerciful disaster follows fast and follows faster"? Their situation has been well presented by Mr. Delano. While they will possibly receive some assistance from the abolition of free services, and allowances, this will be small to most of them. The bulk of the industrial and plant roads are on the stronger systems; and the additional income to be derived by the other roads will be too small to have any perceptible effect. They need this, and the five per cent, and "then some."

Under the free laws of trade these roads would gradually pass into the hands of the larger systems, when thus driven to the wall. But the law now prevents that and is looking toward disintegration, a process which will accentuate the differences between roads in the matter of prosperity. The fact is that the government must either protect these weaker lines, let stronger systems take them over, or take them over itself. It must "fish, cut bait, or go ashore."

If the commission, the individual members of which

profess not to believe in government ownership, takes such a narrow view of its powers and duties as to make government ownership inevitable if persisted in, the country will under a great revulsion of feeling call it to severe account. The prevailing feeling among business men today is that "regulation" has reached a critical point. While the hearing at Washington is going on, the business world is trying "regulation"—and the ultimate court in this country is still public opinion.

The Feasibility of Refined Design.

Appearing elsewhere in this issue is an abstract of a paper read by Prof. L. E. Endsley at the March meeting of the Western Railway Club, and in which is reported the results of a very careful investigation with respect to the stresses set up in the plates of chilled iron car wheels as a result of the heating effect of brake-shoe applications. These, until recently, all but impossible determinations were arrived at through a knowledge of the elongating properties of chilled-wheel material under definite load and the interpolation of strain-gage readings at selected points on the plates of the wheels, with necessary corrections, in terms of unit stress. It is gratifying to note that the results of these tests appear to confirm the wisdom of the deviations from conventional design in wheel sections, which prompted this investigation.

Aside from demonstrating the feasibility of improvement as referred to, a most interesting feature in connection with this work is the remarkable example thereby afforded of the utility of the strain gage as an instrument to be used in arriving at a knowledge of the stresses set up in railway mechanical structures, and by this means to arrive at conditions of greater refinement in design. The usefulness of the strain gage on the elements of engineering structures has been appreciated for some time, but in so far as the facts have been brought to our attention, this is the first time that the results of any such application in the railway mechanical field have been made generally public. This demonstration of the practicability and value of the instrument is all the more impressive from the fact that it was employed on cast iron, the one largely used material in the construction of railway equipment whose coefficient of elongation is most difficult of determination. Having arrived at apparently dependable results in this instance, similar work on forged, rolled, or cast-steel parts, appears in the light of a simple task indeed; the more simple from the further fact that the corrections on the wheel plate readings were in the nature of compensation for expansion due to heat. Few if any load-bearing members in railway tools or equipment (the parts of the locomotive boiler constitute a notable exception) are subject to heat disturbances and hence would not demand this refinement. At the same time, few if any are not subject for profitable investigation in this man-

ner, the most conspicuous, perhaps, being the various cast steel parts that have entered so largely of late years into the construction of both cars and locomotives.

The mention of cast steel parts as above, brings the suggestion also that a second article of more than passing interest appearing in this issue, is that pertaining to the heat treatment of steel castings, same being a brief report of what results are shown to be feasible, by the very extensive investigations conducted by the test department of the Pennsylvania R. R. at Altoona, Pa. As examination of the plotted results of tests of treated and untreated specimens from cast steel bolsters will show, intelligent heat-treatment results in an increase of 40 per cent in the tensile strength of such material, 50 per cent increase in the strength at its elastic limit, and more than doubles the percent of elongation of the material at fracture. A combination of the results of such studies as herein referred to should have the effect making possible very appreciable improvements in the economy of construction and the safety of operation of all forms of railway equipment.

Open-Hearth and Bessemer Rails.

The higher phosphorus content of the iron ores that have been mined in recent years has made desirable the use of the open-hearth process of steel manufacture in certain lines of industry where formerly the Bessemer process was used almost exclusively. This change applies peculiarly to the manufacture of steel rails, in order to reduce the percentage of phosphorus to a desirable minimum, and data just published by the American Iron & Steel Institute shows how rapid the tendency is toward the general adoption of the open-hearth process for making rail steel. The output of steel rails in this country during the year 1913 was a little over three and one-half million tons or, to be exact, 3,502,780 tons, an increase of about 5.2 per cent over the tonnage of 1912. Of this tonnage a little less than 200,000 tons were rolled for electric and street railways. Of the above total 2,527,710 tons of rails were of open-hearth steel, an increase of about 20 per cent over the production of rails of the same class during the year previously; and 817,591 tons were of Bessemer steel, a decrease of 25.6 per cent from the tonnage of Bessemer rails rolled during the year before. There was a small quantity of rails rolled from steel produced in electric furnaces, amounting to 2436 tons. The tonnage of rails rerolled from old ones was about 155,000, showing considerable activity in this line of maintenance work, and amounting to 36,000 tons more than were rerolled during the year before. The prevailing opinion that the heat treatment received in the processes of rerolling old rails improves the quality of the metal would make it seem desirable that this method of renewing rails should be encouraged in practice.

The statistics show that the tendency is decidedly in the direction of rails of heavy section. In 1912 the rails of 85-lb. section and heavier amounted to 63 per cent of the entire tonnage rolled, while in 1913 the tonnage of rails of 85-lb. section and over amounted to 70 per cent of the total. Of the rails rolled in 1913 nearly 60,000 tons were from alloy-treated steel, of which about 80 per cent were treated with ferro titanium.

In this connection it is interesting to notice the results announced in a paper read before the Institution of Civil Engineers, of Great Britain, regarding the use of high-silicon rails in England. By this material is meant steel in which the percentage of silicon is held under control, in much the same manner that a predetermined quantity of carbon is put into steel, by first removing entirely all of the carbon and then adding a known quantity. The process for doing this with silicon can be worked in either basic open-hearth, basic Bessemer or acid Bessemer plants. Mr. William Willox, author of the paper, states that the use of a definite quantity of silicon worked a decided improvement in the quality of the metal, as was shown under drop and other tests, and by lower rate of wear and a smaller percentage of breakage in service.

The Rate Hearing by the Interstate Commerce Commission.

The Interstate Commerce Commission having decided to give more time this week to the main case in the rate advance hearing, the railway executives have been on the stand for presentation of the facts as they appear to them up to date and for cross examination. The side issues of charges for special services, etc., were temporarily postponed. Just what the intention of the Commission is regarding these subjects, does not yet appear; but it is probable that they will be given full consideration as heretofore planned and that a decision of the case need not be expected before June.

The hearings in the matter of the application of the eastern roads for an increase of five per cent in freight rates made more rapid progress this week. On Monday, a statement was presented on behalf of the railways by George Stuart Patterson, general counsel for the Pennsylvania Railroad, who had advised the commission that the figures had been tabulated from reports made to the commission by the roads for the seven months of the current fiscal year, July 1st, 1913, to January 31st, 1914.

The figures indicated a decrease in total freight revenues of \$16,999,330; an increase in passenger revenues of \$7,734,227; an increase of \$2,269,574 in other sources of income, and a decrease in total operating revenues of \$6,995,529, or 1.5 per cent. The total operating expenses showed an increase of \$39,210,233, or 6.3 per cent. A general increase also was shown in various phases of railroad transportation, the aggregate showing the decrease above stated in net operating income.

Mr. Geo. F. Brownell, vice-pres. of the Erie R. R., said: "The statement of the revenues and expenses of the carriers for the seven months ending January 31, 1914, show a decrease of operating revenue amounting to \$6,995,529 and a decrease in operating income of over \$51,000,000, as compared with the seven months ended January 31, 1913, being a decrease in operating revenues of 1.5 per cent.

"The returns of the roads in Central Freight Association

territory for the same period (group 1 show a decrease of \$8,178,477 in freight revenue and a decrease in operating income of \$25,195,598. This is without including the figures of the roads in group 2 of the Central Freight Association roads, which, if included, would show a further decreased operating income of over \$4,000,000.

"The returns of revenues and expenses for February and March, so far as they are now available, are in the same direction, and are of such significance as compared even with the returns for the fiscal year ended June 30, 1913, as to indicate that the condition confronting the carriers at the present time is one of gravity."

Mr. Brownell concluded by declaring that it was of vital importance to the public as well as the carriers that the question of the propriety of the proposed advance in freight rates be submitted to the Commission for their determination at the earliest possible day.

The Commission heard Clifford Thorne, of Iowa, representing a number of Western State railway commissions. His argument principally devoted to the idea that earnings have been unduly expended upon maintenance for the purposes of influencing their case, had previously been presented to an examiner, but was now heard by the full Commission.

In his brief, after some pages of discussion of the commission's expense accounting rules and the wide latitude these leave railroad managers as to the maintenance expenditures that may be made in any one month or year, he says:

"These remarks are not made by way of criticism of any rules. They may be perfect, or the closest to perfection that is practicable and workable. Our comments are solely for the purpose of directing attention to the very large amount of improvement and betterment cost that can be paid for out of operating expenses.

"In addition to these facts, as to strictly maintenance work, it is possible to delay maintenance, or in prosperous years to build for the future. Ties may be left for two or five years longer, and then replaced; rails last for many years; the installation of new rails may be hurried or delayed without working grievous harm. Aside from the possibility of betterments, strictly maintenance costs can be expanded or restricted for a year or a series of years, in accordance with the financial policy of the company. A depreciation account now under consideration to be required for maintenance of way and structures accounts will, when finally adopted, tend to fairly distribute these costs from year to year."

Then follows a comparison of the cost of gravel ballast on a division of the Chicago & North Western with that of stone ballast on the Lake Shore, and the remark: "Variations from a hundred dollars to over \$3,000 per mile is quite interesting and suggestive, in its accounting possibilities." A remark, which of course, ignores the differences in physical requirements between the sections compared.

One of the charts presented by Mr. Thorne shows the line representing maintenance charges per mile rising above that of gross earnings per mile and further above it for 1913 than for any previous year. The basis of the chart is fixed by taking the average of maintenance and of gross earnings for the years 1890 to 1899 as 100 per cent. The divergence between the two lines is greater for the eastern district than for the country as a whole. On the face of the chart it appears, naturally, that maintenance charges have increased at a more rapid rate than gross earnings though they correspond in upward and downward fluctuations closely with the course of gross earnings.

In the testimony he said the capitalization under actual investment in railroads is not a reliable basis upon which to predicate reasonable rates. The correct standard is

a fair valuation of the property and whether or not the rates would develop a reasonable return. He charged that Daniel Willard, president of the Baltimore & Ohio Railroad, had based his demand for an increase in rates on comparative showings of two years. This was not a proper measurement. To show conclusively that eastern carriers should not have the increases asked for, the witness said he had prepared a statement covering the income and revenues for eastern carriers from 1890 to the present time. This, he said, was the only way to get the average yearly income derived by the railroads.

"Bookkeeping accounts of the carriers may show a decline in their net earnings and income for the past seven months as they showed an increase in 1910, which was the largest in the history of American roads. To take these two years and strike an average, we come to the conclusion and to the question as to whether or not the rates are giving a reasonable return. To ascertain this exactly the physical valuation of the railroads is essential. You gentlemen now are wrestling with that proposition, but it will take years to solve. In the meantime, any steps you take are in the nature of an emergency measure. And if you grant the roads' application for the increase, you are arbitrarily prejudging this case."

Mr. Thorne introduced statistical exhibits to show the general increase of expenditures by railroads for maintenance in ten years. In general, comparing each year with 1890, expenditures per mile of road were 34 per cent more in 1908, 100 per cent in 1909, 80 per cent in 1910, 89 per cent in 1911, 111 per cent in 1912 and 140 per cent in 1913. On the B. & O., he said, the largest increase was noted in 1913, 106 per cent over 1890; on the New York Central it was 167 per cent, and on the Pennsylvania, 114 per cent, for the same year. This, he stated, was the argument of the railroads for increases in rates, and showing the reason for the tremendous deficit in income over total operating revenues.

"It is true," he said, "that the cost of labor and the cost of some supplies have increased, but it is equally true that the revenues obtained by the railroads have been greater, and the result is that there is a constantly increasing net revenue. Last year their revenue above all operating expenses and above all taxes was greater than for any other year in their history, except 1910."

On Tuesday, Mr. Thorne resumed discussion of maintenance charges. He said that the seven months ended Jan. 31 last was the only period in recent years in which maintenance charges had not risen or fallen with gross earnings. The shrinkage in receipts in that time had been accompanied by a large increase in maintenance charges. He argued from the record that net earnings rose and fell with the tide of business.

Counsel for the carriers introduced earnings statements for seven months of the current fiscal year for the principal carriers, showing for the Pennsylvania, New York Central and Baltimore & Ohio, combined, a decrease of \$25,195,598 in net, or 24.8 per cent, as compared with last year. Similar exhibits for forty roads in Central Freight Association Territory was offered.

Detailed statements for all of the larger systems, some of them for eight months, were filed. Mr. Brownell, for the Erie, brought his figures down to the end of the third week of March.

TESTIMONY OF PRESIDENT WILLARD OF THE BALTIMORE & OHIO.

President Willard took the stand on Tuesday. The following is a running account of his testimony.

He first gave a complete history of the financial transactions and the improvements installed on the system between the years 1910 and 1913. Approximately \$77,000,000 was spent for improvements. At the present time the road

is engaged in a \$6,000,000 improvement, the only one of any consequence on the system. Expenditures are being kept down as low as possible, and are necessary to take care of the traffic and for the safety of the traveling public. For the year 1913, and for the first time in the history of the company, its business exceeded \$100,000,000.

Soon after rate decision of 1910 West Virginia coal operators called upon the company to improve facilities. That led to the \$50,000,000 loan arranged soon after. Since January, 1910, the B. & O. has issued loans of face value of \$81,500,000, which realized \$76,393,000 cash proceeds. The application included \$42,000,000 for revision of grades, new shops, terminal yards, sidings, 178 miles of additional main tracks, etc., \$4,366,000 for the Sandy Valley and Elkhorn extension into the coal fields, \$2,250,000 on the Chicago Terminal and \$40,000,000 for equipment, including \$13,000,000 taken from accumulations in equipment depreciation fund. Of the above, \$5,876,000 was spent on the West Virginia lines. The dominating policy for four years was to make only such expenditures as necessary to handle traffic; none primarily to reduce expenses, desirable as such were.

Some of the adverse conditions are wage increases, resulting in an annual increase of \$4,000,000; fuel increases, \$448,000, and compliance with state laws, \$290,000. Some rates have been reduced by the commission and by the company, further affecting net earnings. Way bills of October, 1912, re-written according to rate and classification conditions of 1910 showed increases aggregating \$20,000 and decreases of \$92,000, or a net decrease of \$72,000 for the month, due to changes in rates and their classification. To carry out such a test cost the road \$5,000."

"Up to the March floods in 1913 we had been pursuing a rather liberal course with maintenance because we thought business justified it. After the floods we found that we would have to spend so much of earnings to repair the flood damage that we curtailed maintenance expenditures everywhere else. By June 30, 1913, we had charged into expenses \$576,000 directly allotted to the flood effects, though I have no doubt that other expenditures were in part the result of the floods. In the present fiscal year to February 28 we had further charged expenses with \$1,420,000 flood damage, a total of \$1,996,000."

Mr. Bond asked Mr. Willard to discuss Thorne's tables showing increases over 1890 and maintenance and net earnings in 1913 as compared with 1890. The witness said it was impossible to reach any conclusion on those figures without bringing in the additional property investment. Mr. Thorne was comparing the B. & O. of 2,000 miles in 1890 with the 4,456 miles of 1913, and hence for no year were the figures exactly right. If he had taken 1897 he could have shown still greater increases in net earnings per mile than 1913.

Mr. Thorne rejoined that the figures did not purport to cover the same mileage for all years, and that they spoke for themselves. Vice-President Shriver of Baltimore & Ohio said the Thorne exhibit put the net income for 1913 more than \$1,000,000 too high, by leaving out the "outside operations". The portions of the present system in existence in 1890 totaled 3,524 miles, but Mr. Thorne had included only 1,788 miles for that year. He offered a correct statement along the same lines. Mr. Willard declared that the increase in the average train load from 466 tons in 1910 to 650 tons in 1913 had resulted in a saving of \$4,500,000 in train movement expenses based on the wage and fuel scales of 1910.

Referring in detail to the income account of first seven months of the current fiscal year, the surplus for dividends had decreased \$3,321,000 from those a year ago and amounted to \$6,182,330. This is surplus after charges. Funded debt charges increased \$1,143,767 and hire of equipment \$406,000.

Mr. Thorne had stated that there is no crisis in railroad affairs. Mr. Willard said, "I must first define what I believe a crisis to be. I should consider a crisis to exist if the carriers no longer earned a return on additional capital invested, and, therefore, found no longer any incentive to raise new capital to handle the business offered. It has been found necessary for the Baltimore & Ohio to spend \$15,000,000 or \$20,000,000 a year to provide facilities to take care of the traffic. If conditions should now make it unattractive or unwise to put additional money into the property, place additional facilities at the disposal of the people along the lines of the Baltimore & Ohio and the public should be deprived of needed facilities, I should say that was a crisis for the people who look to the Baltimore & Ohio to handle their traffic. Again, I should say a crisis was approaching when net earnings from railroad operation were so small that the ability of the companies to continue to maintain fair returns upon the properties jeopardize the future of railroad securities. Those who hold our securities would certainly consider that a crisis. It would also be a crisis for workmen to be deprived of their positions, not because of the lack of need of their services, but because of employers' inability to pay. As I conceive it, all these conditions of crisis, or approaching crisis, are at hand in full measure today. Three years ago, we based our application on what we considered to be a tendency. Today, it is not a question of tendency, but a question of fact."

Mr. Thorne cross-examined Mr. Willard on the sufficiency of return on capital stock of Eastern roads in 1913 as compared with the averages for preceding five-year periods. Mr. Willard said that if an increase were shown, it would not necessarily prove that such earnings had become either sufficient or excessive. Mr. Thorne then went into maintenance again, Mr. Willard saying: "In 1910, when I became president of the Baltimore & Ohio, we made a change in our depreciation accounting. We had our equipment appraised, and found that it was over-valued by \$8,000,000 on the books. We wrote this off to profit and loss and then made a large increase in our rate of depreciation per year on equipment, which has been substantially the same since." Mr. Willard admitted that prior to 1910 the equipment depreciation allowance had been too low.

At the afternoon session Mr. Willard was cross-examined by Frank Lyon, attorney for the Pittsburg Coal Co. as to whether heavier train loading had offset the effect of higher amounts in recent years on maintenance, but had suddenly increased its investment in equipment. He answered that the purchases had been dictated by requirements of business and refused to predict whether similar purchases would be necessary hereafter. He confessed himself unable to say whether heavier train loading had offset the effect of higher wages on cost of moving freight per ton mile, but declared that it had only partly offset the total operating cost per ton mile. He described the company's system of charging depreciation, which is calculated on book value, less estimated scrap value. On steel cars the percentage of annual depreciation had been reduced from 4 to 3 per cent since 1910. "The fact that the B. & O. has continued to pay 6 per cent on its stock by itself means nothing. It was done last year only by means of economies that cannot continue permanently. I would not permit any work to be omitted that safety required, but would like to keep our equipment in more constant effectiveness, to keep up stations in better shape and to extend interlocking."

Mr. Lyon sought to make the witness admit that his understanding of maintenance was to improve the condition of a road through the expense accounts. Mr. Willard replied: "When you start with a road every part of it is new. If it deteriorates through the operating accounts I suppose

it ought to come back that way. Under some circumstances, it might be the wise course to put up with a lower standard of condition for a time."

Attorney Johnson for the Pittsburgh Coal Co., attempted to discover some connection between the B. & O. and the Consolidation Coal Co. Mr. Willard said the B. & O. had sold its stock interest in that company before he became president. The Consolidation company had built the Sandy Valley & Elkhorn Railroad, in Kentucky, 36 miles long, under an agreement that the B. & O. should purchase it at cost and interest and get the shipment of the coal moved over it, "other things being equal." As to stock interest in the Consolidation Mr. Willard said that neither he nor the company had any interest in or relation to the coal company. As to officers and directors he did not know, but assumed that all such information was on file with commission, in answer to the 78 questions.

Commissioner Hall asked what were the "outside operations" on which the B. & O. showed a loss. Mr. Schriver replied that they were chiefly the lighterage operations in New York harbor. The Interstate Commerce Commission rules required that earnings of outside operations be credited only with the allowances made for them in the published tariffs, which had been arranged twenty or thirty years ago. At the present time the expense of conducting the lighterage and all terminal service in New York harbor, after freight reaches the float, was 6 to 7 cents, whereas the tariff allowances to cover it, theoretically, was 3 to 4 cents.

Mr. Brandeis asked Mr. Willard: "Is it your idea of maintenance that it is an elastic thing, depending upon the degree of prosperity existing, and that the dividends are a fixed charge?"

"I try to make it so," replied Mr. Willard.

F. A. Delano was then called, and went into a careful discussion of railroad credit, from the standpoint of Central Freight Association roads, among them the Wabash, whose present case he said might be extreme, but was not at all unique in that territory. He declared that market price of a road's bonds was not a conclusive test of a road's credit, which was measured by the terms on which it could raise capital. He therefore objected to Mr. Thorne's tables of security values, which included many issues under closed mortgages, and so in a favored position with investors.

On Wednesday W. H. Williams, third vice-president Delaware & Hudson Co., testified as to the impaired credit of the railways and the impossibility of improvement except through better earnings.

President A. H. Smith, of the New York Central, testified that his belief that the situation is critical was based on the tendency of the last few months, although the decline in net revenues had been apparent for several years. He said that on account of arbitration proceedings the New York Central in 1914 would have to pay out \$14,000,000 more than in 1913 in wages. He said that the increased expenditures in 1913 on his road resulting from the New York full crew law would amount to about \$700,000; and that taxes had increased appreciably. "We have been forced to reduce our operating force by 27,500 men since September, 1913, and in February this year, as compared with February last year, we had 13,000 less men."

He added that of the total of \$159,000,000 new capital put in the system since 1910 the sum of \$16,000,000 only had gone into the new terminal facilities and Grand Central station in New York city.

W. C. Wishart, statistician of the New York Central, testified as to increased cost of operation and maintenance. J. T. Wallis, general superintendent motive power, Pennsylvania R. R., testified that that company has expended in 1913 for maintenance of equipment \$72,971,585, as compared with \$58,197,036 in 1910—an increase of 25.39 per cent.

On Thursday, President Rea, of the Pennsylvania, testified at length. His conclusions were as follows:

"1. The margin of surplus is steadily diminishing and the company is not receiving any return either on the additional capital invested or for the value of the service rendered and the facilities provided for public use.

"2. Had there been no surplus in earlier years and had the whole of the improvements been paid out of the capital the margin would have reached the vanishing point.

"3. If surplus steadily decreases, improvements, if made at all, will more and more need to be made out of new capital.

"4. But if the margin of safety decreases new capital will be raised with greater difficulty and on more onerous terms.

"5. Indeed, it is questionable whether, if new capital is to continue to earn no income, the directors will be justified in attempting to raise more than a modicum of what they believe to be necessary, as the effect must be to reduce the percentage return on the shareholders' capital already invested."

President Rea closed his direct statement with the following comparison of the condition of the railroads in 1898 and 1913:

"In 1898 the company was emerging from a period of prolonged and very severe depression, whereas in 1913 it was at the end of a great period of growth. It would be natural under ordinary circumstances that the owners of the property should find themselves very much better off in 1913 than they were in 1898.

"In the fifteen years from 1898 to 1913 property investment increased from about \$792,000,000 to nearly \$1,387,000,000, or 75 per cent; operating revenues increased from a little less than \$145,000,000 to over \$382,000,000, or 163 per cent; operating revenue per mile of track operated increased from \$8178 to \$15,261, or 87 per cent. The company thus had during these fifteen years all the benefits arising from a remarkable growth of business, both in volume and density, which ordinarily under the increasing law of returns should have materially improved the position of its owners.

"But as a matter of fact the return on property investment in 1913 was only 5.48 per cent, against 5.45 per cent in 1897, and was the smallest return in any of the fifteen years of the period; the percentage of net corporate income (plus interest on funded debt), on total capital obligations in 1913 was only 6.88 per cent against 6.65 per cent in 1898, and with the exception of 1899, it is the lowest of any year in the fifteen year period; the net corporate income per cent on capital stock outstanding held by the public in 1913 was only 9.64 per cent, against 8.53 per cent in 1898, and here also the 1913 figure is the lowest for any year in the fifteen year period, with the single exception of 1899, when the figure was 8.94 per cent."

British Process for Fireproofing Wood.

Considerable attention has been given in the United Kingdom to the best method for fireproofing wood, especially in connection with railroad construction. United States Consul General John L. Griffith, of London, England, has transmitted the following description of a process which, it is claimed, has received the favorable consideration of the British admiralty.

The wood is placed in large iron cylinders, the doors of which are hermetically sealed. The wood is then subjected to a course of steaming, and under vacuum the air and moisture in the pores of the wood are removed and the sap vaporized. The fireproofing solution is thereafter run into the cylinders, and under pressure forced throughout the pores and fibers. Subsequently the water in the solution is evaporated in drying kilns, and the chemicals, in minute crystal form, are left embedded in the wood. When heat is applied, these crystals expand to many times their original size, forming a glassy coating to the fibers of the wood which excludes the oxygen in the air. In time the heat causes the crystals to collapse, but further crystals in the

wood immediately expand, and the same process of resistance against fire continues.

The chemicals used are antiseptic and preservative, consisting chiefly of phosphate of ammonia. As a result of the treatment, the life of the wood is also lengthened, for the sap, which is instrumental in the decay, is eliminated. This process is claimed used as tungstate of soda, sulphate of ammonia, sulphate of to be especially satisfactory, inasmuch as the material treated is not saturated with a solution of salt, nor are such chemicals alumina, alum, etc., which invariably cause discoloration of the wood, corrosion of metals, destruction of fibers, and prevent satisfactory painting or polishing. After this treatment the wood can be worked, nailed, glued, painted, polished, etc., as though it had not been subjected to any special process. All kinds of timber can be treated, including oak, teak, deal, pine, mahogany, walnut, beech, birch, ash, maple, whitewood, pitch pine, larch, etc.

The first railway to take advantage of this process was the Underground Electric Railways of London, and at the present time it is stated that the woodwork of all the cars of the company has been subjected to the treatment. It is also stated that after exhaustive tests the British admiralty has adopted the process, that the company is engaged in fireproofing large quantities of wood for 70 motor boats for the British warships *Indomitable* and *Monarch*, and that the two new superdreadnoughts now building, the *Queen Elizabeth* and *Warspite*, are to have their woodwork fireproofed by this process.

The company using the process states that as a result of the recent disaster at Aisgill, the Midland Ry., on whose system the accident occurred, has requested the fireproofing company to submit a tender for erecting a fireproofing plant at the company's works in Derby, and that, pending the erection of such a plant, the company has sent 144,000 ft. of timber to be treated by the fireproofing company.

Literature lately received from the National Tube Co., Pittsburgh, Pa., refers to the utility of "National" pipe for drilling operations, and to the well known N. & C. regrinding valves. Details of torsion tests of well drilling pipe are given in bulletin 15, while the valve information is given in booklet form. Still another bulletin, No. 11-B, gives the history, characteristics and the advantages of "National" pipe. This is probably the most comprehensive bulletin on pipe which the company has thus far issued. In the eighteen chapters into which the bulletin is divided, are given a short history of the pipe industry, a history of the National Tube Co., outlines of both early and modern methods of manufacture, reports of tests, a treatise on corrosion, methods of design of hot water supply systems, etc. Inasmuch as there is a great deal of misinformation and also a lack of information abroad relative to the manufacture and use of tubular products, a careful perusal of this bulletin will give considerable information relative to pipe and particularly to "National" pipe. Copies of this literature are available on application to the company's home office in Pittsburgh.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

A Crisis in Regulation.

"It is not only a crisis for the railroads. It is a crisis for public regulation of the railroads. The Tribune says this with reluctance, having been forced to the conclusion. This paper has long been an advocate of public regulation and has urged and defended all sensible extensions of it. But it is a serious thing that public regulation should have brought the railroads to the condition in which they are today and should be slow to afford relief—almost incompetent to make up its mind as to the necessity for relief. The Interstate Commerce Commission has grave responsibilities, but seems unequal to them. Its work requires great understanding, but it is full of the suspicions which beset minds that do not understand. It prescribes accounting systems, yet hesitates as if it might be deceived by what they show. It chooses strange and noisy advisers, uttering wild charges. Mares' nests possess an irresistible attraction for it. It should know, but it plainly does not know. Public regulation must do better than this.

"A crisis it certainly is, however you look at it."—New York Tribune.

Regulation by Commission at Stake.

"One of the most serious aspects of it all is that regulation by commission is at stake; this, as every one knows, has been heralded as the middle road between government ownership and the old, haphazard legislative control. It is of vital interest to the country that our railroad commissions should be put on the highest possible plane. Some of the questions which are now before them are of enormous importance to the general business interests of the country. Naturally, their authority is undermined if legislatures like our own continue to meddle in matters which have been definitely allotted to a commission for control. To

override it is to lower the commission in the eyes of the public and to breed contempt for it among those whom it is supposed to regulate, while leaving the railroad manager utterly at a loss to know where he may obtain a ruling which shall be lasting—at least, for a few months—and shall not conflict with three or four others. It is a situation which calls for statesmanship, not for prejudice and partisanship."—New York Evening Post.

Opposition to Progress.

"When some genius first subjugated a horse or ox or perchance a mastodon and turned him into a means of transportation the interracial concatenation of the Sons of Shank's Mare made mournful medicine, signed petitions and called on the labor vote to save them from threatened starvation through loss of occupation. Since which time down through the ages, the workers have howled every time somebody has taken the latest inevitable step forward and thus inconvenienced everybody vegetating in a comfortable berth."—New York Commercial.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

At a meeting of the American Society of Mechanical Engineers to be held Tuesday evening, April 14, 1914, at 29 West 39th street, New York, Mr. Willard C. Brinton will read a paper on Graphic Statistics for the Engineer and the Executive, describing some of the graphic methods not generally used by engineers, but which could be of very great assistance to men who must frequently condense and abstract information, and

write reports. Some methods are now in use by the biologist and the statistician that could be widely applied to the work of the engineer if more generally understood. Most of the speaker's talk will be devoted to methods for keeping corporation operating records in convenient form for instantaneous reference by executive officers. It is on this phase of the subject that it is hoped the greatest amount of discussion may be elicited.

The eleventh annual convention of the Railway Storekeepers' Association will be held in the Hotel Raleigh, at Washington, D. C., Monday, Tuesday and Wednesday, May 18, 19 and 20, 1914. Papers will be prepared on the regular subjects for discussion at this meeting, and distributed to all members. The standing committees of the association expect to have their reports ready within a short time and these will also be printed and distributed before the meeting. Some very important subjects have been assigned to these committees, and their reports will be an important feature of the convention. The regular subjects for discussion at this convention are: K-1, Stores Department Expenses; K-2, How to Obtain the Greatest Efficiency from Employees in the Stores Department; K-3, Handling of Stationery; and K-4, Classification of Electric Railway Ma-

terials. The committee reports to be presented, together with the names of the chairmen responsible for same, are: Recommended Practices, H. S. Burr; Accounting, E. E. McCracken; Piece Work, W. W. Eldridge; Standardization of Tinware, W. F. Jones; Stationery, S. C. Pettit; Uniform Grading and Inspection of Lumber, J. H. Waterman; Scrap Classification, W. T. Bissell; Membership, W. M. Portlock; Standard Buildings and Structures, J. H. McMillen; Book of Standard Rules, J. G. Stuart; and Marking of Couplers and Parts, A. H. Young. Requests for further particulars should be addressed to the secretary, J. P. Murphy, Box C. Collinwood, O.

The program for the regular monthly meeting of the Traffic Club of New York, at the Waldorf-Astoria, Tuesday, March 31, included addresses by James T. McCleary, secretary American Iron & Steel Institute, former assistant postmaster general, and by Leslie M. Shaw, former secretary of the treasury. The meeting in April will be on the 28th and will be amateur night. All the world seems to be dancing and the Traffic club will dance, after the "show." Members will be admitted free upon presentation of membership cards. Guests (including ladies) may be invited, but tickets must be secured from C. A. Swope, secretary, 291 Broadway, in advance.

The Railway Supply Man's Point of View

Present Conditions.

What is the outlook for business? When will the railroads begin buying? Do you think they will begin buying in any quantity before fall? Are the railroads going to buy generally, or will there be just a few roads in the market? Will the crops have any effect on railway purchases? Do you think railroads are going to buy for future needs, or simply from hand to mouth?

All these and many more questions are being continually asked by the railway supply trade. What is the real condition of things today? Ask any man who is acquainted with railroad conditions, and in describing the situation as it is at present, he will use the word "spotted." This applies not only to the railroad field, but seemingly to many other fields. In a medium sized city, you will find on one side of the street a manufacturer who says that business is good, and across the street another man will tell you that business is not good; "there is no business." Not that the one man is an optimist and the other a pessimist, but they are really telling you exactly the condition of things as they see them. Probably no one in the railway supply business would claim that his business is unusually good; yet you will find a number who say that their business is running along as well as can be expected. Just what does that mean? Does it mean that that particular railway supply concern does not expect any business, and is, therefore, not disappointed in its expectations?

There is uncertainty everywhere,—yet constant encouragement. One road is not doing any buying, except that which is absolutely necessary, and after it has ordered some small amount of material or equipment, will have the manufacturer cancel the order. Another road will buy carefully, for their immediate needs, and still another seems to maintain the policy of buying conservatively for their immediate and also for their future needs. One railroad has announced, not publicly, that its policy will be to buy carefully and regularly just those things that are needed to maintain the road in proper condition and meet the demands for good service on the part of the public and the shippers.

Analyzing the conditions of the railway trade seemingly

does not get one very far in a satisfactory solution of the problem as to when and how much railroads are going to buy. Very naturally the sellers of railway equipment are simply reflecting the mental attitude of the buyers, and a most satisfactory description of the conditions as they are at the present time seems to be found in the word "spotted." Possibly this is better than a uniform depression in railway purchases. It may indicate the resumption of business, and good business, too, in the near future. Still, on the other hand, it may mean that this "spotted" condition simply reflects a very general curtailment of purchases on the part of the railroads doing only such buying as seems to be absolutely necessary for the actual upkeep of the operation of the railway lines.

The railway supply business for a good many years has had the "feast or famine" appearance, a phase of the business which has been touched upon in these columns very recently. Naturally, men whose livelihood is dependent upon the selling of railway supplies are inquiring anxiously as to what the future may be, in order to prepare themselves for the conditions which must be met. A man may forecast the future; figure it out from the past; analyze the present conditions, and get therefrom the probabilities of what is to come; but no man can speak authoritatively today of that which shall occur tomorrow. It is one of the limitations of the finite mind, and all guessings as to the future remain guessings. The future will determine whether they are good guesses or not.

Meanwhile, with "spotted" conditions in the railway supply business, and uncertainty as to just what the immediate or far future will bring forth, while no discouragement is intended to those who are attempting to anticipate that which is to come in the way of business or lack of business,—still there are certain things that can be accomplished in the railway supply business today, without waiting for tomorrow. No good salesman who knows human nature fails to recognize for a moment this fact: that when a buyer is not buying, his mind is much more open to suggestion or argument as to what he should buy than when he is doing the actual buying. He is in a more recipient mood; listens more carefully to statements in regard to the merits of any appliance.

A man who has a farm does his planting not at the time of year when everyone else is reaping. He does not expect to plant today and see the results of his planting within the following twenty-four hours. He realizes that there are certain times for putting the seed into the ground, and other times for gathering the result of what he has done, and he knows that he is to wait patiently, and that while he is waiting, he is at work. It is one of those universal laws with which everyone is familiar, and no one expects to plant wheat one week, and see it turned into flour the next. A number of months are to intervene, and there is some work to be done during that time.

The railway supply business is not subject to special laws. There is a time for planting, and a time for harvesting, and you cannot plant when you harvest. The individual railway supply manufacturing company which has something of merit must interest the railroads in its special equipment,—must demonstrate to them that it has something that is worth while,—something that is of advantage in railway service.

The first thing is the right kind of publicity which will gain the favorable attention of the possible purchaser, and there is no better time for the gaining of such attention than just the present time. Railroads are not busily engaged in buying, but they are busily engaged in giving serious and constant consideration to lessening the expenses of operation. They are looking more earnestly today than ever before for material and equipment which will give the very best kind of service. They are more apt today to listen to the arguments of a man who, with a higher first cost, has something to sell which will insure a lessened maintenance expense, giving in the long run the best service for the least money. The railway supply manufacturers who appreciate the fact that conditions are "spotted," and who at the same time realize the opportunities for the right kind of publicity,—that is, the correct methods of bringing their equipment and material before railway buyers, are going to reap, after a few months, according to the perfectly natural law, the results. One of the oldest and leading railway supply manufacturing concerns are taking advantage of the present conditions in railway purchasing to advertise more carefully and more thoroughly that which they have to sell than they have ever done in the past.

When the snow is off the ground, and the first signs of spring are in the air, the farmer begins his plowing. The ground is wet; the days are cloudy,—sometimes dreary and chilly, and while the sunshine alternates with the rain, there is nothing to suggest anything in the way of harvest. Yet the farmer knows that the harvest days are coming. He does not wait for them to arrive, but does his sowing, so that he may take advantage of the days which are sure to come. The railway supply manufacturer has something to learn from the farmer.

Combination of Purchasers to Secure Lower Prices.

The Short Line Railroad Association of the Southeast has recently been organized, and one of its objects is to effect economies in purchasing. They are considering combining and centralizing their purchases. In seeking for information and suggestions, the following question is asked:

"Would you consider it practicable to work up a standardized list of all classes of materials bought by the railroads and assign a standard stock number to each item and devise an index card for such item on which to record orders, prices and quantities?" This inquiry is one of office methods or systems and there are other considerations in connection with such combination which are perhaps more important. The purpose is really to obtain lower prices by combining purchases—in other words to get the advantage of wholesale as against retail rates. Most manufacturers would want some definite information regarding the plan before

giving it their approval or entering into contracts under it. Prices are based upon other considerations besides the total amount of purchase. Will the combined purchasing agency guarantee the payment of all bills? Will it guarantee payment within the stipulated period? Some people buy at lower prices than others because their credit is better. The influence of the amount of purchase on price depends on the uniformity of the material or appliance. Even slight differences wipe out that influence. Will all the roads use exactly the same things? Will they be prepared to contract in advance for any definite amounts within definite time?

The advantages to the seller depend on these and some other things as well. It is not often that a number of small orders to be shipped to different points and to be billed and collected separately can be sold at the same aggregate price as one order covering the same amount to one purchaser. The higher price to the small buyer is based upon the actual higher cost of filling the order per unit. As a matter of fact small orders are sometimes filled at an expense, all things considered, which does not pay the manufacturer, although the price per unit is higher than he finds profitable on large tonnage.

There are many things to be thought of in connection with unifying purchases of separate concerns. Possibly some of our readers may like to bring some of these out. It is worth while noticing, too, that if the tentative anti-trust legislation of the Wilson administration becomes actual law, combination of purchasers will be of doubtful legality; and contracts for any period of time to supply all of the requirements of a customer in any commodity at special prices in consideration of a corresponding agreement will be absolutely illegal.

Anti-Trust Bills.

All manufacturers are or should be interested in the forthcoming attempt to secure additional anti-trust legislation in congress. The following comments on the tentative bills prepared by the administration, are by Thomas Thacher, and have recently been distributed from New York. These bills require business men to compete, and at the same time "make criminal the use of the ordinary and reasonable methods of competition." Can business be transacted at all under such conditions?

I. THE DEFINITIONS BILL.

Among the tentative bills drawn to be introduced in congress in pursuance of President Wilson's proposal to amend the anti-trust law, is one sometimes called the "definitions bill," intended to bring within the condemnation of the anti-trust law any combination or agreement between corporations, firms or persons engaged in interstate or foreign trade or business, for (among other things) the following purposes:

To prevent competition in the manufacturing, making, transporting, selling or purchasing of merchandise, produce or any commodity.

To make any agreement, enter into any arrangement, or arrive at any understanding by which they, directly or indirectly, undertake to prevent a free and unrestricted competition among themselves or among any purchasers or consumers in the sale, production or transportation of any product, article or commodity.

The decision of the Circuit court in the tobacco trust case (164 Fed. Rep. 700) was based upon the theory that, according to the previous decisions of the Supreme court, every combination—such, even, as the formation of any ordinary partnership between two persons—which hindered competition between the parties thereto, was illegal under the Anti-Trust Act, if it related to interstate or foreign trade or commerce. If two or more persons, natural or artificial, engaged in like business, unite their capital and energies to develop trade and

commerce, competition between them is necessarily ended. According to this decision, it was only necessary, in order to bring condemnation under the act, to find that, somehow or other, two or more persons or corporations engaged in interstate or foreign commerce had united their capital and energies to work together, so that there was an end of competition between them.

To this conclusion the judges of the circuit court who concurred in the decision thought themselves forced by the previous decisions of the Supreme court, although Judge Lacombe said: "As thus construed, the statute is revolutionary." The wide application of the act, as so construed, was made clear by Judge Lacombe in this language:

"It is contended that, under existing conditions, in that way only (by aggregations of capital and extensive combinations of individual enterprise) can production be increased and cheapened, new markets opened and developed, stability in reasonable prices secured, and industrial progress assured. But every aggregation of individuals or corporations, formerly independent, immediately upon its formation terminates an existing competition, whether or not some other competition may subsequently arise. The act as above construed prohibits every contract or combination in restraint of competition. Size is not made the test: Two individuals who have been driving rival express wagons between villages in two contiguous states, who enter into a combination to join forces and operate a single line, restrain an existing competition; and it would seem to make little difference whether they make such combination more effective by forming a partnership or not."

In the Supreme court, counsel for the government did not attempt to support this theory, and it was manifestly rejected, although not commented upon in the opinion of the chief justice; for had this theory been accepted, the court would have decided the case at once and would hardly have found it necessary to write an opinion—certainly would not have ordered a re-argument—since there was no dispute as to the restraint of competition.

The theory that the act prohibits "every contract or combination in restraint of competition" was expressly rejected in the opinion of the Circuit court in the powder trust case, (188 Fed. Rep., 339), in which (p. 373), the court said as follows:

"There is a distinction between restraint of competition and restraint of trade. The latter expression had, when the Anti-Trust Act was passed, a definite legal signification. Not every combination in restraint of competition was, in a legal sense, in restraint of trade. Two men in the same town engaged in the same business as competitors may unite in a co-partnership, and thereafter, as between themselves, substitute co-operation for competition. Their combination restrains competition, and if their town is located near the line between two states, and each has been trading in both states, their combination restrains competition in interstate trade. But it does not necessarily follow that such restraint of competition is a restraint of interstate trade and commerce. The determination of whether it be so must depend upon the facts and circumstances of each individual case. It is undoubtedly the policy of the statute that competitive conditions in interstate trade should be maintained wherever their abolition would tend to suppress or diminish such trade. But this being true does not read into the statute a denunciation of all agreements that may restrain competition without regard to their purpose or direct effect to restrain 'trade or commerce among the several states.'"

The Sherman bill, as it stood on March 27, 1890, was directed against agreements or combinations made with a view, or which tend, "to prevent full and free competition" or "to advance the cost to the consumer." On that day, Senator Platt, of Connecticut, made a vigorous speech against it, arguing forcibly that full and free competition was often destructive and ought often to be restrained by agreement in the interest of manufacturers and consumers alike, and that it was often

for the interest of everybody to advance the cost of articles of production to the consumer (21 Cong. Rec., 2729-2731). At the conclusion of his speech, the bill was referred to the judiciary committee, which amended it by striking out all after the enacting clause and substituting entirely new provisions, making no reference either to competition or to advance of cost to the consumer.

If the tentative bill now under consideration shall be adopted, what Judge Lacombe felt constrained to hold to be the meaning of the law in its present form, will undoubtedly be the law, with the consequences pointed out in his opinion. Then his two expressmen, joining forces in order to do business better for themselves and for the community, will be criminals under the law, beyond a doubt. Then the law will contain all the elements which Senator Platt denounced and which the judiciary committee of the senate rejected.

And moreover, since purchasers and consumers are reached by this bill equally with manufacturers and sellers, co-operative buying as well as co-operative manufacturing and selling will be condemned as unlawful and criminal.

II. THE TRADE RELATIONS BILL.

Of the tentative bills drawn to carry out the anti-trust programme, those which seem to be intended to make clear what may and may not be done under the Sherman act are the "definitions bill," the subject of my paper of February 6th, and the "trade relations" bill. Neither of these bills really defines the crimes covered by that act. Each extends but neither limits its prohibitions. Each makes criminal many ordinary business arrangements and transactions which have always been recognized as proper, and which are necessary for that reasonable competition which is the life of trade. But neither fixes the outer bounds of the field of this law.

How far the definitions bill extends the prohibitions of the Sherman act has already been pointed out. The trade relations bill carries the extension much farther. It provides that it shall be deemed an attempt to monopolize trade or commerce among the states or with foreign nations, or a part thereof, "for any person in interstate or foreign commerce to discriminate in price between different purchasers of commodities in the same or different sections or communities, with the purpose or intent to thereby injure or destroy a competitor, either of such purchaser or of the seller: Provided, that nothing herein contained shall prevent discrimination in price between purchasers of commodities on account of differences in the grade, quality, or quantity of the commodity sold or that makes only due allowance for difference in the cost of transportation"; with a further proviso permitting sellers to select their own customers. This stretches the meaning of "monopolize" far beyond anything which has ever been suggested in any case arising under the Sherman act. "Unfair competition" has been recognized, among other things, as evidence of intent to monopolize, but it has never been held nor argued, I believe, that a single instance of unfair competition is an attempt to monopolize. Nor has it ever been held that any such discrimination as is described in this bill must be regarded as unfair competition.

It will doubtless be urged that there can be no objection to prohibiting only such discrimination as is intended to injure or destroy a competitor. But what does this mean and how is the intent to be judged? Competition means strife for trade. It includes efforts to get or keep trade from others, not for the sake of, but regardless of, the injury which results to such others. Injury to others is not the motive; the motive is one's own gain; but there is the intention to do what is known may, and if successful must, injure others. A seller who discriminates in price to draw trade from a competitor, cannot be assured that he will escape condemnation under such a law, by pleading that he acted simply to benefit himself. He cannot reasonably assume that such a plea will protect him from fine and imprisonment. If he would be safe he must disregard the limitation and resolve to make no discrimination in prices at all

except for the reasons expressly approved in this bill. And so every business man must, I think, look at this bill as if, without regard to purpose or intent, it prohibited any discrimination in prices except "on account of differences in grade, quality or quantity of the commodities sold" or on account of "difference in the cost of transportation." And he must contemplate the possibility of his being fined or sent to prison, or both, if in a single instance he makes any such discrimination. This is alarming enough for a seller who does all his own business; how much more for a seller who has agents and employees for whose acts he may be held responsible? And in the case of corporations, if amendment making officers and directors personally liable for corporate acts (proposed in the definitions bill) be adopted, to be an officer or director of a selling company will have unusual and unavoidable terrors.

Any business man can see how this bill, if it is passed, will embarrass him, if he must regard it as practically prohibiting any price discriminations except as aforesaid. Two or three illustrations will suffice:

A manufacturer or a middleman, let us say, has a normal and reasonable net price, after allowance for cost of transportation, for sales of a commodity throughout the county; competition is active in Chicago; if he cuts the price there, he is chargeable with such discrimination as the bill forbids.

A manufacturer or a middleman, offered a price which is below the normal and reasonable price but which he can afford to take rather than lose the customer, accepts the offer but maintains his normal price generally; he will be guilty under the law if this bill has passed.

The practice of cut prices for limited distribution will be condemned.

Discrimination in price between cash and time sales and discrimination based on difference in financial responsibility will be prohibited.

This bill also provides that it shall be deemed an attempt to monopolize trade or commerce within the meaning of the Sherman act, "for any person in interstate or foreign commerce to make a sale of goods, wares or merchandise or fix a price charged therefor or discount from or rebate upon such price, on the condition or understanding that the purchaser thereof shall not deal in the goods, wares or merchandise of a competitor or competitors of the seller." This again extends very far the provisions of the Sherman act. It applies not only to a series of transactions, which coupled with other things might be evidence of an attempt to monopolize, but to single transactions. It would make unlawful and criminal transactions and arrangements which are now and always have been deemed proper and are necessary for healthy competition and for efficient business.

Under the law as proposed by this bill a manufacturer or middleman cannot agree for any period of time to supply all the requirements of a customer in any commodity at special prices in consideration of a corresponding agreement. Further illustrations of the operation of this provision will occur to almost any business man.

In order to carry out the purpose of the Sherman act, to reach the evil against which it is aimed, is there any need of further prohibitions? The evil is monopoly, and it is sufficiently established in the courts that evidence of unfair competition is pertinent under a charge of monopolizing or attempting to monopolize. It is for the courts to decide what competition is unfair, under all the circumstances. Definitions are worse than useless.

The question of unconstitutionality I intentionally avoid, and raise only the question of expediency. Is it expedient to so tie the hands of those who make and those who deal in commodities that industrial and commercial competition cannot be free? Is it reasonable in one breath to tell business men to compete and in the next to forbid and make criminal the use of the ordinary and reasonable methods of competition.

Like the definitions bill this trade relations bill applies not

to big business alone, but to business of any size, if only it be not confined to a single state. All business men, big or little or intermediate, would seem to be vitally interested in the proposals of this bill, as well as in those of the definitions bill.

Railway Service as Training School for Railway Supply Business.—IX.

WALTER BENTLEY GOES WITH CURTAIN SUPPLY CO.

Walter Bentley has just joined the sales force of the Curtain Supply Co., of Chicago. His father, Mr. H. T. Bentley, is the well known superintendent of motive power of the Chicago & Northwestern Ry., and has a high standing among railroad men—being past president of the American Railway Master Mechanics' Association, also the Western Railway



Walter Bentley, Curtain Supply Co.

Club. Mr. Bentley saw to it that his son had a thorough railway training. Beginning in the stores department, he worked his way through various branches of railroad work, having served in the different departments of the shops, road-master's, general superintendent's and purchasing agent's offices. In the last few years has represented the Baldwin Locomotive Works and the Standard Steel Works Co., and his connection with these two large concerns has brought him into close contact with prominent steam and electric railway officials.

Consulting Authority.

Hang up your caps and lanterns,
And pray don't take it hard;
Your engine's been white leaded,
Your train's in storage yard.
You ask what's hit the payroll,
And why is traffic flat?
Consult the railroad expert,—
Ask Mr. Brandeis that.

Your overalls are safe there,
On shop and roundhouse wall;
You're men of leisure—10 to 3,—
Some needn't work at all.

You wonder why equipment
Is fixed less frequently?
That needs an expert answer,—
Consult with Mr. B.

Throw down, along the section,
Your crowbar, jack and tamp;
Henceforth not roadbed gravel
But city streets you'll tramp.
That maintenance is padded,
You rather disagree?
A question scientific,—
Confer with Mr. B.

You puddlers, mixers, rollers,
Your schedules and your scales
You find are growing shorter
On switches, frogs and rails?
You ask what's hit the market
For rail and frog and switch?
There may be expert reasons,—
Let Mr. B. Say which.

Why is the 10:11
Merged with the 11:10?
Where is our extra smoker?
Where our new station and when?
Calm yourself, Mr. Sububs,
And take your petty woes
To an expert in railroad science,—
Ask Mr. Brandeis those!
—Boston News Bureau Poet.

The many friends of Mr. Charles T. Schoen have been delighted at receiving an artistic announcement which reads as follows:

"Mr. and Mrs. Charles T. Schoen take pleasure in announcing to their friends the great happiness which they enjoy in having arrived at the fiftieth anniversary of their marriage, 1864, March 31, 1914. Schön Haus, Rose Valley, Moylan, Penn."

A photograph of the couple seated under a tree on the lawn is artistically framed in a sketch including their home.

Iron and Steel Industry.

The prolonged withdrawal of a normal railway demand for steel has caused a slight reduction in shapes and plates. The small business in shapes in lots from 1000 tons down is fairly good. For bars, sheets, merchant steel and tin plate a full average is maintained. In railroad material there is a stronger tendency to delay. A few importations from foreign mills are now looked for. Behind the apparent lethargy the undertone of the market as to volume of business is strong.

Supply Trade Notes.

—James N. Wallace, president of the Central Trust Co., has been elected a director of the Westinghouse Electric & Manufacturing Co., succeeding Thomas W. Lamont, of J. P. Morgan & Co., resigned. Herman H. Westinghouse succeeds the late George Westinghouse.

—The Chicago branch sales office of the U. S. Light & Heating Co., manufacturers of U-S-L electric starter and lighter, storage batteries and axle electric car lighting equipments, has been moved from 1013 Peoples' Gas buildng to 2335 State street. This change brings the U-S-L Chicago sales office and service station into the same building. The

railway department of the Chicago office is now under H. A. Matthews; R. E. Stuntz has charge of the battery and starter department, and the service department is being looked after by H. M. Emerson.

RAILWAY NEWS.

Atlanta, Birmingham & Atlantic.—The plan of reorganization of the Atlanta, Birmingham & Atlantic R. R. is said to provide for the formation of a new company to be known as the Georgia, Alabama & Western R. R. Co., with the following capitalization: \$27,000,000 common stock, \$3,200,000 5 per cent noncumulative preferred stock, \$3,000,000 first and general mortgage 30-year gold bonds, to be presently issued, and \$400,000 equipment trust notes. Arrangements have been made, it is said, with Kidder, Peabody & Co. to underwrite the cash requirements.

Atlantic Coast Line.—Stockholders of the Atlantic Coast R. R. April 1 authorized a bond issue of \$200,000,000 at 4½ per cent to retire the outstanding \$30,000,000 of the 4 per cent issue of November 16, 1909, closing the mortgage of that date, and for other purposes.

Canadian Northern.—The Canadian Northern Ry. has taken over from the contractors 78½ miles of new trackage from Avonlea to Gravelbourg, Sask.

Cassville & Western.—Following the dissolution of the receivership of the Cassville & Western Ry. by decree of Federal court, the stockholders have reorganized the road under the name of the Cassville & Western R. R. Co. The following officers, all of Cassville, Mo., were elected: President, S. M. Mitchell; vice-president, O. H. Orendorff; secretary and treasurer, W. T. Ayers. The road extends from Cassville to Exeter, Mo., a distance of 4.51 miles.

Chicago, Rock Island & Pacific.—The Chicago, Rock Island & Pacific Railway Co. has sold \$7,500,000 two-year 6 per cent collateral trust notes to William A. Read & Co. It is said that the notes were secured by deposit of \$9,000,000 of the refunding 4 per cent bonds of the company and by two small bond issues of subsidiary lines. It also is stated that the sale of the notes, which was authorized by the Illinois public service commission March 5, will take care of all the company's capital requirements up to July 1.

Georgia, Alabama & Western.—See Atlanta, Birmingham & Atlanta R. R.

Minneapolis & St. Louis.—Stockholders of the Minneapolis & St. Louis R. R. voted on March 31 to approve the sale of \$870,000 first and refunding mortgage 4 per cent bonds, and \$750,000 refunding and extension mortgage 5 per cent bonds of the Minneapolis & St. Louis and \$512,000 first and refunding mortgage 4 per cent bonds of the Iowa Central Ry. The proceeds are to provide funds for the payment of obligations and indebtedness of the Minneapolis & St. Louis.

Minneapolis, St. Paul & Sault Ste. Marie.—The Minneapolis, St. Paul & Sault Ste. Marie Ry. transferred its passenger traffic in Chicago from the Illinois Central station to the Grand Central station, at midnight March 31.

New York Central Lines.—Press reports say that the electrification of the Dunkirk, Allegheny Valley & Pittsburgh R. R. between Warren and Youngsville, Pa., 8.5 miles, is contemplated.

Norfolk & Western.—The Norfolk & Western Ry. has formal permission from the Ohio public utilities commission to issue \$10,000,000 4½ per cent equipment trusts.

Norfolk Southern.—The Norfolk Southern R. R. has passed the quarterly dividend usually declared at this time. The board announces that under existing conditions it would seem that the interests of the property and stockholders are better conserved by adding to the company's surplus all earnings above fixed charges, instead of distributing them in dividends.

Northwestern Pacific.—The Northwestern Pacific R. R. has applied to the California railroad commission for authority to issue \$5,543,000 additional first and refunding 4½ per cent bonds. Of the proceeds \$1,803,913 will be used to pay for completing the line from Willits, Cal., to Shively, Cal., and \$1,236,700 for equipment.

Oregon-Washington R. R. & Navigation Co.—The Oregon-Washington R. R. & Navigation Co., it is stated, will spend about \$2,000,000 for additional improvements in Oregon. Construction and improvements authorized and under way will amount to \$24,000,000. A summary includes extensive

terminal facilities at Spokane, Wash., to cost over \$5,000,000; completion of 100 miles of new line between Spokane, Wash., and a connection with present line near Ayer, Wash., involving an expenditure of \$10,500,000; completion of construction of new line from Vale, Ore., to Riverside, Ore., approximately 60 miles, and costing approximately \$4,000,000. Miscellaneous construction and improvement work at Tacoma and Seattle in Washington, and in Portland, Ore., and other points, will consume the balance. See also New Roads and Projects under Oregon.

Pere Marquette.—The Pere Marquette R. R. has defaulted in its semi-annual interest on \$5,000,000 bonds due April 1. The bonds under default are divisional issues of the old Flint & Pere Marquette R. R., \$1,000,000 of which bears 4 per cent interest and the remaining \$4,000,000 6 per cent. A protective committee consisting of T. Crapo, Oliver Prescott, E. V. R. Hoyt, F. R. Hart and H. R. Hoyt has been appointed.

St. John & Quebec.—The company, it is reported, has applied to the New Brunswick government for an additional bond guaranty of \$10,000 per mile.

St. Louis & San Francisco.—The St. Louis & San Francisco R. R. has sold \$560,000 of receiver's certificates. There were originally authorized \$3,000,000 of such certificates all of which have now been sold. The proceeds of the recent sale have provided funds with which to pay all interest and maturing car trusts to May 1.

St. Louis Southwestern.—Application has been filed with the Missouri public service commission by the St. Louis Southwestern Ry. for authority to issue equipment notes to the amount of \$1,700,000.

Directors of the St. Louis Southwestern Ry., March 30, voted to reduce the quarterly dividend rates on the preferred stock from 1 per cent to one-half per cent.

PERSONALS.

E. N. Brown, trainmaster of the Baltimore & Ohio Southwestern R. R. at Chillicothe, Ohio, has been appointed assistant superintendent of the Ohio division, with headquarters at Chillicothe. G. Cameron has been appointed assistant superintendent of the Cincinnati Terminal division, with headquarters at Seymour, Ind.

J. L. Otis has been appointed trainmaster of the International & Great Northern Ry., San Antonio division, with headquarters at San Antonio, Tex., succeeding J. R. Jones, promoted.

Maury Middleton has been appointed assistant treasurer

and assistant cashier of the Southern Railway, with office at Washington, D. C.

H. T. Malcolmson has been appointed superintendent of the Toronto, Hamilton & Buffalo Ry., with headquarters at Hamilton, Ont., vice R. A. Barrett, resigned. A. E. Lock is appointed car accountant to succeed Mr. Malcolmson.

W. L. Seddon, assistant to president of the Seaboard Air Line Ry., Norfolk, Va., has been appointed first assistant to the president and H. W. Stanley, general manager, with headquarters at Portsmouth, Va., has been appointed second assistant to the president. These offices were created April 1 and the office of general manager abolished.

C. S. Lake, who recently resigned as general superintendent of the Minneapolis & St. Louis R. R. at Minneapolis, Minn., has been appointed general superintendent of the Seaboard Air Line Ry., with headquarters at Portsmouth, Va.

S. H. West, heretofore general attorney of the St. Louis Southwestern Ry., has been appointed general solicitor, with office at St. Louis, Mo.

J. H. P. Hughart, vice-president and general manager of the Grand Rapids & Indiana Ry., with office at Grand Rapids, Ind., was elected president of that company April 1.

W. P. Hickey has been appointed division storekeeper of the New York Central & Hudson River R. R. at Oswego, N. Y., vice J. F. Wallace.

A. C. Peterson has been appointed trainmaster of the Kansas City division of the Chicago, Milwaukee & St. Paul Ry. at Ottumwa Junction, Iowa, vice W. H. Druen, resigned. C. A. Anderson is appointed trainmaster of the Iowa and Dakota division, with headquarters at Mason City, Iowa, vice Mr. Peterson. Effective April 1, 1914.

Elisha Lee, assistant to general manager of the Pennsylvania Railroad, Philadelphia, Pa., has been appointed, effective April 1, general superintendent of Philadelphia, Baltimore & Washington R. R., with headquarters at Wilmington, Del. He succeeds E. F. Brooks, who retires under the pension rules of the company. Mr. Lee was born in Chicago, September 24, 1870, and is a graduate of the Massachusetts Institute of Technology, class of 1892. He entered the service of the Pennsylvania Railroad in November, 1892, as rodman in the office of the division engineer of the Tyrone division. From August, 1895, to October, 1897, he was on leave of absence, attending to personal affairs. He was appointed assistant supervisor in April, 1899, and served in that capacity on various divisions until April, 1901, when he was appointed supervisor. In August, 1903, Mr. Lee was promoted to assistant engineer in the maintenance of way department, and advanced to principal assistant engineer of the Philadelphia, Baltimore & Wash-



W. I. Jones, Recently Appointed Assistant to Vice-President, M. P., St. L. I. M. & S., D. & R. G., and W. P. Railways.



John B. Berry, Assistant to President, Chicago, Rock Island & Pacific Ry., who has Resigned.



J. B. Hutchinson, Assistant to Vice-President of the Pennsylvania Railroad, who has Retired.

ington R. R. on April 1, 1907. On March 24, 1909, he was appointed superintendent of the New York, Philadelphia & Norfolk R. R., and on March 3, 1911, he was made assistant to the general manager. During the last year and a half, Mr. Lee has been chairman of the conference committee of managers of the eastern railroads.

J. W. Mulhern, division superintendent of the Chicago division of the Pere Marquette R. R., with headquarters at Grand Rapids, Mich., is now superintendent also of the Petoskey division, which is merged with the Chicago division, effective April 1. **H. O. Halsted**, division superintendent of the Petoskey division, has been appointed assistant to general manager, with headquarters at Detroit. The Detroit and Canadian divisions have been merged and **J. J. Corcoran** is superintendent, with headquarters removed from Grand Rapids to Detroit, Mich. **W. K. Tasker**, division superintendent of the Canadian division has been appointed superintendent of telegraph lines. The Saginaw division has been enlarged to include the Port Huron, the Thumb, the Saginaw-Grand Rapids, the Grand Rapids-Big Rapids and the Edmore-Greenville lines, with **J. L. Hayes** as superintendent.

J. B. Hutchinson, assistant to the vice-president in charge of real estate, purchases and insurance of the Pennsylvania Railroad, has retired under the pension plan of the company, he having reached the age of seventy years. Mr. Hutchinson has served the company fifty years and ten months. He was born in Bristol, Pa., March 20, 1844. In June, 1863, he entered the service of the Pennsylvania Railroad as rodman. After two weeks' service he was given leave of absence and served in the Gettysburg campaign. Mr. Hutchinson returned to the service as rodman later in the same year and in August, 1864, was promoted to assistant engineer on the Western Pennsylvania R. R. and the following year to assistant engineer of maintenance of way and construction. In 1868 he was transferred to the Columbia & Port Deposit R. R. as assistant engineer. Promotions followed and in 1893 he was made general superintendent of transportation, Pennsylvania Railroad system, and in 1897 was made general manager. On January 1, 1903, he was appointed to the newly created position of assistant to the second vice-president. Upon the election of Mr. Pugh as first vice-president, in 1909, Mr. Hutchinson was advanced with him as assistant to the first vice-president, and in 1911, by a change in the organization, he became assistant to the fifth vice-president. When the practice of designating the vice-presidents numerically was abolished he was made assistant to the vice-president in charge of real estate.

W. B. Wood, superintendent of Eastern division of the Northwest system of the Pennsylvania Lines West of Pittsburgh, with headquarters at Allegheny, Pa., effective April 1, was appointed general manager of the Grand Rapids

& Indiana Ry., with headquarters at Grand Rapids, Ind. **F. J. Kron**, superintendent of Logansport division of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry., has been appointed to succeed Mr. Wood. **R. K. Rochester**, superintendent of the Peoria division of the Vandalia Railroad at Decatur, Ill., has been appointed division superintendent of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. at Logansport, Ind., succeeding Mr. Kron. **J. F. Patterson**, trainmaster of Western division, Northwest system, Pennsylvania Lines West of Pittsburgh, with headquarters at Fort Wayne, Ind., has been appointed superintendent of the Peoria division of the Vandalia at Decatur, succeeding Mr. Rochester.

P. C. Allen, whose appointment as superintendent of the Philadelphia division of the Baltimore & Ohio R. R. was announced in our previous issue, was born at Rock Island, Ill., December 20, 1869. After attending the public schools, he entered railway service in 1889 as a clerk in the operating department of the Atchison, Topeka & Santa Fe Ry., and after filling various positions with this company he became trainmaster in 1901. In 1902 he entered the service of the Chicago Great Western R. R., where he remained until 1904, when he entered the employ of the Great Northern Ry. Mr. Allen filled the position of assistant superintendent and later was superintendent of the Great Northern at Grand Forks, N. D., and at Great Falls, Mont. He continued with this company until 1913 and March 1, 1914, entered the service of the Baltimore & Ohio.

TRAFFIC.

H. R. Bingham has been appointed general agent of the passenger department of the Denver & Rio Grande R. R., Western Pacific Ry., Missouri Pacific Ry. and St. Louis, Iron Mountain & Southern Ry., at Los Angeles, Cal., to succeed **C. P. Ensign**, resigned to engage in other business.

George A. Hill has been appointed agent of the Union Line—Pan Handle Route, Chicago, in place of **W. S. Anderson**, retired from service in accordance with the regulations of the pension department after a service of 45 years; the appointment taking effect April 1.

Elbert Blair, general freight and passenger agent of the Texas Central R. R. at Waco, Tex., has been appointed commercial agent of the Missouri, Kansas & Texas Ry., at Dallas, Tex.

C. A. Turnell has been appointed soliciting freight agent of the Nashville, Chattanooga & St. Louis Ry., at Chicago, vice **J. F. Bolger**, resigned to accept service with another company.

M. L. Schultz has been appointed commercial agent of the Louisiana & Arkansas Ry., with office at Chicago, effective April 1.



D. J. Brumley, Appointed Valuation Engineer of the Illinois Central R. R.



F. L. Thompson, Appointed Assistant Chief Engineer of the I. C. R. R.



C. G. Delo, Chief Engineer of the Chicago Great Western R. R.

B. F. McCamey is appointed traveling freight agent of the Illinois Central R. R., with headquarters at Memphis, Tenn.

W. S. Yeatts, Canadian freight agent of the Pennsylvania Railroad at Toronto, Ont., has been appointed special agent in the general freight agent's office at Philadelphia, Pa., and **S. T. Stackpole**, freight solicitor, succeeds Mr. Yeatts. **R. K. Neilson** has been appointed freight solicitor, with office at Uniontown, Pa.

M. R. Leahy has been appointed assistant general passenger agent of the Chicago & Northwestern Ry. to succeed **J. W. Munn**, deceased. **J. A. Williams** succeeds Mr. Leahy as chief clerk of the general passenger department and is succeeded as terminal passenger and ticket agent at Chicago by **H. G. Van Winkle**, passenger agent at New York.

R. Daniels has been appointed assistant general passenger and ticket agent of the Missouri, Kansas & Texas Ry. of Texas, with headquarters at Dallas, Tex.

A. C. Carper, commercial agent of the New Orleans, Mobile & Chicago R. R. at Memphis, Tenn., has removed his headquarters to St. Louis, Mo. **W. H. Askew** has been appointed district freight and passenger agent, with office in Memphis, and **John O. Gill** has been appointed traveling freight and passenger agent at Memphis.

G. A. Weller has been appointed assistant general freight agent of the Ann Arbor R. R., with headquarters at Toledo, Ohio, in charge of industrial and development work and local traffic.

ENGINEERING.

J. B. Berry, assistant to the president of the Rock Island Lines, with office at Chicago, has resigned. Mr. Berry's plans for the future have not been announced.

C. P. Lloyd has been appointed superintendent of water service of the St. Louis & San Francisco R. R., with headquarters at Springfield, Mo.

D. R. Morris, signal engineer of the El Paso & Southwestern System, has resigned to take a position with the Federal Signal Co.

H. E. Hale, engineer maintenance of way of the Missouri Pacific-Iron Mountain system, southern district, with headquarters at Little Rock, Ark., has been appointed engineer for the presidents' committee on valuation, eastern group, with headquarters in New York. **R. C. White**, general roadmaster at Wynne, Ark., is appointed to succeed Mr. Hale as engineer maintenance of way.

D. J. Brumley, assistant chief engineer of the Illinois Central R. R., has been appointed valuation engineer with office at Chicago, effective April 1. **F. L. Thompson**, engineer of construction, has been appointed assistant chief engineer, with office at Chicago, succeeding Mr. Brumley and **August F. Blaess**, district engineer, Northern lines, has been appointed engineer maintenance of way, with headquarters at Chicago. **Patrick Laden** succeeds Mr. Blaess as district engineer, with headquarters at Chicago.

Charles G. Delo, whose appointment as chief engineer of the Chicago Great Western R. R. has been noted in these columns, was born December 5, 1866. He was graduated from Kansas State university and Cornell university and entered railway service in 1887 with the Atchison, Topeka & Santa Fe Ry. as rodman. He was draftsman in an architectural office for a time and from 1890 to July, 1902, was with the Burlington, Cedar Rapids & Northern Ry. as assistant engineer, then as draftsman, and later division engineer at Cedar Rapids, Iowa. He then became principal assistant engineer of the Chicago, Rock Island & Pacific Ry. at Chicago, resigning in November, 1903, to engage in contracting business. In March of the following year Mr. Delo returned to railway service as division engineer of the Chicago Great Western R. R. From July, 1905, to September, 1908, he was engineer maintenance of way of the Chicago & Alton at Kansas City, Mo., and Bloomington, Ill. He then went to the Chicago Great Western for three months as division engineer at Des Moines, Iowa, leaving that road in December, 1908, to become engineer maintenance of way of the National Railways of Mexico at the City of Mexico. In March, 1910, he again returned to the Chicago Great Western as engineer maintenance of way, from which position he has just been promoted to that of chief engineer.

MECHANICAL.

B. F. Lilly has been appointed general foreman of the car department of the St. Louis, Brownsville & Mexico Ry., with headquarters at Kingsville, Tex., succeeding **W. L. Jones**, resigned to take service with another company.

M. S. Montgomery has been appointed road foreman of

engines of the Northern Pacific Ry., with headquarters at Duluth, Minn.

OBITUARY.

William G. Bullit, formerly a vice-president of the Norfolk & Western Ry., died in Philadelphia, Pa., March 22, aged 58 years.

William O'Herin, assistant to general manager of the Missouri, Kansas & Texas Ry., at Dallas, Tex., died in Chicago, March 31, aged 69 years.

Charles F. Smith, division superintendent of the Oregon Short Line R. R. at Pocatello, Idaho, died at the home of his parents in Niagara Falls, N. Y., March 30. He had been granted a leave of absence by the Oregon Short Line last November, due to ill health.

James L. Frazier, former general manager of the California Northwestern and North Shore railroads, died in Rome, Italy, February 27, aged 65 years.

Arnold D. Perry, former general agent of the Chicago & Alton R. R. at Peoria, Ill., died recently in Bloomington, Ill., aged 61 years.

W. L. Hall, general attorney of the Texas & Pacific Ry., with headquarters at Dallas, Tex., died recently at the age of 61 years.

John N. Faithorn, former president and general manager of the Chicago Terminal Transfer R. R., died at Chicago, March 28, following a long illness. Mr. Faithorn was born in London, England, March 21, 1852. He was educated in St. Mark's college, London. When a boy he came to the United States with his parents, and when 20 years old took up railroad work, his first position being that of clerk in the offices of the Chicago & Alton R. R. In 1882 he was made auditor of the Southwestern Railway association. He was appointed chairman of the Southwestern Railway and Steamship association in 1890. In 1893 he was made general manager of the Wisconsin & Michigan railway and five years later he was made president and general manager of the St. Louis, Peoria & Northern Ry. He was vice-president of the Chicago & Alton R. R. from 1902 to 1904 and from August 1, 1899, to 1910, he was president and general manager of the Chicago Terminal Transfer R. R. He has since been president of the Faithorn Company, printers and manufacturing stationers, in Chicago.

NEW ROADS AND PROJECTS.

Alberta.—Final plans have been filed, according to a report from Edmonton, Alta., for the route of the Canadian Northwestern Ry. (Canadian Northern Ry.), which proposes to build a line into the Peace River country. The grade is reported completed practically as far as White Court, near the confluence of the McLeod and Athabasca rivers. The line will follow the valley of the Athabasca for about 50 miles on the south side, crossing the McLeod by a separate bridge. The line will cross the Smoky river about three miles from the confluence of the Wapiti, and it will pass just south of the town of Grand Prairie, between Saskatoon and Bear lakes.

Arizona.—Construction of a railroad 20 miles long from Yuma, Ariz., south, to provide transportation facilities for settlers in the Yuma irrigation project, has been authorized by the Department of Interior.

British Columbia.—The Esquimalt & Nanaimo Ry. expects to complete the Comox extension of its lines on Vancouver island, 44 miles, about July 1. Thirty miles of track have been laid to the Sable river, about five miles south of Union bay, where a steel bridge is now under construction. Another bridge is also being built over Trent river, four miles north of Union bay. As soon as the bridges are completed 15 miles of steel will be laid to Courteney, the terminus of the line.

Florida.—The South Florida & Gulf R. R., recently organized as reported in the Railway Review of February 28, filed articles of incorporation at Jacksonville, Fla., on March 30. The capital stock is \$50,000. **C. H. Armstrong**, Rochester, Minn., is president.

Georgia.—The Cumming & Norcross R. R. is reported chartered for the purpose of constructing a railroad from Cumming to Norcross, Ga., a distance of 23 miles. The company is capitalized at \$250,000. The offices of the company will be located at Forsyth, Ga. **C. L. Harris**, Cumming, Ga., is president; **J. R. McKelvey**, Lawrenceville, Ga., general manager and **P. B. Lawrence**, chief engineer.

The Georgia Chamber of Commerce advises that the fol-

lowing cities have written to the organization saying that their localities wanted a railroad: Danielsville, Madison county, R. C. Griffith, mayor; Dawsonville, Dawson county, H. Branon; Dahlonega, Lumpkin county, H. D. Gurley, president of the Bank of Dahlonega. It is stated that these localities would cooperate financially and otherwise in the building of railroads.

Kentucky.—A press report says that a preliminary survey will be made next month for the proposed Virginia & Hocking Valley Ry. along the entire eastern shore of Licking river from Falmouth, Ky. This project is backed by eastern coal operators and seeks an entrance into Newport and Cincinnati for West Virginia and eastern Kentucky coal.

Louisiana.—The Lyon Cypress Lumber Co., Marquette building, Chicago, which has recently acquired a large tract of lumber in Livingston parish, La., is contemplating the construction of ten-mile extension to its logging railroad.

The Mansfield & Northeastern Ry. has been chartered in Louisiana and will lease the Frost-Johnson tram road running from Mansfield to Naborton, La. The new company will extend the line three miles beyond the latter point to the Louisiana oil field.

Missouri.—The Caldwell County & Southern Ry. has been incorporated in Missouri with \$100,000 capital stock. The company proposes to operate a standard gage railroad 9½ miles long, connecting Kingston, the county seat of Caldwell county, Mo., with Hamilton, on the main line of the Chicago, Burlington & Quincy R. R. The board of directors is as follows: D. Miller, Kansas City; Perry Roberts, Hamilton, and F. L. Brown, H. C. Shiveley and S. C. Rogers, Kingston.

Nebraska.—The Chicago, Burlington & Quincy R. R., it is rumored, plans to start work May 1 on the construction of a cut-off from Chalco, Neb., to Yutan, Neb. A bridge would be built over the Platte river.

New Brunswick.—See Railway News under St. John & Quebec Ry.

New York.—Both houses of the New York state legislature have passed a measure extending the time within which the Frontier Terminal R. R. and Frontier & Western R. R. may complete their proposed lines.

Oregon.—The Oregon-Washington R. R. & Navigation Co. will construct a line of railroad from Coyote, Ore., to a point six miles west of Stanfield, Ore., a distance of approximately 20 miles, involving an expenditure of \$750,000. In connection with this work a change of present line is proposed from Echo, Ore., to a connection with above new line, a distance of eight miles, which will involve an expenditure of about \$350,000.

The Metolius, Prineville & Eastern Ry. plans to start work soon on the construction of its proposed line from Prineville, Crook county, Ore., to Metolius, Ore., a distance of about 31 miles. Walter G. Scheel, Tenino, Wash., is interested.

Pennsylvania.—The Easton & Western R. R. has been chartered to construct and operate a railroad from Easton to Hope's Lock, Northampton county, Pa. George F. Baer is president.

Texas.—L. J. Smith, Kansas City, Mo., one of the incorporators of the company which is organized to build the proposed Uvalde & Northern Ry., has been awarded contract for construction from Uvalde, Tex., to a point near the headwaters of Camp Wood creek in Edwards county, a distance of about 55 miles. Citizens of Uvalde are now engaged in raising a bonus of \$150,000 to have the line start from that city.

Utah.—The Central Utah R. R., according to report, has completed surveys for the construction of its proposed line from Salina to Nioche, Utah, via Salina Canon, a distance of 20 miles. See Railway Review of December 6, 1913.

West Virginia.—See New Roads and Projects under Kentucky.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Union Pacific R. R. has ordered 15 mikado type (2-8-2), 25 Pacific type (4-6-2) and 14 six-wheel (0-6-0) switching locomotives from the Lima Locomotive Corporation. The 40 road locomotives are all coal burning and will have 9000 gallon cylindrical tenders. Twelve of the switching locomotives are coal burners and two oil burners, all with 4000 gallon tenders.

—The Detroit, Toledo & Ironton R. R. has asked for bids on 10 mikado type (2-8-2) locomotives, weight of engine 297,500 lbs.

—The Ligonier Valley R. R. has ordered one American type (4-4-0) locomotive from the Baldwin Locomotive Works.

—The Lehigh Valley Coal Co. has ordered one four-wheeled switching locomotive from the Baldwin Locomotive Works.

—The Death Valley R. R., F. M. Smith, president, San Francisco, Cal., is reported in the market for locomotives.

Freight Cars.

—The Great Northern Ry. is in the market for 1000 refrigerator cars.

—The St. Louis, Brownsville & Mexico Ry., reported in the Railway Review of February 28 as contemplating the purchase of 600 freight cars, is taking bids on 200 box, 200 stock, 30 tank cars and 10 cabooses.

—The Detroit, Toledo & Ironton R. R. expects to purchase freight car equipment but has not yet determined number or types of cars required.

—The Death Valley R. R., F. M. Smith, president, San Francisco, Cal., is said to be in the market for rolling stock.

—The Railway Supply Co., St. Louis, Mo., is in the market for 5 gondola, 40 tank, 10 box and 10 flat cars for export to Mexico.

—The Central of Georgia Ry. has ordered 500 box cars from the Standard Steel Car Co.

—The Missouri, Kansas & Texas Ry. is in the market for 100 tank cars of 40 tons capacity.

Passenger Cars.

—The Pacific Great Eastern Ry. has ordered one 250 h. p. passenger motor car from the Hall-Scott Motor Car Co., and 3 trailer cars from the Canadian Car & Foundry Co.

—The Southern Railway has ordered 35 steel coaches and 5 steel parlor and baggage cars from the Pressed Steel Car Co., and 5 steel baggage and mail and 5 steel passenger express cars with the American Car & Foundry Co. The 5 postal cars on which bids were asked were not purchased and 4 steel diners are still pending.

Signals and Interlocking.

—The Baltimore & Ohio R. R. is installing a 35-lever electro-pneumatic interlocking plant at Green Springs, W. Va. The signals will be of the top-post type; twelve three-position and eight two-position, all upper quadrant.

—The Chicago & North Western Ry. has completed the installation of automatic block signals on its line between the Missouri valley and Sioux City, Iowa, a distance of 75 miles. The upper quadrant three position automatic block type of signal was used. Work on this improvement was started last September, and has been going on continuously ever since. Approximately 150 signals have been installed, an average of two to a mile. The signals are already being operated between Sioux City and Onawa, 37.2 miles, and between Missouri Valley and California Junction, 5.9 miles, and within a few days the section between California Junction and Onawa will also be in operation. In addition to this improvement, work is also under way on two other extensive pieces of signal protection work. One is on the main line west of Chicago, between Elmhurst and West Chicago. This stretch of track, about 14 miles in length, has up to this time been protected with the disk type of signal. Steps are now being taken to substitute the newer and improved upper quadrant signals mounted on signal bridges. The bridges will be made large enough to cover four tracks. The other work which is also under way, along the line from Ames to Des Moines, Ia., consists of the installation of a similar system over the 34 miles of track that connect those cities.

Iron and Steel.

—The International Traction Co., Buffalo, N. Y., has ordered 20,000 steel ties from the Carnegie Steel Co.

—The Southern Railway has closed with the Tennessee Coal, Iron & Railroad Co. for 9000 tons of plates, shapes and bars for work in its own shops.

—In order to make a test of the rigid specifications upon which it has been insisting in its negotiations with rail makers the Pennsylvania Railroad, it is said, has placed 10,000 tons with the Pennsylvania Steel Co., and 10,000 tons with the Cambria Steel Co. Nothing further will be done toward closing for the rest of the 175,000 to 200,000 tons

which the road is expected to order for 1914, until definite data is obtainable from tests of these rollings.

Bridges.

—The Wabash Railroad has awarded contract for proposed viaduct at Jasper street, Decatur, Ill., to cost \$25,000.

—The Pennsylvania Railroad has ordered 250 tons of bridge work from the Fort Pitt Bridge Works and 250 tons from L. F. Shoemaker & Co.

—The Northern Pacific Ry. has ordered 780 tons of bridge steel from the Milwaukee Bridge Co.

—The Southern Pacific Co. and Atchison, Topeka & Santa Fe Ry. has awarded contract to Milliken Bros., Inc., for 400 tons of steel for the proposed bascule bridge at Kentucky street, San Francisco, Cal.

—The Chesapeake & Ohio Ry. has awarded contract to the McClintic-Marshall Co. for about 300 tons of bridge steel.

—The Baltimore & Ohio R. R. will build a 60 ft. bridge over Concord turnpike, New Castle county, Del.

—Contracts involving nearly \$1,000,000 have been awarded by the Pennsylvania Railroad for the elevation of its tracks through Johnstown, Pa., and the elimination of six grade crossings. The first section, embracing the erection of retaining walls, an overhead bridge and subway, has been awarded to John Goll & Co., of Philadelphia. The other section, embracing three bridges, retaining walls and a bridge over the Conemaugh river, was awarded to P. McManus, Philadelphia.

Buildings, Terminals, Etc.

—The Atlantic Coast Line R. R. has appropriated \$110,000 for enlargements to its shops at Florence, S. C.

—Plans for a new passenger terminal for the New York Central Lines and the Pennsylvania Company in Cleveland, Ohio, are reported as approved at a closed meeting in the office of Mayor Newton D. Baker. After the conference it was announced that a referendum election would be held, probably in November, to permit voters to approve the sale of a site for the station on the lake front at approximately \$1,400,000. The improvements, it is said, will involve an expenditure of about \$17,000,000.

—That the Chicago, Rock Island & Pacific Ry. has awarded contract for a new station at Searcy, Ark., is denied.

—The shops of the Buffalo, Rochester & Pittsburgh Ry. at Dubois, Pa., will be enlarged. Alterations are to be made to the power house and additional machinery installed.

—The Chicago, Burlington & Quincy R. R. is preparing to build about 14 miles of additional trackage in the yards at Kewanee, Ill.

—The Lehigh Valley R. R. is planning to spend between \$3,000,000 and \$4,000,000 in extending and improving its terminal property and facilities at the mouth of the Morris Canal in Jersey City, N. J., providing the New Jersey legislature passes the bill for the sale of the canal and its property to the company.

—The Southern Railway is preparing to erect a freight and passenger depot at Clinton, Tenn.

—The Pennsylvania Railroad has acquired 65 acres of ground at Phillipsburg, N. J., which, it is said, will be used in extending company's yards at that place.

—The Northwestern Pacific R. R., it is said, will build roundhouse, shops and yards at San Rafael, Cal.

—Tenders for work on the new union station to be erected in Toronto, Ont., were to be called for this week. J. R. Ambrose is engineer of the Toronto Terminals Railway Co. The proposed improvements will cost about \$3,000,000.

—The Lehigh Valley R. R., through the Pioneer Realty Co., it is said, has purchased a plot of land embracing 63,000 feet in Scott street, Buffalo, N. Y., as part of a site for a new station. This and various other purchases are equivalent to more than six city blocks.

—The terminal commission of Buffalo, N. Y., it is announced, has approved the plans of the New York Central Lines for a new passenger terminal in that city only as far as location is concerned. This did not carry approval of all the plans. It was agreed by the representatives of the railroad and the city that the Terrace site, near the foot of Main street, is the logical one for the proposed passenger station, leaving the site of the present station as a location for a freight terminal. The plan involves the vacation of a number of unimportant streets and a request of the railroad for a strip of park land to widen the right of way. The cost of the terminal improvements, freight yard and pas-

senger station is estimated to be between \$9,000,000 and \$10,000,000. The New York Central would also erect a passenger station at East Buffalo and electrical operation between the two stations, about three and one-half miles, is contemplated.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, MARCH 24, 1914.

- Switch point, 1,090,832—Joseph Bellve and Thomas Wilson Potts, Dunedin, New Zealand.
- Car coupling, 1,090,839—Harry G. Dodds, Mobile, Ala.
- Electropneumatic brake system, 1,090,841—James S. Doyle, New York, N. Y., assignor to the Westinghouse Air Brake Co., Pittsburgh, Pa.
- Locomotive arch construction, 1,090,891—Enoch P. Stevens, Chicago, Ill., assignor to Locomotive Arch Brick Co., Chicago, Ill.
- Brake shoe, 1,090,892—Alfred L. Streeter, Chicago, Ill.
- Car coupling, 1,090,922—Walter La Fary, Herndon, Ia.
- Card for railway cars, 1,090,928—Duncan S. McEwing, Chicago, Ill.
- Shade roller for car windows, 1,090,931—Andrew McLean, Passaic, N. J.
- Rail anchor, 1,090,946—John M. Scott, Racine, Wis., assignor to Otto R. Barnett, Chicago, Ill.
- Rail joint, 1,090,949—Richard John Smith, Gwanda, Rhodesia, South Africa.
- Rail joint, 1,090,967—Albert Van Beuning and Benjamin F. Killam, Edgewater, Colo.
- Railroad tie, 1,090,978—Daniel S. Graeff, Hershey, Pa.
- Cattle guard, 1,090,979—Daniel Grant, Hamilton, Mont.
- Apparatus for preventing railway accidents, 1,090,998—Harvard L. Lockart, Philadelphia, Pa.
- Rail joint, 1,091,029—Charles C. Acker, Winnsboro, Tex.
- Combined tie plate and rail brace, 1,091,050—Isaac L. Edwards, Aurora, Ill.
- Fire-door operating device, 1,091,060—George H. Gregory, Mount Carmel, Ill.
- Water-tight, sanitary floor for cars and similar structures, 1,091,073—John Emory Meek, New York, N. Y., assignor to H. W. Johns-Manville Co., New York.
- Metallic railway tie, 1,091,088—Edward C. Shaw, Portsmouth, N. H.
- Railway signaling apparatus, 1,091,102—Benjamin Franklin Wooding, Denver, Colo.
- Car truck, 1,091,107—Walter S. Adams, Philadelphia, Pa., assignor to The J. G. Brill Co., Philadelphia, Pa.
- Universal carriage locomotive, 1,091,125—Karl Eickemeyer, Munich, Germany.
- Block signal system, 1,091,133 and 1,091,134—Laurence A. Hawkins, Schenectady, N. Y., assignor to the Union Switch & Signal Co., Pittsburgh, Pa.
- Bumping Post, 1,091,150—Lewis M. Lawrence, Birmingham, Ala.
- Steam locomotive, 1,091,178—George W. Wyman, Wilmington, Del.
- Means for cushioning the bodies of railway cars, 1,091,183—William P. Bettendorf, Bettendorf, Ia.
- Hub plate, 1,091,192—Matthias Christman, Springfield, Mo.
- Locomotive grate lever and handle, 1,091,212—Charley W. Gregory, Goodland, Kan.
- Metallic running board, 1,091,214—Edward Gruber, Cleveland O., assignor to the Hydraulic Pressed Steel Co., Cleveland, O.
- Automatic train stop, 1,091,268—Judge Shirlock Allen, New York, N. Y.
- Rail construction, 1,091,281—Marshall R. Brown, Bellefontaine, O.
- Railway rail, 1,091,323—James S. Fox, Jackson, Mich.
- Railway car underframe, 1,091,324—Charles F. Frede, St. Louis, Mo., assignor to Commonwealth Steel Co., St. Louis, Mo.
- Pneumatic derailer, 1,091,367—John J. McIntyre, Uniontown, Pa.
- Truck bolster, 1,091,375—Yuske Miyasaki, McKees Rocks, Pa.
- Car wheel guard, 1,091,409—William F. West, Minneapolis, Minn.
- Air brake, 1,091,416—Andrew J. Wisner, Philadelphia, Pa.
- Car truck, 1,091,431—James T. Halsey, Philadelphia, Pa., assignor to Philadelphia Holding Co., Philadelphia, Pa.
- Wheel mounting or demounting press, 1,091,457 and 1,091,458—Albert A. Longaker, Chambersburg, Pa., assignor to Chambersburg Engineering Co., Chambersburg, Pa.
- Rail joint, 13,703, reissued—Joseph M. Johnson, Millersburg, Pa., assignor to The Rail Joint Co., New York.

RAILWAY REVIEW

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Mr. Daniels' Nomination Opposed on Question of Valuation.

President Wilson's nomination of Winthrop More Daniels of Princeton, a member of the New Jersey Public Service Commission, to be a member of the Interstate Commerce Commission, was confirmed by the United States senate April 3, by a majority of nine. The senate's proceedings were in executive session, but it is known that a determined opposition to the ratification of Mr. Daniels, as a commissioner, developed on the part of some of the senators who have been most radical in their position on railroad questions. It is understood that the basic objection to the confirmation of the president's choice was a finding of Professor Daniels made in the case of the Passaic Gas Light Co., while a member of the New Jersey commission. In this instance Professor Daniels had, after an investigation covering the period from 1911 to 1913, decided that in addition to the actual naked physical value of the real estate, pipe lines, machinery, buildings and supplies of the Passaic concern, "the intangible assets" of the corporation under which were included franchise, good will, certain methods of singular and specific value in the conduct of the business, should add to this strictly physical value an additional 17.6 per cent of actual inherent worth. Further he set the fact that it was "a going concern" as worth an additional 30 per cent. The opposing senators took the extraordinary view that a man who could take this position was unfitted to help decide the greater problem of physical valuation of the railroads now pending before the commission.

Limit on Baggage Liability Upheld.

The United States Supreme court rendered a decision, April 6, which upholds the practice of railroads limiting their liability for baggage to \$100, unless a greater value is declared by the passenger. The practice is declared valid under the Hepburn rate law, even though the passenger has no personal knowledge of the limitation. The decision was in the suit of Mrs. Katherine Hooker, of Los Angeles, against the Boston & Maine R. R., for baggage destroyed by fire at the Lake Sinapee railroad station in New Hampshire, in 1908. The courts of Massachusetts allowed her a judgment of \$2,133.04, as full value of the baggage. Under the Supreme court's decision today she will be able to recover only \$100. "This decision varies much from anything of the kind ever decided by this court or any other court," said Justice Pitney in a dissenting opinion.

Good Results in Efficiency Tests, P. R. R.

During 1913 exactly 212,779 efficiency tests were made to ascertain the observance of train safety rules on the Pennsylvania Railroad between New York and Philadelphia, the New York division, and 99.65 per cent showed perfect performance. One thousand fifty-seven checks were made of the observance of signals set at "danger," and the result was practically perfect. In two cases trains passed signals by only sixteen or seventeen feet, but they were counted as failures. These were the only trains that failed to come to a stop at a danger signal. The other tests were of rules concerning "engineer's observance of flagman's signal," "flagman's performance," "conformity to speed regulations," and similar ones. In summarizing his report for the year, the superintendent of the New York division makes

this comment: "I think failures are becoming generally less each month, and I further feel that we are having better cooperation of the men in general in trying to comply with the rules."

Tests of Shipments of Dressed Poultry.

The bureau of chemistry of the United States Department of Agriculture has completed an extended series of tests pertaining to the efficiency of refrigerator cars in the shipment of dressed poultry, and to determine the changes that take place in this poultry in transit at different temperatures. The bureau made complete examinations and records of 120 carload shipments of dressed poultry which traveled an aggregate of 140,000 miles. The hauls averaged between 1000 and 1500 miles, and terminated generally in New York city. No car was used twice, and many different types of ordinary refrigerator cars were employed. The shipments were made in winter and summer, so that the effect of outside temperatures could be determined. Many of the cars were equipped with accurate recording devices which showed the temperature near the ice bunker and in various parts of the car, and also outside temperatures. As a result of this experiment the report is made that the builders of refrigerator cars have not kept pace with the refrigerating industry in general. The bureau also determined the temperatures which best keep poultry fresh in long trips from Iowa or Tennessee to the Atlantic Coast markets. These results are reported in bulletin No. 17, "The Refrigeration of Dressed Poultry in Transit," which contains a large number of tables and illustrations in its 35 pages.

To Hear Testimony on Efficiency Systems.

Efficiency systems and their effect on industrial relations will be considered by the United States Commission on Industrial Relations at public hearings to be held in Washington for three days beginning Monday April 13. Witnesses called by the commission will be asked to testify with special regard to the status of the workman under "scientific management." Consulting engineers and employers who have led in the introduction of efficiency systems will alternate with trade union officials on the stand. On Monday April 13, the witnesses will be Frederick W. Taylor of Philadelphia, who originated and developed the Taylor system of scientific management; James Duncan of Quincy, Mass., first vice-president of the American Federation of Labor; Dr. Charles W. Mixter of New Haven, Conn.; Louis D. Brandeis of Boston, special counsel to the Interstate Commerce Commission; Harrington Emerson, of New York city, consulting engineer; and John F. Tobin of Boston, general president of the Boot and Shoe Workers Union. On Tuesday April 14, the following will testify: R. G. Valentine of Boston, consulting engineer; J. M. Dodge of Philadelphia, president of the Link Belt Company; William H. Johnston of Washington, president of the International Association of Machinists; Carl G. Barth of Philadelphia, consulting engineer; A. L. Berres of Washington secretary of the metal trades department, American Federation of Labor; David Van Alstyne of New York city, consulting engineer; and John P. Frey of Cincinnati, editor of the Molders Journal. The witnesses on Wednesday April 15th will be: Sidney E. Thompson of Newton Highlands, Mass., consulting engineer; William J. Bowen of Indianapolis, president of the Bricklayers' & Masons' Union; H. L. Gantt of New York, consulting engineer; and John Golden, president, United Textile Workers, Fall River, Mass.

Bridge Wreck on the Wabash R. R.

On April 5 part of the "Continental Limited" train of the Wabash R. R. fell with a bridge into the Wabash river, near Attica, Ind., and the engine man, fireman and baggageman were

killed. Besides these a number of passengers were injured. The engine and the first baggage car fell at the edge of the water and the combination baggage and smoking car fell into the river. When the cars left the bridge the day coach, which was crowded, fell with the rear end out of the water and though the majority of the injured were in this car, none of them was killed. Unofficial reports published in the newspapers state that the bridge in question had been injured by the wreck or derailment of a freight train, and after repairs had been made locomotives were sent across to test the strength of the structure. As it was considered safe the passenger train was then permitted to proceed across the bridge slowly, with the result as stated.

Enormous Wheat Crop Promised.

The forecast of the winter wheat crop of the United States issued this week by the Department of Agriculture, estimates on a conservative basis that the yield may exceed 551,000,000 bushels. The statement says: "The condition of winter wheat on April 1—viz., 95.6 per cent of normal—is 11.5 per cent higher than the average of the past ten years. The yield per acre in the same ten years averaged 15 bushels; an increase of 11.5 per cent to this average would be 16.7 bushels. The acreage planted last fall was estimated at 36,506,000; 16.7 bushels (the average yield), applied to this acreage, gives 609,650,000 bushels. But there is always some of the planted area abandoned before harvest the average of such abandonment in the last ten years has been about 9.6 per cent of the area planted. If this average of abandonment be deducted from the estimated planted area, and 16.7 be applied to the remaining output, a production of about 551,000,000 would be indicated. The wheat plant wintered unusually well, and it is not to be expected that the ten-year average of abandonment has occurred this year. On the other hand, a crop that is in very high condition on April 1, as is the case this year, is more susceptible to depreciation later in the season than a crop having a lower condition on April 1. The final estimate of production of winter wheat in 1913 was 523,561,000 bushels (the largest ever recorded) and in 1912 it was 399,919,000 bushels."

Conductor Arrested by Federal Agents for Cutting Fares.

United States authorities arrested William A. Boyer of Chicago, a conductor on the Chesapeake & Ohio Ry., at Cincinnati, Ohio, April 9, on a charge of violating the Hepburn act. It was alleged he allowed Chicago-Cincinnati passengers to ride for \$3, although the fare when collected on trains is \$6.10. It is understood that federal indictments accusing others of the same offense are in the hands of officers charged to make more arrests. In fact there have been very specific rumors that the present disclosures are the first of an important series of conspiracies which the federal agents have uncovered.

Settlement in the Missouri Baggage Book Controversy.

At a hearing before the Missouri public service commission at Jefferson City, Mo., April 7, representatives of Missouri trunk lines, traveling men's organizations and large commercial establishments of St. Louis and Kansas City reached an agreement in the matter of excess baggage books. The complainants agreed to withdraw their protests against the roads, which were filed when the lines decided to withdraw the excess baggage books from sale, about six months ago. The railroads agreed to continue the sale of the books, at face value, and to honor those previously sold, in accordance with the condition of sale. The trouble started when the 2-cent passenger fare law became effective in Missouri. Previous to that time the railroads had charged 12½ per cent of the cost of a first-class ticket for carrying each 100 pounds of excess baggage. The roads also had been selling coupons good for payment of such charges at a reduction of 20 per cent from the face value of

the coupons. When the rate became effective the 12½ per cent collected was so reduced that the carriers did not care to continue their 20 per cent reductions. Therefore they issued tariffs withdrawing the books from sale and providing that books already sold would not be honored. During October the commission suspended numerous tariffs affecting the sale of baggage books. The commission has given the carriers authority to put into effect immediately the new arrangement.

Heavy Fines in Rebate Case.

The United States circuit court of appeals at Cincinnati on April 7, handed down opinions sustaining fines of \$14,000 and \$3000, respectively, against the Grand Rapids & Indiana Ry. for granting and Nichols & Cox Lumber Co. of Grand Rapids, for accepting rebates. These fines had previously been levied in the United States district court at Grand Rapids, Mich., and the appeals of the two companies were dismissed. The indictment against the railway company contained 14 counts, while that against the lumber company contained three counts, the jury finding the companies guilty on all of the counts, District Judge Sessions at Grand Rapids assessed a fine of \$1000 upon each count. The alleged rebates grew out of admitted abuses of transit privileges accorded to shippers of lumber. Fourteen car loads of lumber were claimed to have been shipped to and fourteen car loads shipped from Grand Rapids, but without any transit relations that would entitle either the inbound or outbound shipments to the benefits of the transit rates. The total of the rebates alleged accepted by the lumber company was \$105.16. Five other cases of similar nature were simultaneously decided by the decision of the high court, the cases being against five firms indicted at the time of the Nichols & Cox Lumber Co. It was agreed that if upon the appeal of the Nichols & Cox case the decision of the district judge was affirmed, pleas of guilty would be interposed in the other cases and the defendants would submit to fines.

Economy Campaign on Baltimore & Ohio R. R.

Urging conservation of materials and economy in the use of supplies, W. T. Lechliden, superintendent of the Baltimore & Ohio R. R., at Cleveland, Ohio, has issued a circular to the trainmen, mechanics, trackmen and laborers in that territory to save every article for which there may be future use, thus reducing the cost of operation. "If you find a spike, bolt or nut, safety appliance or tool which has been lost or mislaid, pick it up and turn it in," reads the circular, "for it will cut down wasteful expense and reflect to the credit of the officials and employees of the Cleveland division." The appeal delegates each employee as a member of the efficiency committee that aims to prevent waste, better the service and contribute to economical operation. Superintendent Lechliden directs the attention of his force to the action of Engineman Harrison Lynch, who runs an engine into the Cleveland terminal. The engineer, having heard a conversation between officials as to the possible saving in the use of mislaid materials, brought his engine into Cleveland, after a recent run, with five angle cocks with air hose attached and nine hose clutches, which meant a saving of \$15.95 to the company. Like economies will be undertaken in a systematic manner by the railroad employees over all of the lines of the Baltimore & Ohio system.

Canadian Freight Rate Reductions.

Canadian freight rates were materially reduced as the result of a decision rendered by the railway commission, of Canada on April 7. By the terms of this ruling new rate zones and standard tariffs are established. All Canada west of the Great Lakes is divided into three zones, the first extending from the lakes to the mountains and to be known as the "Prairie" section. The "Pacific" section is to include British Columbia, while a zone to be known as "British Co-

lumbia Lakes" section applies to the navigable waters in that province. For each of these sections a standard of maximum freight rates has been set. What is at present known as the Manitoba standard has been extended to fix all rates in the Prairie and British Columbia Lakes sections, abolishing the higher rates now charged in Saskatchewan and Alberta. While the Pacific section rates will be somewhat higher than those of the Prairie and British Columbia Lake sections, they will nevertheless be lower than the maximums now in force in Saskatchewan, Alberta and British Columbia, the provinces included in this section. The reduction in freight rates will amount to from 5 to 30 per cent on nearly all classes of goods on all railways operating from Winnipeg to the Pacific Coast, and will go into effect on September 1 of this year.

Bureau of Information of the Eastern Railways.

A new institution with the title of Bureau of Information of the Eastern Railways has been established, with John G. Walber, formerly with the Baltimore & Ohio R. R., in charge, as secretary. The purpose of the bureau will be to collect, tabulate and

keep up to date, rates of pay, rules of service and working conditions affecting railway employees throughout the country, in such classes of service as may hereafter be decided upon. A mass of data was collected in connection with the recent arbitration proceedings of the engineers', firemen's and conductors' and trainmen's cases, by the conference committee of managers, and is the intention to continue such records and keep authentic information for the use of the members of the bureau. Each railroad has been attempting to keep up this information, but it is believed that centralizing such efforts will be more economical and also more reliable. No member of the bureau commits his company in any way to joint proceedings concerning wages. Mr. Walber has been, since 1912, assistant to the third vice-president of the Baltimore & Ohio system, including the Baltimore & Ohio Southwestern, the Cincinnati, Hamilton & Dayton and the Staten Island lines, in charge of wage, discipline and employment bureaus. He had charge of the preparation of the case for the railroads in the recent firemen's and conductors' and trainmen's arbitrations, and appeared as their principal witness in the hearings. The office of the new bureau will be in the Grand Central Terminal, Forty-fifth street, New York city.

New Dock Facilities of the Hocking Valley Ry. at East Toledo, Ohio

Description of a notable improvement by the Hocking Valley Ry., on the east side of the Maumee river, Toledo, Ohio, now approaching completion. The undertaking included construction of two large docks, erection of a power house and car dumping machines, and construction of a cut-off line and yards, involving separation of grades and erection of four bridges, and heavy excavation. The improvement will double the Hocking Valley's facilities for handling coal traffic to the upper lakes and the Northwest.

The Hocking Valley Ry. has been working for a year past on the construction of new coal dock facilities, at Toledo, Ohio, on the east side of the Maumee river, opposite its present coal dock. Upon the completion of this work, which will probably be some time during the coming spring, the present dock, which is equipped with one unloading machine, will be conveyed to the Pennsylvania R. R., and will be used by that company to enlarge its facilities at that

place; while the Hocking Valley will more than double its present capacity in using the new dock exclusively. The improvement will give the Hocking Valley modern facilities for handling a heavy coal traffic destined from its lines to the upper lakes and the Northwest, and the dock will be large enough to accommodate the largest vessels now engaged in this trade.

The Hocking Valley's new site consists of an irregularly shaped parcel of land with a dock frontage of approximately 1600 ft., which the road has owned for many years; but it was necessary to build a new line to gain access to this place. This line cuts off from the Toledo Terminal Ry. at Starr Avenue, East Toledo, and extends by a 1½-mile tangent in a northwesterly direction, to the river front. The route and surroundings may be noted on the accompanying map, Fig. 1. This section of the city is only partially platted, and is comparatively unimproved. All the land occupied by the new right of way



Fig. 2—View During Construction of Coal Dock, Hocking Valley Ry., East Toledo, Ohio. Coal Pier Partly Completed, and Sinking of Crlbs In Progress for Ore Dock.



Fig. 1—General Layout of Coal Dock Improvement, Hocking Valley Ry., East Toledo, Ohio, and Route of Cut-Off to Site.

was practically free from buildings, and the main roads or streets previously open are allowed to remain so by separation of grades. These thoroughfares are Seaman road, at which the railroad passes above the highway, and Front street, at which the street and street railway pass over the railroad tracks. The new line also intersects the Toledo Belt tracks of the Wheeling & Lake Erie R. R., and here also grade separation was necessary. To effect this the Wheeling & Lake Erie tracks were raised to a height of 14 ft., in order to keep the Hocking Valley tracks on the low grade, and give the most advantageous access to the coal dock. This extensive elevation of the Wheeling & Lake Erie tracks necessitated another overhead crossing of the highway at Seaman road, making in all four viaducts or bridges involved in the whole enterprise.

The Hocking Valley's cut-off approach includes two yards, the extent of which will be determined in part by the future development of the dock, of which a prospective layout is shown in the illustration, Fig. 1. At the immediate approach to the dock, the center tracks are running tracks for the loaded and empty car movement, and on either side of these dock tracks between Front street and the W. & L. E. R. R. is for storage of empty and loaded cars. The grade on the approaches to the dock is such as to afford a gravity movement of loaded and empty cars. After the car is dumped it is switched onto the empty running track by gravity. This arrangement necessitated a low elevation for the entire cut-off line and yards, and as a matter of fact the construction involved heavy steam shovel excavation from the W. & L. E. R. R. to the water front.

The dock structures are two in number, with a third proposed, as shown in the accompany plan, Fig. 3. In the center is the coal pier, 170 ft. wide, built on a pile substructure. On each side are the slips, roughly some 250 ft. in width and 850 ft. in length. The upstream slip is formed in part by the ore dock, which is built on a submerged timber crib. Downstream is the proposed ore dock.

The accompanying illustrations, Figs. 4 and 5, are sections indicating the construction of the two types of dock. The crib, which is the substructure of the ore dock, is built up of 2x12-in. timbers on the outside faces, and 2x10-in. timber elsewhere. The bottom members are 12x12-in. square timbers. The intersecting cribs form pockets roughly 12 ft. square, all of which are filled with sand. The elevation of the top of the crib is four feet below water level, the concrete dock face continuing from this point to the top of the dock, at an elevation of 10 feet above water level. Tie rods $2\frac{1}{4}$ ins. in diameter extend from the concrete dock wall to pile anchorages, located well in the rear.

The concrete which forms the dock wall is three feet wide on the top coping, in front of which is a berm four feet wide and three feet deep along which cast iron mooring posts are set. The whole broadens out to 13 ft., 9 ins. at the base. There is a small amount of 1-in. square reinforcing in this section, extending both laterally and transversely and at the dock face three 10-in. I-beams are embedded with the flange flush to the wall, to act as a reinforcing against abrasion by vessels. Eye bolts, $1\frac{1}{4}$ ins. in diameter, carrying $1\frac{1}{4}$ -in. rings, are embedded at intervals along the dock face for the purpose of hanging timber fenders therefrom.

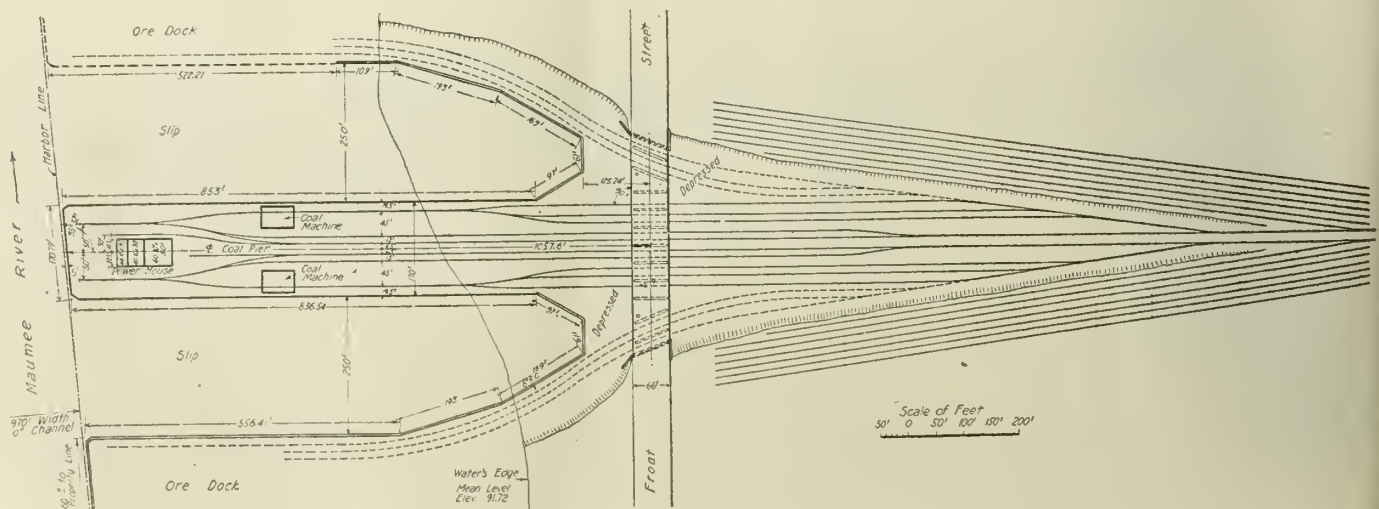


Fig. 3—Plan of Coal Pier and Ore Dock and Terminal Trackage, Hocking Valley Ry., East Toledo, Ohio.

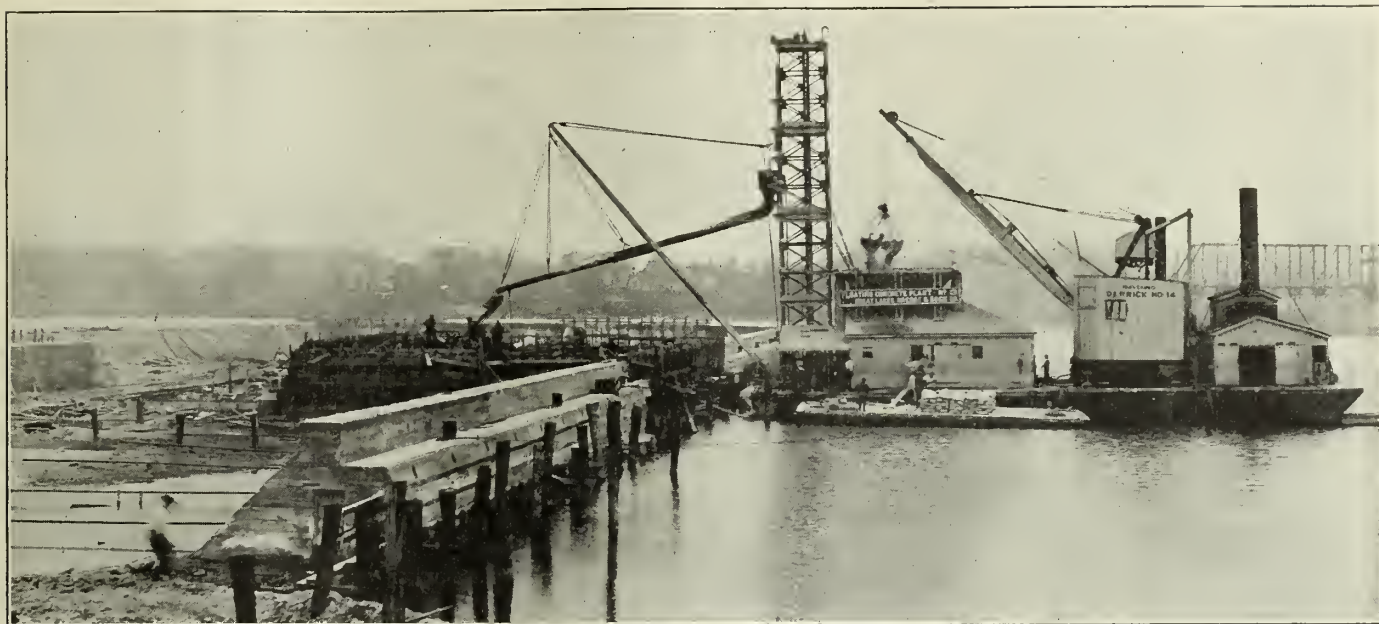


Fig. 4—Floating Concrete Plant Depositing Concrete for Down-stream Car Dumper Foundation, Hocking Valley Ry., East Toledo, Ohio.

The coal pier as mentioned above, is founded on piles. The piles are 45-ft. white oak, driven in four longitudinal rows carrying the concrete dock face. The outside row of piles is spaced 2 ft. 6 ins. center to center, and the second row is spaced as closely as the piles could be driven. Flush against this row of piles and back of same a line of steel sheet piling is driven, to prevent displacement of the sand fill which occupies the interior of the dock. The other two rows of piles are spaced six feet center to center longitudinally. Tie rods $2\frac{1}{4}$ ins. in diameter and spaced at uniform intervals tie the two side walls of the coal pier together. The wood piles are sawed off at an elevation of 2 ft. 6 ins. below mean water level, and the base of the concrete work is four feet below mean water level. The base is 16 ft. 6 ins. in width, and the top of the dock is ten feet above mean water level.

The concrete in both docks is a 1:3:5 mixture, and that part of it which is below water level was deposited under water. The concrete on the coal pier was placed before the slip was dredged and rests directly upon the sand fill. Wooden forms in sections were used for the upper portions. The concrete was deposited from floating concrete mixing plants of the Great Lakes Dredge & Dock Co., Cleveland, Ohio. This concern was the contractor for the dock structures entire. The accompanying illustration, Fig. 2, is a general view of the site, taken early in January of this year, in which the sinking of one

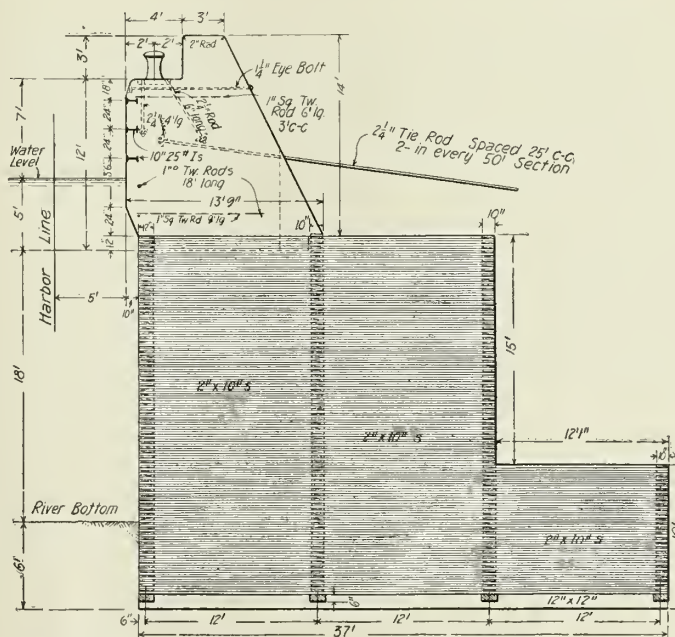


Fig. 6—Sectional View Showing Crib Dock Construction, East Toledo Improvement, Hocking Valley Ry.



Fig. 5—Progress View Showing Concrete Wall of Crib Dock and Anchorages of Tie Rods, Hocking Valley Ry., Toledo, Ohio.

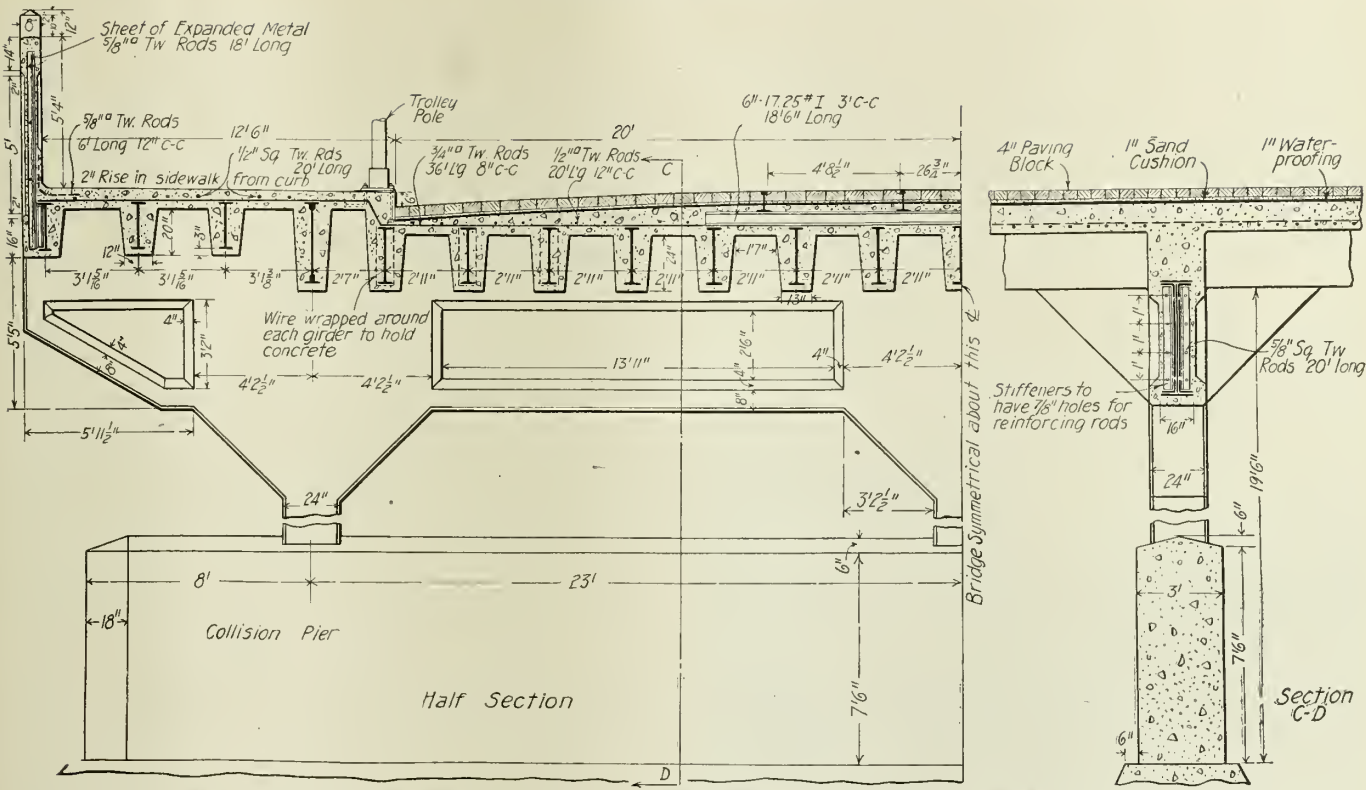


Fig. 9—Transverse and Longitudinal Section of Front Street Viaduct, Coal Dock Improvement, Hocking Valley Ry., East Toledo.

molded in the concrete floor. The purpose is to lighten the structure, and economize the concrete.

As was stated above, elevation of the Wheeling & Lake Erie tracks, for the sake of letting the Hocking Valley come under at low elevation, extended as far back as the intersection with Seaman road; and the Hocking Valley was

obliged to construct for the other company, an overcrossing at that thoroughfare. This structure is similar in type to the Hocking Valley's viaduct at Seaman road, previously described, the variations being only in minor details and dimensions, and the description of one will serve for both.

The Front street viaduct, by which the Hocking Valley carries the street railway tracks and highway over its right of way, provides space for 16 tracks, although only 10 will be laid at present. Longitudinal and transverse sections showing the design of this structure are given in the accompanying illustration, Fig. 9. The floor used in this design is made up of a series of longitudinal 24-in. I-beams varying in weight from 80 to 120 lbs., according to load requirements. The floor is filled in with concrete, as indicated in the drawing previously referred to. The intermediate supports are of the same description and dimension as the Seaman Road viaduct, 24 ins. square. They are three in number to each bent, and located on 23-ft. centers. The transverse girders which span these intervals are built up, 48 ins. in depth, and encased in concrete. The prevailing spans of the viaduct are

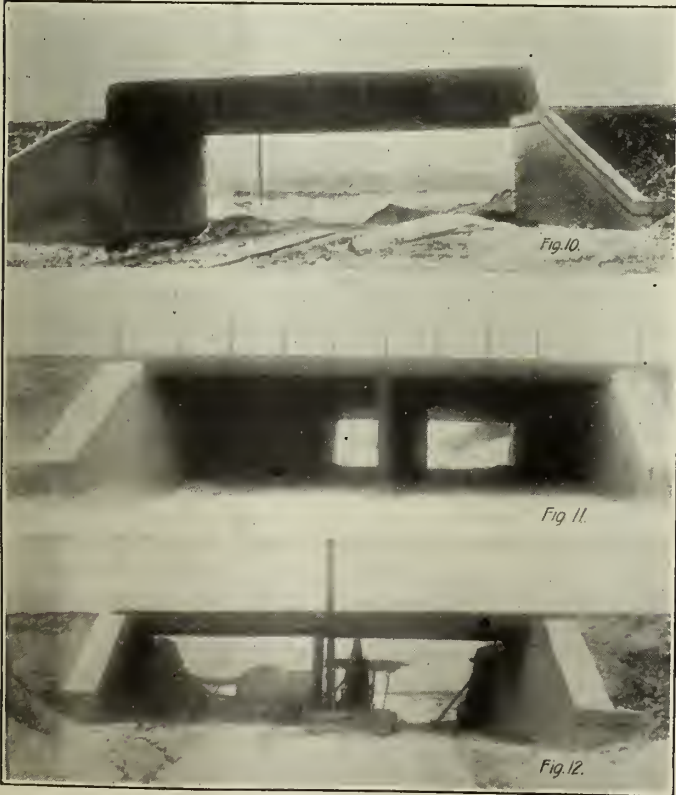


Fig. 10—Overhead Crossing of W. & L. E. R. R. at Hocking Valley Ry.
Fig. 11—Overhead Crossing of Hocking Valley Ry. at Seaman Road.
Fig. 12—Overhead Crossing of W. & L. E. R. R. at Seaman Road.



Fig. 13—Front Street Viaduct Over Hocking Valley Ry., East Toledo Coal Dock Improvement.

32 ft. in length. There is in this structure, the addition of a concrete collision pier which extends continuously across the structure along each row of the supports. It is three feet in thickness and eight feet in high and pointed at each end.

The bridge at the intersection of the Wheeling & Lake Erie and the Hocking Valley, unlike the other structures, will not be encased in concrete at once, although it is designed with this in view at some future date. This bridge is simply a through girder span, 67 ft. long, 61 ft. between abutments. The width between centers of girders is 15 ft. 4



Fig. 14—Concrete Wall of Coal Pier, and Power House Partly Erected, Hocking Valley Ry., East Toledo, Ohio.

ins. The girder is designed for Cooper's E-60 loading. The floor consists of 15-in. beams, spaced 16 ins. center to center. For vertical clearance reasons a center girder was necessary, in order to get a shallow floor system of 15-in. I-beams, to which the rails are secured.

We are indebted for the privilege of presenting the foregoing description, to the courtesy of Mr. D. W. Smith, engineer of construction, Hocking Valley Ry., Columbus, Ohio, who supplied us with data and drawings, supplementing the observations of our staff representative. For the most of the photographs showing construction work on the docks, we are indebted to the kindness of the Great Lakes Dredge & Dock Co., Cleveland, Ohio, whose part in the construction work was mentioned above.

John Barrett Says Get Ready for the Panama Canal.

John Barrett, director of the Pan-American Union, former United States minister to Argentine Republic, Panama and Colombo, spoke before the Traffic Club of Pittsburgh, March 27, on "The Panama Canal and Pan-American Commerce; What They Mean to the Traffic Interests of the United States." The speaker began by assuring the traffic men that the Panama canal will be a real benefit to the railroads as well as to the country at large. The canal, he said, would take up a certain fragment of the freight traffic, but what the railroads will lose to the water way they would more than make up through a greater development of other business. Mr. Barrett said that the tolls question, in his opinion, is a secondary one, and need not cause worry to anyone interested in the railroads. The need of the situation, said Mr. Barrett, is for railroad men to begin a systematic and comprehensive and detailed study of the new conditions, and how best to meet them. Every country in the world which is likely to be affected by the

canal has already made its study of what is to come, except ours. Extracts from Mr. Barrett's address follow:

"The Panama canal will have a great influence upon the railroads of the United States. That this influence will be favorable I am convinced. It is no exaggeration, in my opinion, to state that the traffic which should develop through the Panama canal will prove a boon to the railroads of Atlantic and Pacific coasts and central sections of the United States. At first the transcontinental systems or their sections between the Mississippi valley and the Pacific coast may suffer from the competition of the canal, especially in the bulky class of freight, but in the course of a few years what they will lose in this respect will be more than counterbalanced by their growth of business in the increased prosperity of both the Pacific coast and the western portion of the central west. In other words, in the course of five years the increased development of local business which will come indirectly from the opening of the canal will far more than make up for the loss of the heavy through freight business.

"The possibilities of the Panama canal and of Pan-American commerce are today the greatest foreign problems and opportunities which confront railroad and business interests of the United States. Getting ready for the Panama canal and going after Pan-American and Pacific trade should be the special study of this hour of every railroad system and of every manufacturing company which in any way are concerned with export business. The railroads in every part of land should join with commercial organizations and civic societies in not only studying the meaning and possibilities of the canal and of the commerce which it will develop, but in actively and actually preparing to use the canal to send exports out, bringing imports back and above all things to meet the competition of such countries as England, Germany and France and Europe and Japan and Asia.

"Not to be sensational, but simply to tell the truth, I am compelled to sound here in this great gathering of traffic men a strong note of warning. It is that the powerful traffic interests of Europe on the east, and of Japan on the west are leaving no effort unneglected not only to understand all the conditions of foreign trade affected by the Panama canal, but to get ready for it in a practical way. The investigation which I have carried on both officially and personally as to what is being done by the great commercial interests of Europe and Asia convince me that unless the corresponding interests of the United States wake up and make extraordinary efforts along the same line the canal will prove a far greater advantage during the earlier years of its use to foreign lands than it will to the United States.

"The issue of the canal tolls, which is now engaging Washington and the country, is absolutely unimportant and secondary as far as actual trade conditions are concerned when compared to the importance of practical steps to use the canal for the upbuilding of the export and import traffic of the United States. There is not a great port or exporting or importing center of Europe, of Japan, of Australia and of northern and western South America that is not today doing more to get ready for the Panama canal than our corresponding ports and centers of the United States with the possible exception of New Orleans and San Francisco.

"Another note of warning that I desire to sound is this: The Panama canal will not be a magic influence or a talisman of trade which will suddenly crowd our coast harbors with additional shipping, make busy our manufacturing establishments which are running on half force and provide freight for all of the idle cars of the railroads, but it can and will accomplish such results in a reasonable period of years provided we prepare to use it and actively go after

the commercial features just as we would prepare to use a new great trunk railroad in the United States and go after the trade which it would open up.

"The one great danger and problem confronting the whole United States today in connection with the Panama canal is that we have become so awed and impressed by the greatness of it as an engineering triumph and we have also become so proud of ourselves in accomplishing the joining of the oceans that we have overlooked the vital and all important necessity of getting ready for it so that we can use it at the fullest advantage 'from the jump,' as it were, when it is opened. Colonel Goethals tells us that in all probability he can put a regular commercial steamship through the canal in July; that is only three months distant. The formal official opening will come in January, 1915; that is only nine months away. And yet, when we call the roll of preparation on the part of the railroad lines, on the part of the steamship lines, on the part of the manufacturing, exporting and importing interests, what have they actually done in getting ready to use the canal and to go after the commerce which it should develop?"

Government Loses in Coal Trust Suit.

The federal government's suit against the Delaware, Lackawanna & Western R. R. and the Delaware, Lackawanna & Western Coal Co. for alleged violation of the commodities clause and the Sherman anti-trust law, was decided in favor of the corporations, Tuesday, April 7, by the action of the United States court in filing an opinion dismissing the suit. The court held that there is no United States law or decision prohibiting

against the Lehigh Valley R. R. and its subsidiaries in the federal court in New York, and another government action against the Philadelphia & Reading to separate it from the Central R. R. of New Jersey, and other interests is in the United States court in Philadelphia.

The present decision is the second that the same court has handed down in a commodities clause case. The first case involved all the anthracite roads and reached the Supreme court, which decided that the commodities clause was constitutional, but that a railroad might own stock in a bona fide corporation which owns the commodity. After the Supreme court decision the Delaware, Lackawanna & Western R. R. declared an extra dividend of 50 per cent, and the stockholders were given the option to use half of the dividend to purchase stock of the Delaware, Lackawanna & Western Coal Co., which was organized to take over the marketing of the railroad's coal.

The government's contention in the suit now dismissed was that the Delaware, Lackawanna & Western R. R. and the Delaware, Lackawanna & Western Coal Co. were practically the same corporation, and that they were violating the law for the reason that the Delaware, Lackawanna & Western R. R. was admittedly engaged in transporting over its lines a large quantity of coal shipped by the coal company. It was admitted that the stock of the coal company was largely owned by stockholders of the railroad company, but it was contended on the part of the defendants that there was a bona fide distinction between the two companies. The opinion goes extensively into former decisions in the United States courts, including the United States Supreme court, in which the defendant companies with other companies were involved. It is pointed out that after these decisions, which were adverse to the defendants,

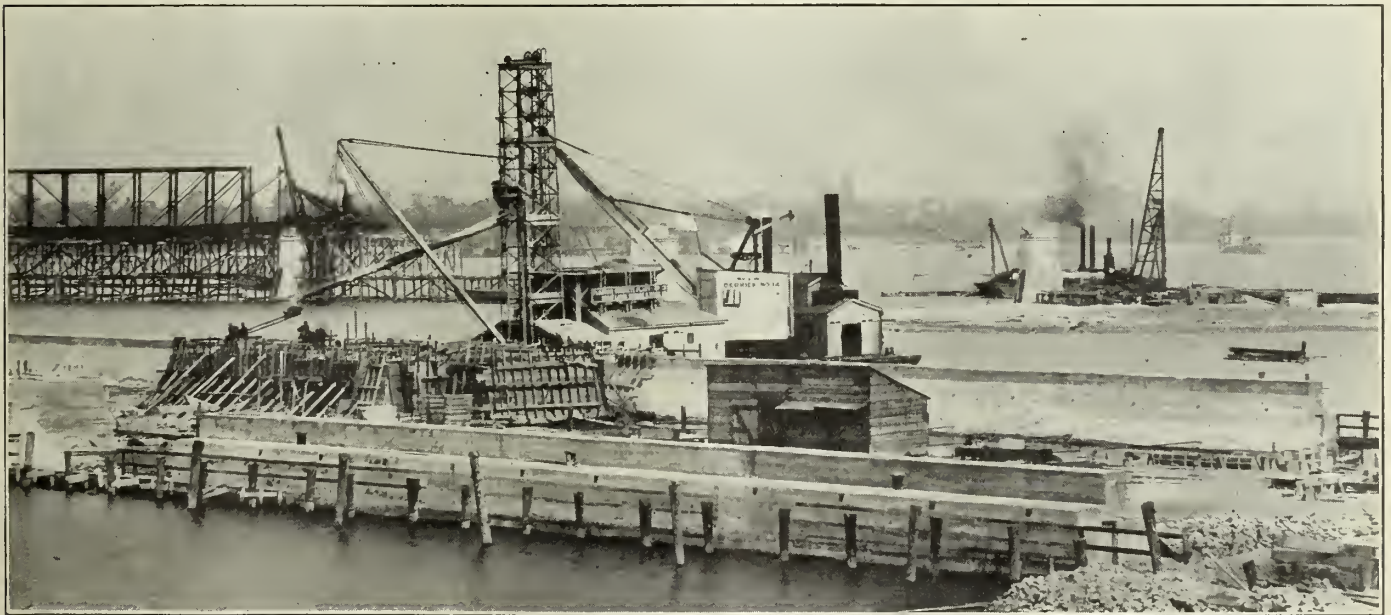


Fig. 15—Progress View Showing Construction of Pile Dock (Coal Pier), Hocking Valley Ry., East Toledo, Ohio.

the same set of individuals holding stock in two distinct corporations, even if they may be engaged in kindred business. The decision was handed down at Trenton, N. J., by Judges Gray, Buffington, and McPherson of the Third Judicial circuit. The action was brought in the federal court at Trenton, but through a certificate of expedition filed by Attorney General McReynolds was heard by the judges of the Court of Appeals at Philadelphia last January.

The case is recognized as one of the highest importance in anti-trust legislation, as it was one of the steps planned by the department of justice in its efforts to break up what it alleged to be a monopoly of the anthracite coal trade. It was brought under both the Sherman anti-trust law and the commodities clause of the Hepburn law. A similar suit was instituted

the Delaware, Lackawanna & Western R. R., which at the time owned the stock of the Delaware, Lackawanna & Western Coal Co., placed the stock of the coal company on the market, giving preference in the sale of such stock to the stockholders of the railroad company. This method of the railroad company in divesting itself of the stock of the coal company is held in today's opinion to have been a substantial compliance with the decisions in the former cases. The decision goes on to say:

"No act of congress, or judicial decision, has declared it to be illegal for any individual citizen to invest his money in two enterprises merely because the two enterprises may be closely connected." The decision also states that the facts before the court are to the effect that the two companies are entirely distinct and that the railroad company, which owns mines and

sells coal to the coal company, has no interest in that coal after it is mined, except the interest that it has in the business of transporting the same.

Concerning the alleged violation of the Sherman anti-trust law, the opinion says that there was a formal charge against both defendants under the anti-trust act, but that the oral argument left the court under the impression that the charges were not much insisted on by the government. The court's understanding was that what was desired was a decision on the alleged violation of the commodities clause on which point the

dismissal is based, and for this reason the court deems it needless to discuss the evidence bearing upon the charge of restraining or monopolizing commerce, and adds, "If we are mistaken in this supposition, the error can easily be corrected."

The department of justice will promptly take an appeal to the Supreme court, and if possible the case will be brought up for argument during the fall term. It seems evident that if the supreme court were to sustain the circuit court, the whole plan of the department to break up what it believes is a monopoly of the hard coal industry in eastern Pennsylvania will meet with failure.

Maintenance of Equipment Expense, Pennsylvania R. R.

The following is extracted from a memorandum recently filed by J. T. Wallis, general superintendent of motive power, Pennsylvania R. R., in the rate hearing before the Interstate Commerce Commission. A full analysis of the various causes leading to the increased cost of equipment maintenance is given, there being taken into consideration in this analysis, the effects of increased size of cars and locomotives, increased labor costs, the expenses involved in observing the boiler inspection and the safety appliance laws, depreciation, etc.

Locomotives.

The cost of locomotive repairs on the Pennsylvania Railroad, lines east of Pittsburgh, for the year ended June 30, 1910, was \$11,597,406. The cost of locomotive repairs for the year ended June 30, 1913, was \$15,267,832, an increase of \$3,670,426, or 31.7 per cent. The following table shows the details of the increase:

LOCOMOTIVE	JUNE 30, 1911	JUNE 30, 1910	INCREASE	PER CENT. OF INCREASE
Number of	4,242	4,067	175	4.3
Total tractive power (pounds)	139,034,918	126,129,003	12,905,915	10.2
Average tractive power (pounds)	32,776	31,013	1,763	5.7
Average weight (pounds)	174,027	161,070	12,957	8.0
Total locomotive miles	128,334,119	117,010,549	11,323,570	9.7
Repairs	\$15,267,832	\$11,597,406	\$3,670,426	31.7

Of the total increase of \$3,670,426 in the cost of locomotive repairs, 15.9 of the 31.9 per cent is accounted for by an increase in the tractive power miles equivalent to \$1,843,988. In the year 1910, effective April 1, an increase of six per cent in wages was granted to all employees of the system earning less than \$300 per month, and the cost of labor directly chargeable to locomotive repairs was thus increased in 1913 over the portion of 1910 in which this six per cent increase did not apply by \$321,437. The labor charged indirectly through shop expenses, etc., was increased \$45,414. Consequently, as a result of the increase in wages, there is accounted for a further sum of \$366,851. The above figures, however, do not include the increase due to the six per cent increase in wages on such material as was manufactured from the raw material at the system's shops and taken to the storehouse and then distributed from there and charged out to locomotive repairs as material. To figure out the result of the six per cent increase on these items would be so voluminous a task that we were not able to do it in the time at our disposal.

The expense of locomotive repairs in 1913 was increased over 1910 by the amount of \$622,748 by reason of the federal-boiler-inspection law. This increased expense covers the preparation of the locomotives for test and doing a very great amount of work in connection therewith, such as drilling staybolts, applying badge plates, etc. The changes in grab-irons and other similar appurtenances on locomotives, which had to be made for the purpose of standardizing safety appliances under the provisions of the act of congress of April 14, 1910 (effective July 1, 1911),

resulted in an expenditure in 1913 of \$140,341, or 1.2 of the 31.7 per cent. There is consequently accounted for by the boiler inspection law and the standardization-of-equipment law a total sum of \$763,089. To summarize, of the total increase of \$3,670,426 in locomotive repairs, \$1,129,940 is accounted for by increased rates of pay and by expenditures to meet changed conditions, and \$1,843,988 as a result of increase in tractive power miles, or 25.7 of the total increase of 31.7 per cent, leaving 6 per cent, or approximately \$690,000, due to other causes.

As stated in the foregoing, the figures given for increase in cost of labor do not include the effect of the six per cent increase in wages in 1910 on manufactured material charged against locomotive repairs as material, because it has been impossible for us to go back over all our manufacturing costs to determine this figure. Approximately 70 per cent of the cost of locomotive repairs is for labor. If we had applied the 6 per cent increase referred to above to 70 per cent of the cost of locomotive repairs, instead of applying it, as was done, to the actual expense for labor directly chargeable against locomotive repairs, the figure accounted for by the 6 per cent increase would have been approximately \$125,000 more than that shown. In addition to this, there have been a number of miscellaneous adjustments in wages, and there have been variations in the designs of locomotives brought about by the requirements for handling heavier trains, as well as variations in the class of material used, with consequent increase in the cost of material per pound, which will quite account for the amount mentioned.

There is appended hereto a statement (Table I) that has been made a part of the answer of the Pennsylvania Lines

Maintenance of Equipment Expense for the Years 1910 and 1913, Pennsylvania R. R., Lines East and West of Pittsburgh.

	1913	1910	INCREASE	PER CENT. OF INCREASE
Lines East	\$18,304,195	\$38,741,939	\$9,562,256	24.68
Lines West	21,667,380	19,455,097	5,212,283	26.79
Total System East and West	\$72,971,585	\$58,197,036	\$14,774,549	25.39

East to one of the 78 questions that the Interstate Commerce Commission asked the several carriers, which shows the cost of locomotive repairs from 1903 to 1913, and the cost per million tractive power miles for the same period. From this it will be noted that the cost per million tractive power miles for 1913 is \$3.63. If there are deducted from the total cost of locomotive repairs for that year the expenditures on account of standardization-of-equipment law, the effect of the 6 per cent general increase in wages, and the expenditure made necessary by the federal-boiler-inspection law, referred to in the foregoing, the figure would be \$3.36. Comparing this figure with the cost per million tractive power miles in 1910, there is a difference of only

5 per cent. There is less difference when compared with the figures for 1909, and a still smaller difference in comparison with 1908. If account is taken of the increased cost of material manufactured by the railroad company and used in locomotive repairs, to which this 6 per cent increase in wages applied, even this figure would be reduced.

It will be noted that the figure for 1913 is actually comparable with those of 1908, 1909 and 1910, with the slight variation that might be expected in such costs between any two years. Of course, the adjusted figure of \$3.36 for 1913 is not comparable with the figures for the years prior to 1908, because there had been other general increases in wages prior to 1908, which have not been taken account of in the adjustment for 1913. If account is taken of all the general adjustments in wages that have been made since 1903, the figure of \$3.36 would be reduced to \$3.16, which is even comparable with the figure for 1905. It is plain from this statement that the cost of locomotive repairs today bears a proper relation to the class of locomotives that are being maintained when due consideration has been given to the general increases and various adjustments in wages that have been made since the adoption of locomotives of the type used today.

Freight Cars.

The following table shows the details of the increased cost in repairs of freight cars, as charged to the system freight car pool, for the year ended June 30, 1913, as compared with the year ended June 30, 1910:

FREIGHT CARS	YEAR ENDED JUNE 30, 1913	YEAR ENDED JUNE 30, 1910	INCREASE	PER CENT. OF INCREASE
Number of.....	268,364	249,788	18,576	7.4
Total tonnage capacity.....	12,151,222	10,740,884	1,410,338	13.1
Total mileage.....	2,488,324,476	2,222,869,315	265,455,161	11.9
Repairs.....	\$24,121,049	\$18,281,364	\$5,839,685	31.9

*Estimated by applying to number of cars at June 30th the average tonnage capacity per car of the cars in existence at December 31st, the actual tonnage capacity figures as of June 30th not being available.

Of the total sum of \$5,839,685 increased charges to repairs of freight cars, there is due to an increase in total freight car mileage \$2,175,482. The increase in wages previously referred to in connection with locomotives, caused an increase of \$572,802. Expenditures rendered necessary by the standardization-of-equipment law, accounted for a further sum of \$1,190,054. The remaining amount of \$1,901,347 is due, first, to an increase in the price of yellow pine and oak used in repairs of wooden cars, and, secondly, to the increase in the capacity of the modern car. For example, the 100,000-pound steel car is equipped with larger trucks, larger axles and larger bearings. The wheel wear on wheels subjected to heavier loads is greater, and the increased truck repairs are approximately proportional to the capacity of the car. On account of the increased shocks to the heavier equipment, draft gear repairs are increased approximately proportional to the capacity of the car.

As shown in Table II the equipment has increased from 257,773 to 281,953 cars as between 1910 and 1913, all of the additions being made in heavier capacity cars and in addition to this increase in the total equipment there has been an increase in the number of heavier capacity cars by replacement in that period of 23,555 cars. It has only been necessary within the last few years to renew the bottoms of steel gondola cars. The life of these sheets is averaging between ten and twenty years. On a basis of ten years, with 104,000 such cars in our equipment, we will have to renew the sheets of 10,400 cars per year, at a cost of about \$150 per car. This figure will be approximately \$1,500,000 per year. In 1910 we repaired 89,000 cars costing over \$5 each, while in 1913, 123,000, or an increase of 38 per cent, whereas the number of cars in the entire equipment of the Lines East and West was increased only 9 per cent, which shows the manner in which the repairs to these cars is increasing. Certain materials used in repairs of wooden

Cost of Equipment Repairs for the Years 1910 and 1913, Pennsylvania R. R., Lines East of Pittsburgh and Erie.

REPAIRS	1913	1910	INCREASE	PER CENT. OF INCREASE
Locomotives.....	\$15,267,832	\$11,597,406	\$3,670,426	31.7
Freight Cars.....	14,633,449	11,235,917	3,398,432	30.2
Passenger Cars.....	3,176,707	2,681,753	494,954	18.4
Total.....	\$33,077,988	\$25,514,176	\$7,563,812	29.6

cars have increased in cost: Yellow pine has gone up in price 10 per cent, and oak 5 per cent.

The character of the cars that are being constructed today is different from what it was ten years ago. Steel cars are coming in for heavy repairs, and the situation is gradually adjusting itself, but we will not have complete data as to the cost of repairs to such cars until a greater proportion of the steel cars have been passed through the shop for heavy repairs, and probably not until some of them, at least, have been discarded on account of decay, at which time an average figure for the repair of steel cars can be arrived at, but this is not possible today.

The trend of the entire situation in so far as the repairs of freight cars are concerned, is shown in the statement (Table II), which shows the total number of freight cars, total carrying capacity, total car mileage, total charges for repairs, total capacity ton miles, and the average cost per million capacity ton miles, for the years ended December 31, 1903 to 1913 (the figures for the years ended June 30 for that period not being available). From this statement it will be seen that the cost of repairs to freight cars per million capacity ton miles has decreased each year as compared with the year 1903, this decrease for 1909 being 22.6 per cent. Since that time the decrease has not been so great, due to the fact that there was an increase in wages and added expenditure in connection with the standardization-of-equipment law. In the year 1913 there was a decrease of 17.4 per cent in the cost of repairs per million capacity ton miles under the cost of 1903. If the charges for the standardization-of-equipment law and the increase in wages were eliminated, the cost per million carrying capacity miles would have been .00069 as compared with .00093 in 1903, or a decrease of 26 per cent. In other words, it is quite plain that the cost of car repairs per unit of capacity available for loading is decreasing, if other varying factors, such as increases in wages and charges for standardization of equipment, are eliminated.

Passenger Cars

The following table shows the increased cost of repairs to passenger equipment cars on the lines east of Pittsburgh and Erie for the year ended June 30, 1913, as compared with the year ended June 30, 1910:

PASSENGER CARS	YEAR ENDED JUNE 30, 1913	YEAR ENDED JUNE 30, 1910	INCREASE	PER CENT. OF INCREASE
Number of.....	3,935	3,280	655	20.0
Total mileage.....	159,380,494	149,555,847	9,824,647	6.6
Total seating capacity.....	191,072	143,377	47,695	33.3
Repairs.....	\$3,176,707	\$2,681,753	\$494,954	18.4

The cost of repairs to passenger equipment cars for the year ended June 30, 1910, was \$2,681,753, and for the year ended June 30, 1913, \$3,176,707, an increase of \$494,954, or 18.4 per cent. Of this, 6.6 per cent, or \$176,006, is due to an increase in car mileage. An increase in wages heretofore referred to accounts for an additional amount of \$75,781, or 2.8 per cent. Increased expenditures due to standardization-of-equipment law were \$22,345, and cost of maintenance of the cars in the Hudson & Manhattan joint service, whose mileage is not included in the above mileage, was \$16,347. The two items last mentioned accounted for 1.4 of the total percentage increase of 18.4 per cent. The increased number of sleeping and parlor cars damaged by this company

Table I.

STATEMENT SHOWING COST OF LOCOMOTIVE REPAIRS, TRACTIVE POWER OF LOCOMOTIVES, LOCOMOTIVE MILEAGE AND TRACTIVE POWER MILES FOR FISCAL YEARS ENDING JUNE 30, 1903, TO JUNE 30, 1913, INCLUSIVE.—TOTAL LINES EAST OF PITTSBURGH AND ERIE.

(1)	(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
Year Ending June 30th	Total Number of Locomotives	Per Cent. of Increase over 1903	Total Tractive Power	Per Cent. of Increase over 1903	Total Cost of Repairs (Excluding Depreciation and Renewals)	Per Cent. of Increase over 1903	Total Locomotive Miles Run	Per Cent. of Increase over 1903	Cost of Repairs (Column 4) per 1000 Pounds Tractive Power	Per Cent. of Increase over 1903	Average Tractive Power per Locomotive	Per Cent. of Increase over 1903	Total Tractive Power Miles	Per Cent. of Increase over 1903	Cost of Repairs (Column 4) per Million Tractive Power Miles	Per Cent. of Increase over 1903
1903	3,147		79,846,735		\$6,193,802		102,039,680		\$77.57		25,372		2,588,950,760,960		\$2.39	
1904	3,303	5.0	87,766,313	9.9	7,292,026	17.7	103,449,620	1.4	83.08	7.1	26,572	4.7	2,748,863,302,640	6.2	2.65	10.9
1905	3,536	12.4	98,592,697	23.5	9,112,717	47.1	105,321,654	3.2	106.83	37.7	27,383	9.9	2,936,683,678,482	13.4	3.10	29.7
1906	3,988	26.7	116,025,499	45.3	9,820,290	58.6	118,216,741	15.9	84.64	9.1	29,094	14.7	3,439,397,862,654	32.8	2.86	19.7
1907	4,094	30.0	121,765,877	52.5	10,629,342	71.2	124,506,592	22.0	87.29	12.5	29,742	17.2	3,703,075,059,264	43.0	2.87	20.1
1908	4,090	30.0	123,653,288	54.5	11,329,757	82.9	114,729,686	12.4	91.63	18.1	30,233	19.2	3,468,924,926,838	34.0	3.27	36.8
1909	4,013	27.5	123,386,927	54.5	10,357,130	67.2	104,016,875	1.9	83.94	8.2	30,747	21.2	3,198,206,855,625	23.5	3.24	35.6
1910	4,067	29.2	126,129,003	58.0	11,597,406	87.2	117,010,549	14.7	91.95	18.5	31,013	22.2	3,628,848,156,137	40.2	3.20	33.9
1911	4,242	34.8	133,632,057	67.4	12,593,564	103.4	116,693,933	14.4	94.26	21.5	31,502	24.2	3,676,092,277,366	45.3	3.43	43.5
1912	4,252	35.1	136,412,006	70.8	14,269,946	130.4	120,297,024	17.9	104.61	34.9	32,082	26.4	3,859,369,123,968	49.1	3.68	54.8
1913	4,242	34.8	139,034,918	74.1	15,267,832	146.5	128,334,119	25.8	109.81	41.6	32,776	29.2	4,206,279,084,344	62.5	3.63	51.9

resulted in an increase of \$69,293, or 2.6 of the total increase of 18.4 per cent.

In 1908 we received our first steel passenger equipment cars. At January 1, 1914, we had a total of 1742 steel passenger cars in steam service, 84 steel cars in electric service and 2209 wooden cars. The wooden cars have been rapidly going out of service and the steel cars have been replacing them. The rate of replacement has been very rapid, in fact, much faster than the replacement of wooden cars prior to the adoption of the steel car. During the first few years that the steel cars came to us, they required comparatively little attention, and in our effort to utilize our steel passenger equipment cars to the very best advantage and to make steel cars cover a maximum number of trains so that the public might have the maximum benefit therefrom, we kept our steel passenger equipment cars out of the shop and did but comparatively little work on them until within the last two years, when it became necessary to take them in and do more work to prevent deterioration.

In connection with this subject, it should be stated that the increased mileage does not represent the entire cause of increase in expense, for the reason that the cars are larger and seat more people. Our present steel suburban car seats 72 people, as compared with 66 in our former wooden through coach. Our present steel through coach seats 88 people as compared with 66 in our former wooden through coach. If the statement were based on the carrying capacity of the cars, the comparison would be more complete, but

it would be difficult to present it in that form, because the question of mail and baggage capacity in combination cars is involved and some adjustment would have to be made in order to make the comparison equitable.

The statement made in regard to freight cars, namely, the changed condition of the service and the use of cars construction of steel in lieu of the former wooden ones, applies also to passenger cars. This produces a changed condition, the effect of which we cannot positively know in all its details until some better averages as to the life and total cost of repairs of steel cars are arrived at. It can be said that the design of steel passenger cars is not a closed subject, and we have been put to expense by reason of changes in some of the designs originally adopted, which changes were thought necessary in the light of later experience, but which would not have been necessary had the art been understood better when the development of the steel passenger car was started.

Renewals and Depreciation of Equipment.

At the present time, the Pennsylvania Railroad charges depreciation on the following bases: Locomotives and passenger cars on a basis of 4 per cent of the original cost of the equipment, and on freight cars on a basis of 3 per cent on such cost for the reason that we believe a locomotive will last about twenty years, and based on the final value of the scrap being 20 per cent of the original value, the depreciation plus the salvage will equal the original cost.

Table II.

FREIGHT CAR POOL—ALL LINES EAST AND WEST OF PITTSBURGH.

1	2		3		4		5		6		7	
Years Ending December 31	Total Number of Pool Freight Cars	Per Cent. of Increase Over 1903	Total Carrying Capacity of Pool Freight Cars (Net Tons)	Per Cent. of Increase Over 1903	Total Pool Freight Car Miles	Per Cent. of Increase Over 1903	Total Charges for Repairs (Including Inspection)	Per Cent. of Increase Over 1903	Total Carrying Capacity Ton Miles	Per Cent. of Increase Over 1903	Average Cost of Repairs per One Million Capacity Ton Miles	
											Including Inspection	Per Cent. of Decrease Over 1903
1903	214,029		7,395,150		1,778,732,219		\$12,240,210		13,153,991,569,337,850		.00093	
1904	208,274	D. 2.7	7,442,680	0.6	1,780,458,312	0.1	11,114,095	D. 9.2	13,251,381,469,556,160	0.7	.00084	D. 9.7
1905	216,567	1.2	8,327,470	12.6	1,948,230,952	9.5	14,962,515	22.2	16,223,834,705,851,440	23.3	.00092	D. 1.1
1906	234,772	9.7	9,388,540	27.0	2,090,909,456	17.6	17,414,044	42.3	19,630,587,064,034,240	49.2	.00089	D. 4.3
1907	245,758	14.8	10,067,060	36.1	2,250,152,283	26.5	20,570,435	68.1	22,652,418,042,097,980	72.2	.00091	D. 2.2
1908	246,034	15.0	10,197,835	37.9	1,895,586,592	6.6	14,243,489	16.4	19,320,879,293,428,320	47.0	.00074	D. 20.4
1909	246,891	15.0	10,396,305	40.6	2,085,209,757	17.2	15,698,439	28.3	21,678,476,622,747,885	64.8	.00072	D. 22.6
1910	257,773	20.4	11,085,295	49.9	2,286,541,173	28.5	19,635,784	60.4	25,346,983,332,351,035	92.7	.00077	D. 17.2
1911	260,697	21.8	11,305,575	52.9	2,211,869,861	24.4	19,094,657	56.0	25,006,460,603,775,075	90.1	.00076	D. 18.3
1912	263,115	22.9	11,648,560	57.5	2,419,231,297	36.0	22,439,762	83.3	28,180,560,916,982,320	114.2	.00079	D. 15.1
1913	281,953	31.7	12,767,863	72.7	2,541,170,489	42.9	24,840,470	102.9	32,445,316,663,195,007	146.7	.00077	D. 17.4

D. Signifies Decrease.

On passenger cars we believe that our wooden cars will last twenty years. As far as steel cars are concerned, we do not know how long they will last, but in order to provide for the replacing of our wooden with steel cars in a reasonable time, and for the steel cars when they shall have to be retired, the best figure we have been able to arrive at is 4 per cent.

The average age of the freight cars that we have destroyed since July 1, 1908, approximately 21,500 in number, was 19.9 years. We believe that the life of a steel freight car will be eventually between thirty and thirty-five years, and of wooden cars, twenty years; and, therefore, consider an average of 3 per cent to be the best figure we can arrive at to take care of the final replacement.

The charges arrived at under the above percentages are

made monthly on a locomotive and car mileage basis. The total depreciation actually charged in the years 1909, 1910, 1911, 1912 and 1913 was \$37,486,781, as compared with \$38,648,701 that would have been charged had the present system been in effect. The actual charges in 1909 and 1910 were greater than the amount that would have been arrived at on the present basis, and were, in 1909, within \$500,000, and in 1910, within \$200,000 of the charges in 1913. We have an accurate record of the original cost covering 97 per cent of the equipment charges for depreciation of the Pennsylvania System, which shows that the total charge to depreciation of equipment for 1913 was \$12,678,626, whereas, taking 4 per cent on locomotives and passenger cars and 3 per cent on freight cars, as against original cost, the depreciation would have been \$12,764,239.

Increase in Maintenance of Way Expenses on the P. R. R.

Testifying in the five per cent rate case before the Interstate Commerce Commission, Mr. J. G. Rodgers, general superintendent of the Pennsylvania R. R., set forth the reasons for the increase in cost of maintenance of way and structures on the Pennsylvania Railroad in recent years. Charges to operating expenses on the Pennsylvania system east of Pittsburgh were \$24,855,624 in 1910 and \$29,411,210 in 1913—an increase of 18.3 per cent. Mr. Rogers' statement, in detail, appears below.

The maintenance of way expenses for 1913 are necessarily much larger than they have been in the past and will undoubtedly continue to be at least on the present level in the future, due to the following causes:

1. The large increase in wages which have already been made.

2. That in view of the policy of commissions and the demands of the public, a much higher standard of maintenance must be observed than in the past.

3. That in past years the standard, quality, durability and strength of the roadbed and track structure has not kept pace with the increase in the weight of locomotives and steel cars, but the improvements that have been made looking toward this end have made the track a much larger and more expensive structure than it was some years ago and, therefore, it costs more to renew the different parts thereof.

4. That the policy of eliminating grade crossings, installing interlocking and automatic signals, straightening line, etc., in which respect there is still a great deal to be done, and which will continue as far into the future as we can foresee, involves heavy charges for replacement in kind of plant retired, and the structures which are built to eliminate grade crossings, consisting as they do of embankment, tunnels and bridges, will require much more to be spent upon them in the way of maintenance than the ordinary running track that heretofore existed.

	1913	1910	Increase	Per Cent
Maintenance of Way and Structures Operating Expenses....	\$29,411,210	\$24,855,624	\$4,555,586	18.3
Mileage, all tracks....	12,852	12,440	412	3.3

The above increase in expenses of \$4,555,586 is due to the following:

1. Mileage maintained.
2. Rate of wages paid.
3. Number of men employed.
4. Prices of material used.
5. Miscellaneous repair items.
6. Amounts charged to expenses, as replacement in kind, in connection with elimination of grade crossings, installation of

interlocking and automatic signals, changes of grade and line, etc.

1. Mileage Maintained.

During the above period the facilities of the Pennsylvania Tunnel and Terminal Company were placed in use. These represented 69 miles of all tracks, new station in New York, tunnels, etc.

Actual maintenance charges for year ending June 30,

1913	\$ 403,745
In addition, there was maintained 343 miles of other new track, equivalent, at the 1910 rate per mile of all tracks (\$1,998) to	685,314

Total increase\$1,089,059

2. Rate of Wages Paid.

Effective April 1, 1910, a general increase of 6 per cent was granted to all employees receiving less than \$300 per month. Effective March 1, 1913, a general increase (varying somewhat on different parts of the system) was made in the wages of track foremen and assistants. The above advances in rates of pay, excluding the force on P. T. & T. tracks, were distributed among the principal disbursement accounts, as follows:

Superintendence	\$ 46,299
Roadway and track—repair force	463,309
Signals—repair force	31,313
Buildings—repair force	50,457
Bridges, fence and other repair force	42,382

Total increase\$633,760

3. Number of Men Employed.

The total number of employees in all classes in 1910 was 29,097, and in 1913—32,081, an increase of 2,984. A certain number of these men were employed indiscriminately as between additions and betterments and repair work, and the amounts chargeable to each cannot be readily separated. The increased amount of money due to the employment of additional men, directly chargeable to expenses, represents an increase in clerical, supervisory, signal and other maintenance forces, as detailed below, there having been little or no increase in the number of men employed on regular track repairs. While the latter have been engaged in various kinds of work, the number of track men per mile of track has remained substantially unchanged.

The maintenance of way and structures proportion of increased clerical and supervisory expenses at the general office, Philadelphia, together with similar increases in division offices amounted to..... \$159,535
An increase in the division clerical force due to changes

in accounting methods, etc., as required by various commissions; also to comply with the legislative enactments, such as semi-monthly pay laws, etc., amounted to 23,131

The extension and improvement of the signal system, including the installation of new or improved interlocking required an enlarged maintenance force, which involved an outlay of..... 101,055

Total\$283,721

4. Prices of Materials used.

The principal increases in cost of materials are in rails, ties, signal material and ballast.

Rails.—The average distributing point price of rail has advanced from \$28.87 in 1910 to \$30.88 in 1913, an increase of \$2.01 per ton, or seven per cent, due to a greater proportion of open-hearth than Bessemer steel used to secure increased safety during the latter year. The average price received for scrap rail during 1910 was \$16.89 per ton in 1913, \$15.37 per ton, a de-

been very general, with the exception of wire. Twenty representative items, including wire, in which no improvement has been made in quality or design, were selected as giving a fair average of the total. These showed a net average percentage of increase of 9.7 per cent, which represents an increase of \$45,390.

Ballast.—The company keeps a separate record only of stone ballast used. The prices for limestone have remained the same; those for trap and granite have increased from 65 cents to 70 cents per ton. On the other hand, on the divisions in the western part of the State of Pennsylvania, some granulated slag has been used, in many cases replacing stone. Since 1910 a division of this account has been effective, the cost of increasing the depth being chargeable to additions and betterments. In 1913 the charges were \$909,340 to expenses and \$107,491 to A. & B.; a total of \$1,016,831, as compared with \$1,110,325, all of which was charged to expenses of 1910. While there was a decreased charge to operating expenses of \$200,985, there was a total charge on account of ballast only slightly less than in 1910.

Other Material.—The great diversity in character of other

Table I.

THE PENNSYLVANIA RAILROAD LINES EAST OF PITTSBURGH AND ERIE.
MAINTENANCE OF WAY AND STRUCTURES EXPENSES, YEARS ENDED JUNE 30, 1913-1910.

ACCOUNTS	YEARS ENDED JUNE 30th			EXPLANATION OF INCREASES AND DECREASES						
	1913	1910	INCREASE OR DECREASE	MILEAGE, INCLUDING P. T. & T.	WAGES	NUMBER OF MEN	PART OF MATERIAL	MISCELLANEOUS	REPLACEMENT IN KIND—REPAIRS—REPAIRS OF GRADE CROSSINGS, INSTALLATION OF TIES, LOCKS, ETC.	TOTAL
Superintendence.....	\$1,554,164	\$1,250,858	\$303,306	\$74,341	\$46,299	\$182,666				\$303,306
Ballast.....	909,340	1,110,325	D. 200,985	42,079				D. \$243,064		D. 200,985
Ties.....	3,527,812	2,752,902	774,910	79,915			\$313,014	270,260	\$118,215	781,404
Rails.....	1,375,777	1,448,426	D. 72,649	39,161			249,199	D. 491,939	177,427	D. 26,152
Other Track Material.....	1,879,496	1,929,181	D. 49,685	59,613				D. 245,517	140,289	D. 45,615
Roadway and Track.....	10,343,545	9,252,358	1,091,187	345,432	463,309			72,852	290,558	1,172,151
Tunnels.....	102,812	43,762	59,050	30,041				29,032		59,073
Bridges, Trestles and Culverts.....	1,842,312	1,361,359	480,953	48,522	22,373				440,469	511,364
Bridges, Trestles and Culverts—Depreciation.....	8,485		8,485					8,485		8,485
Over and Under Grade Crossings.....	209,882	165,886	43,996	4,600	1,650				46,473	52,723
Grade Crossings, Fences, C. Guards and Signs.....	362,130	303,294	58,836	10,552	5,373			36,206	4,304	56,435
Snow and Sand Fences and Snowsheds.....	6,257	4,647	1,610							1,610
Signals and Interlocking Plants.....	1,866,555	1,081,361	785,194	88,805	31,313	101,055	45,390	65,458	484,486	816,507
Signals and Interlocking Plants—Depreciation.....	817		817					817		817
Telegraph and Telephone Lines.....	659,832	469,316	190,516	20,231	12,986			130,962	23,784	187,963
Electric Power Transmission.....	68,441	45,713	22,728	28,464						28,464
Electric Power Transmission—Depreciation.....	98,913		98,913	62,388				36,525		98,913
Buildings, Fixtures and Grounds.....	3,656,645	2,879,951	776,694	176,223	50,457			115,419	436,959	779,058
Buildings, Fixtures and Grounds—Depreciation.....	20,873		20,873	14,971				5,902		20,873
Docks and Wharves.....	163,502	302,189	D. 138,687	11,406				D. 132,593		D. 121,187
Roadway Tools and Supplies.....	400,062	294,253	105,809	13,668				92,141		105,809
Injuries to Persons.....	27,164	16,862	10,302	1,174				9,128		10,302
Stationery and Printing.....	73,845	65,963	7,882	2,432				5,450		7,882
Other Expenses.....	44,471	42,531	2,140	1,215				925		2,140
Total.....	\$29,203,132	\$24,820,937	\$4,382,195	\$1,155,233	\$633,760	\$283,721	\$607,603	D. \$231,941	\$2,162,964	\$4,611,340
Maintaining Joint Facilities, Dr.....	1,446,582	1,143,931	302,651	31,556				271,095		302,651
Maintaining Joint Facilities, Cr.....	1,238,504	1,109,244	129,260	97,730				31,530		129,260
Net Total.....	\$29,411,210	\$24,855,624	\$4,555,586	\$1,089,059	\$633,760	\$283,721	\$607,603	\$7,624	\$2,162,964	\$4,784,731

D.—Decrease.

crease of \$1.52 per ton, or nine per cent, making an increase in the charge to "Rails" of \$94,240 on 62,000 tons of scrap sold in the latter year. the increases due to the above amount to \$249,199.

Ties.—The average price of all ties used for repairs increased from 76.6c to 84.5c at the distributing point. This is due largely to the increased use of creosoted soft wood ties made necessary by the scarcity of hardwood ties. Creosoted ties have been used since 1909 only; in 1910—17,598, and in 1913—1,102,886 creosoted ties were put in. The average price of these creosoted ties in 1913 was \$1.01 each (and with the tie plates made necessary by their use, \$1.40 each), in most instances replacing white oak ties costing 79.2c in 1910. The tie plates costing 39c are charged to additions and betterments when first installed and, of course, would not be included in this item until renewal took place. The increase due to the above is \$313,014.

Signal Material.—Increases in prices of signal material have

material makes it impracticable to fix index for the miscellaneous items and these increases and decreases are, therefore, disregarded in this statement.

Summary.—The above increases, 1913 over 1910, excluding additional mileage, summarize as follows:

Rails	\$249,199
Ties	313,014
Signal material	45,390
Total	\$607,603

5. Miscellaneous Repair Items.

Ballast.—Trap rock is being largely used in place of limestone for ballast, at an additional cost of 5 cents per yard, as explained under "Increase in Price of Material Used." The depth of ballast in 1909 was from 8 to 12 inches, and the stand-

Table II.
PENNSYLVANIA LINES EAST OF PITTSBURGH
MILEAGE, MAINTENANCE OF WAY AND STRUCTURES EXPENSES AND UNIT COSTS,
YEARS ENDED JUNE 30, 1913-1910.

	YEARS ENDED JUNE 30		INCREASE OR DECREASE	PER CENT.
	1913	1910		
First Main Track (miles).....	5,310	5,289	I. 21	4
All Main Track (miles).....	8,231	8,128	I. 103	1.3
Sidings and Yard Tracks (miles).....	4,621	4,312	I. 309	7.2
Total Tracks (miles).....	12,552	12,440	I. 412	3.3
Train Miles.....	79,859,303	74,578,995	I. 5,280,308	7.1
Traffic Units.....	28,703,576,301	25,564,966,928	I. 3,118,609,373	12.2
Total M. W. & S. Operating Expenses.....	\$29,411,210	\$24,855,624	I. \$4,555,586	18.3
Total M. W. & S. Expenses per:				
Mile of First Track.....	\$5,539	\$4,699	I. \$840	17.9
Mile of Main Track (inc. 1st Track).....	3,573	3,058	I. 515	16.8
Mile of All Track.....	2,288	1,998	I. 290	14.5
Train Mile.....	36.84	33.34	I. 3.50	10.5
Million Traffic Units.....	1,025	971	I. 54	5.6
Ratio M. W. and S. Expenses to Operating Revenue.....	12.8%	12.2%	I. 0.6%	4.9
Million Traffic Units per:				
Mile of First Track.....	5.406	4.837	I. .569	11.8
Mile of Main Track.....	3.487	3.148	I. .339	10.8
Mile of All Track.....	2.233	2.057	I. .176	8.6
MAINTENANCE OF WAY AND STRUCTURES EXPENSES, EXCLUDING P. T. & T. CO.				
Total M. W. and S. Expenses.....	\$29,007,465	\$24,855,624	I. \$4,151,841	16.7
Per Mile First Track.....	5,475	4,699	I. 776	16.5
Per Mile Main Track.....	3,538	3,058	I. 480	15.7
Per Mile All Track.....	2,269	1,998	I. 271	13.6

ard has now been established as 18 inches. While the first cost of the increased depth is chargeable to A. & B., operating expenses are increased by the renewal of cinder, gravel and slag ballast placed under track a few years ago and will increase as the additional stone ballast wears out. During 1908 and 1909 charges to this account were very low and it became necessary in 1910 to extend a larger amount than usual. This resulted in a large consumption during 1910, the year of 1913 thus showing a decreased consumption amounting to \$243,064.

Ties.—The difference brought about by the use of creosoted ties has been included under the increased price of material used. In addition, the number of ties used per mile has been increased in order to strengthen track for use of heavier equipment. Prior to 1909 the number of ties to a 33-foot rail was 16, or 2560 per mile; in 1909 this was increased to 18 or 2880 per mile; to comply with which policy additional ties per rail have been put in as rapidly as possible, and in 1913 the extra ties have not been charged to expenses, as they were only to a slight extent in 1910, but to additions and betterments. Only the renewal thereof, as it occurs, goes to expenses. The decreased supply and high price of white oak ties has necessitated the use, in recent years, of a greater proportion of softwood ties with shorter life, which, not being offset by creosoting and tie plates prior to 1910, is causing at present an increased consumption of ties annually, as the life of softwood ties is from four to seven years. Excluding the additional mileage, the increase in tie consumption was 352,820, which at the 1910 price amounted to \$270,260.

Rails.—The total number of tons used for renewals in 1913 was 77,094 as compared with 95,808 tons in 1910. There was 3023 miles of 100-pound rail in main track in 1910, or 37 per cent of the total; and in 1913—3534 miles, or 43 per cent of the total. There were 3904 miles of 85-pound rail in main track in 1910, or 48 per cent of the total, and in 1913—3825 miles, or 46 per cent of the total. The eighty-five-pound section was adopted as standard in 1887, and 100-lb. rail for main line passenger tracks in 1892.

As was the case in some other instances, renewals of rails in 1908 and 1909 were low, which made it necessary to use larger amounts in 1910. The consumption in the latter year, therefore, was considerably higher than the average while that for 1913 was about normal, based upon the average for the

past five years. This decreased consumption amounted to \$310,629, to which should be added the decreased charges to expenses due to the fact that "relaying" rail was credited, when removed, at \$10 per ton in 1910, and \$18 per ton in 1913. The total decrease for these two causes was \$491,939.

Other Track Materials.—The decrease in rail consumption was reflected in a decreased charge for splices, etc. A smaller number of tie plates were used for renewals in 1913, which brought the total reduction in consumption of material to \$245,517.

Track Labor.—In the endeavor to promote the safety of the traveling public in every possible direction, special attention was given to the rock cuts between Philadelphia and Pittsburgh, and overhanging rocks were removed, at a cost of \$72,852.

Tunnels.—Renewing linings of tunnels on the Western Pennsylvania division and maintenance of an improved ventilation system at Baltimore entailed an increase expenditure of \$29,032.

Grade Crossings, Fences, etc.—"Safety work"—Signs and signals at crossings, heavier repairs to road crossings and fences—together with the construction of a large amount of improved fence in New Jersey, represented an increase of \$36,206.

Signals.—The signal system has been greatly extended during this period, all passenger tracks having been put under the absolute block system in 1912, in addition to which there has been a large extension of the automatic signals in place of manual block signals, and revisions of interlocking in connection therewith. In 1910 there were 395 miles of automatic signals and 3209 miles of manual block signals; in 1913 there were 690 miles of automatic signals and 3926 miles of manual block signals. These changes must continue, resulting in increased charges to expenses for replacements in kind as shown above, as well as in the increased cost of maintenance. The increased amount of material needed in the maintenance of these additional signals and the improvement in quality and design amounted to \$65,458.

Telegraph and Telephone.—The extra cost of rebuilding pole

Table III.
PENNSYLVANIA LINES EAST OF PITTSBURGH.
TRACK STRUCTURE ACCOUNTS.
FIVE-YEAR PERIOD, ENDED 1913.

BALLAST.		OPERATING EXPENSES		ADDITIONS AND BETTERMENTS		TOTAL	
Charges, Year ended June 30, 1909.....		\$744,987				\$744,987	
1910.....		1,110,325				1,110,325	
1911.....		924,741		\$2,172		926,913	
1912.....		928,530		1,584		930,114	
1913.....		909,340		107,491		1,016,831	
Average 5 years.....		923,585				945,834	
		MILES WITH STONE		QUANTITIES USED—TONS			
				REPAIRS	A. & B.	TOTAL	PER MILE
Consumption, Year ended Dec. 31, 1909.....		3,349		941,538		281	
1910.....		3,375		916,809		272	
1911.....		3,394		749,395		221	
1912.....		3,507		737,166		211	
1913.....		3,447		755,805		251	
Average 5 years.....		3,414		820,143		247	
TIES		NUMBER USED FOR REPAIRS				PER MILE ALL TRACKS	
		TREATED		ALL KINDS			
Consumption, Year ended June 30, 1909.....				2,821,704		228	
1910.....		17,598		3,079,836		248	
1911.....		384,995		2,963,604		235	
1912.....		579,505		2,957,476		232	
1913.....		1,102,886		3,554,608		277	
Average 5 years.....				3,075,446		244	
RAILS		NEW STEEL RAILS USED FOR REPAIRS—TONS					
		TOTAL		PER MILE OF MAIN TRACK			
Consumption, Year ended June 30, 1909.....		21,326		2.6			
1910.....		95,808		11.8			
1911.....		117,547		14.4			
1912.....		53,350		6.5			
1913.....		77,094		9.4			
Average 5 years.....		73,025		8.9			
BRIDGES, TRAMPLES AND CULVERTS		OPERATING EXPENSES		ADDITIONS AND BETTERMENTS		TOTAL	
Charges, Year ended June 30, 1909.....		\$1,202,065				\$1,202,065	
1910.....		1,361,359		\$163,771		1,525,130	
1911.....		1,438,869		205,079		1,643,948	
1912.....		1,034,091		302,421		1,336,512	
1913.....		1,842,312		448,516		2,290,828	
Average 5 years.....		1,375,739				1,599,697	

lines and the increased maintenance cost due to larger plant and the use of telephone instead of telegraph involved an additional expenditure of \$130,962.

Buildings.—Increase in repairs to Altoona Shops amounted to \$98,450 and "safety work"—increasing clearances at station platform—to \$16,969, a total of \$115,419.

Docks and Wharves.—Extensive repairs were made in 1910 to Philadelphia Piers 41, 46 and 48, and New York Piers H, K and L, which were not necessary in 1913, resulting in a decrease in this account of \$132,593.

Roadway Tools.—A comparatively large portion of the increase in charges to this account is due to the greater amount of improvement work under way; replacing hand cars with motor cars, and "safety work"—requiring better conditions of tools—added still more, the total increase being \$92,141.

Maintenance Joint Facilities (Dr.).—Changes in the method

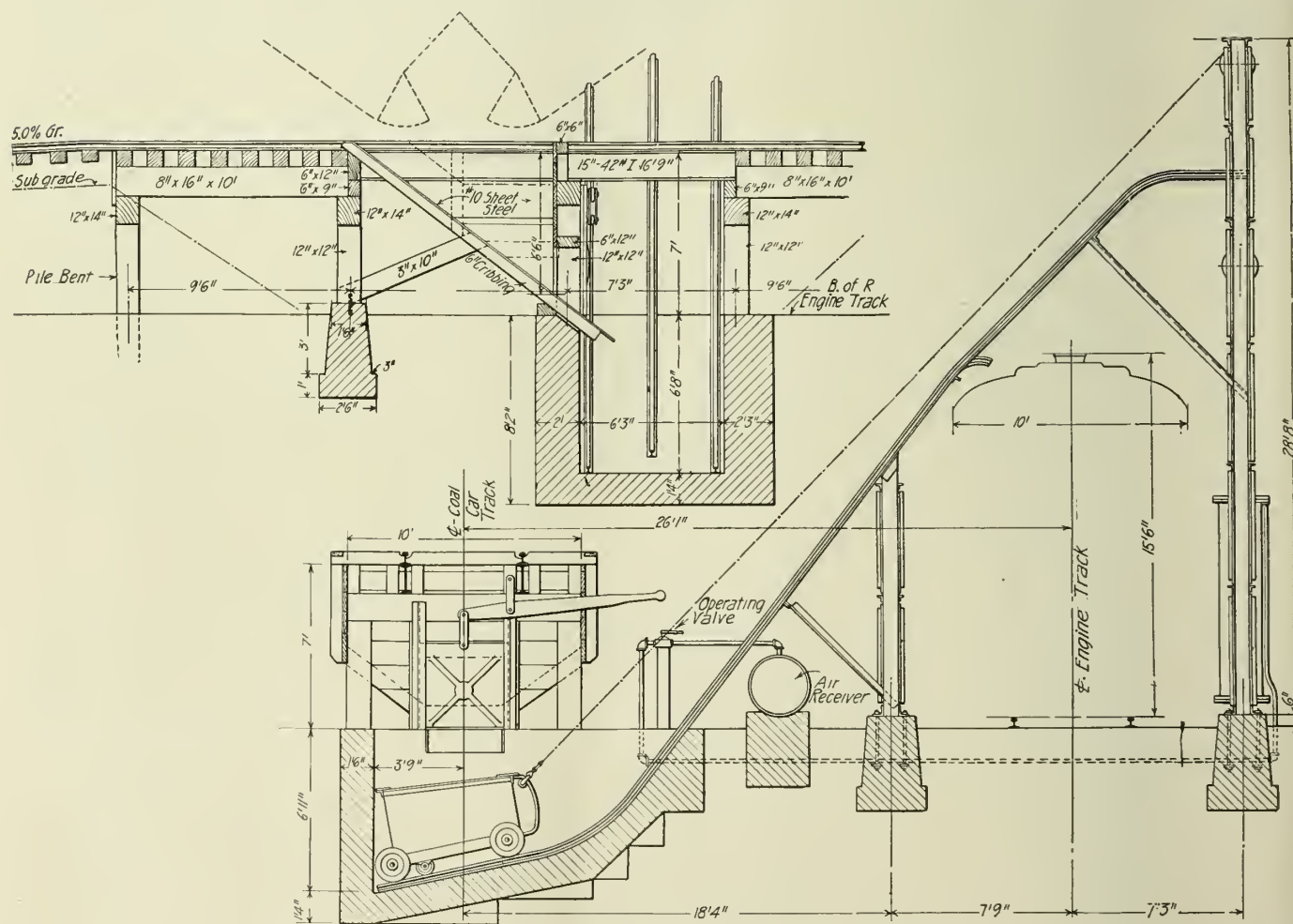
grade crossing elimination, installation of heavier bridges, largely brought about by the heavier equipment, installation of automatic signals and interlockings and station improvements. The principal accounts affected, therefore, are "roadway and track," "bridges," "signals" and "buildings," as follows:

Roadway and Track:

1913 charges	\$338,089
1910 charges	47,531
Increase	\$290,558

Bridges:

1913 charges	\$608,285
1910 charges	167,816
Increase	440,469



Arrangement of Robertson Conveying Apparatus for Coaling Locomotives.

of accounting for maintenance of the N. Y. & L. B. R. R., due to instructions of the Interstate Commerce Commission resulted in increases in this account of \$140,058. This has been more than offset by the inclusion of the earnings of said road in the revenue accounts. Increased charges from the Washington Terminal amount to \$89,701, and from other railroads, \$41,336. Total increase, \$271,095.

Summary.—The above increases and decreases resulted in a net increased charge during 1913 of \$7624.

6. Amounts Charged to Expenses as "Replacements in Kind" in Connection with Elimination of Grade Crossings,

Installation of Interlocking and Automatic Signals, Changes of Grade and Line, Etc.

The amount of such work under way during the year ending June 30, 1913, was much in excess of that during the year ending June 30, 1910. This included principally track elevation and

Signals and Interlockings:

1913 charges	\$508,997
1910 charges	24,511
Increase	484,486

Buildings, Fixtures and Grounds:

1913 charges	\$487,353
1910 charges	50,394
Increase	436,959

Various Accounts (Ties, Rails, etc.)

1913 charges	\$528,409
1910 charges	17,917

Increase	510,492
Total increase, all accounts	\$2,162,964



Robertson Locomotive Coaling Apparatus at Oakwood Yard, Wabash R. R., Detroit, Mich.

SUMMARY.
Thus of the total increase in maintenance of way and structures expenditures, 1913 over 1910, of \$4,555,586 there are accounted for:

1. Mileage maintained	\$1,089,059
2. Rates of wages paid.....	633,760
3. Number of men employed.....	283,721
4. Prices of materials used	607,603
5. Miscellaneous repair items.....	7,624
6. Amounts charged to Expenses as replacements in kind in connection with elimination of grade crossings, installation of interlocking and automatic signals, changes of grade and line, etc.	2,162,964

Total \$4,784,731

Accompanying tabular statements summarize the above information and show various unit costs, etc.

The Robertson System of Coaling Locomotives.

A novel scheme for coaling locomotives has been devised and installed at the Oakwoods yard of the Wabash R. R. at Detroit, Mich., by Wm. Robertson & Co., of Chicago. The simplicity and economy of this system commends it for the coaling of engines where a moderate amount of coal is to be handled out in localities not convenient to more elaborate facilities.

This arrangement, as the illustrations show, involves the use of two tracks having a difference of about 7 feet in elevation, a hopper of nominal capacity with a sliding gate underneath the higher of these two tracks and so located as to be able to discharge into a skip lowered by means of an inclined track into a concrete lined pit, and means for hoisting the skip to a position where its contents are automatically discharged into the tender of the locomotive standing underneath the inclined skipway spanning the coaling track and supported at its outer end by means of a structural steel tower in which the air hoist by means of which the apparatus, in this instance, is operated.

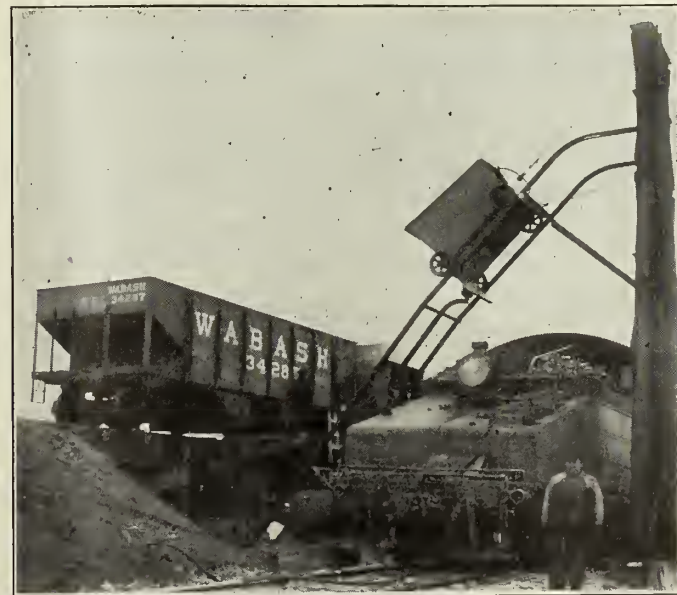
A notable feature of the plant illustrated is that the air supply for the hoist is derived from the locomotives to be supplied with coal. This is accomplished by connecting the train line by means of a hose, to the reservoir from which the hoist derives its supply, and recharging the reservoir simultaneously with the coaling process. The reservoir is thus left fully charged, leaving the

plant in readiness for the next engine immediately upon its arrival at the station. In case compressed air is available from a more advantageous source, it can of course be piped to the machine and thereby obviate the necessity of connecting up with the hose at the rear of the tender each time a locomotive arrives for coaling. Electric or other power, when available, is equally adaptable to the operation of elevating the skip.

With a two-tons capacity skip and uniform air pressure of 70 lbs. per square inch, one man can elevate coal to a locomotive tender at an average rate of one ton per minute. It will be observed that the hopper car in which the coal arrives at the machine, is used as the means of storage. The sliding gate through which the coal is admitted to the skip-car is manually operated by the station attendant and that the air valve by means of which the hoist is manipulated is located convenient to the point from which the hopper-gate is controlled. The dumping of the contents of the skip into the locomotive tender is effected automatically by supporting the hinged bottom of the car by means of a roller running on an intermediate rail, the latter being so curved at its upper end that the door swings open at the proper point in the ascent of the skip to drop its contents into the tender. At the Oakwood yards the Wabash R. R. has also installed one of these machines for handling cinders. By adding others an indefinite coaling capacity at this or any other point can be secured where lack of room is not a factor in determining the type of station to be employed.

The firm previously mentioned has been successful in adapting this general idea to the handling of ashes and cinders both at power stations and at engine terminals, the latter service especially being one in which this apparatus finds a marked degree of usefulness.

The first production in the eastern part of the United States of pig iron in an electric furnace took place recently in the foundry of the Carnegie Institute of Technology. The experiment was in charge of Frederick Crabtree, professor of metallurgy at the institute; Prof. F. F. McIntosh, his assistant, and a body of students. The test was successful and those in charge were delighted with the experiment. Raw ore from the Mesaba mines in Michigan, 50 per cent pure, was converted into a high grade pig iron by the new process. The furnace, erected by Professors Crabtree and McIntosh and the students of the institute, is of 100 horsepower, with a capacity of 2000 pounds of pig iron every 24 hours.



View Showing Skip in Dumping Position, Robertson Coaling Apparatus, Oakwood Yard.

RAILWAY REVIEW

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WILLARD A. SMITH	- - - - -	President and Manager
HAROLD A. SMITH	- - - - -	Assistant Manager
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SATURDAY, APRIL 11, 1914.

The secretary of the Ohio Manufacturers' Association addressed an inquiry as to the condition of business to all members. Some 300 responded, and everyone considered that the advance in railway rates now before the Interstate Commerce Commission should be granted and that business is held up by the delay. The business men and the press of the country are practically a unit on this subject. Is it possible that they do not represent public sentiment; or that the wishes of the people ought not to have any weight with an administrative body to which Congress has delegated its power over railway rates?

The Chicago Tribune having stated in scare heads to a certain dispatch from Washington, regarding the rate hearing, that "Willard and Delano Admit Juggling Maintenance Figures to Thorne," admits that the accusation was untrue as to Mr. Delano, who was not even asked any "question" which would bring forth such an admission." It is silent as to Mr. Willard—but the fact is that he made no such admission either. "Manipulation" and "juggling" are inventions of Thorne. The Tribune will have much more to re-

tract if it permits Thorne's publicity bureau the free use of its columns as it has been doing.

President Wilson may soon have to declare himself on the exemption of labor and tillers of the soil from the Sherman law, and the amendment to be made to it. A bill published in another column distinctly proposes class legislation and permits labor unions, agriculturists and horticulturists to do what it forbids everyone else to do.

A certain group of United States senators consider Mr. Daniels, of New Jersey, an unfit man to have a hand in the valuation of railway property, because he is possessed of faculties which can discern the "intangible values." However stoutly these individuals and others may maintain the intangibility of such factors as good will, franchise, business methods and going concern value, they are yet elements of actual inherent worth. Like many other of the intangible values of life, they can be ignored by denying their existence, but not with safety. Rather we think should a man be disqualified from the business of valuation who has no perception of these elements of value.

The development in size and weight of rolling equipment which has taken place in the last thirty years has caused many parts of the roadway and terminal facilities to become either obsolete or of too small capacity. Bridges, turntables, roundhouse stalls and other things about railway terminals have fallen into this class, and, not to be overlooked, is the track scale. Investigation of the capacity and accuracy of track scales has been rather active of late, and the necessity for a general overhauling or renewal of this class of equipment is extensively recognized. Discovery of instances of gross inaccuracies in weighing has not been uncommon, and the replacement of many old scales with newer designs better adapted to heavier carloads has become a pressing question. A very thorough treatment of the whole matter was presented in the form of a committee report at the annual meeting of the American Railway Bridge & Building Association last fall, and the result of these investigations was so startling in some respects that there was hesitancy in approving of the report, principally because the membership was unprepared for the reception of full information on the subject, and not that there was any disposition to dispute the accuracy or truthfulness of the statements or data of the report. It is now very generally conceded that the track scales question is one well worth looking into on all railroads.

One way in which inaccuracy has entered into the use of track scales, more or less frequently, has been through the mistaken use of counterpoise weights that were not intended for the ratio of the scale to which they were applied. Mistakes of this character have been easy to make through confusion of weights on

roads where scales of different ratios were in service. In order to overcome liability to such mistakes in the future the Southern Railway has recently designed and adopted as standard a series of counterpoise weights in which there is a distinctive shape of weight for each of the several ratios. For illustration, where the ratio is 1:100 the weights are made hexagonal; where the ratio is 1:200 the weights are square, with rounded corners; where the ratio is 1:500 the weights are elliptical in shape; and where the ratio is 1:1000 the weights are triangular in shape. In no case is the ordinary round weight used. In each instance the cap of the counterpoise cup for a given ratio is made the same shape as the weight for that ratio, so that if, by any chance, a wrong counterpoise weight should come to hand the misfit would be apparent at once. Moreover, each weight is marked with the ratio of the scale to which it belongs, and attached to the scale there is an engraved brass plate on which the ratio of the scale is marked, the inscription reading thus: "CAUTION. Use No Weights with this Scale but this Ratio———Shaped thus———."

The instructions require that in making requisition for new and additional weights the application shall "simply specify the ratio and number of pounds (value) for each weight required." The letters and figures on the counterpoise weights are cast one-sixteenth inch in relief; and the regulations require that no plugs, fillers or other means may be used for the purpose of building up weights which have been drilled below their deficiency tolerance, but that such weights must immediately be broken up and scrapped.

"Procrustes had only one bed for all comers; if his guest was too short for the bed, he stretched him out; if he was too long he cut him down to the requisite length."

Procrustes is the patron saint of the religion of standardization. He established a length for the physical man, to which he proposed that all must conform. He saw certain advantages in that uniform length. Variation added to expense in clothing and furniture; and a body of men of uniform height looked better than one of unassorted sizes. He proposed to rectify nature, and he went about it in much the same way that some industrial and political reformers and "efficiency" promoters of modern times attack the subject of improvement. There must be, they say, certain sizes, methods, and prices which are about right. "We will ascertain these dimensions and bring everybody and everything to them. Thus will we simplify existence, eliminate differences and reach an ultimate level of scientific exactness, which will beat the laws of Nature, which never made any two things exactly alike."

The characters and stories of ancient mythology always had a meaning. They were founded upon observed truths of natural history and of human nature. Theseus was a hero who destroyed many monsters, and among them the one who sacrificed the human race

to his idea of what was about the right size for a man. Extremists are men who are blinded by a single idea or group of ideas, and fail to reckon with the real facts of human nature, and the countless variations developed under laws which are themselves immutable.

The history of social intercourse and trade has proven certain laws to be inexorable; and that they cannot be beaten in the long run by artificial restraints and barriers. The laws of supply and demand; of quality of work and materials as influencing price; of wholesale and retail; of the ultimate cheapness of the best; of service as a criterion of value; that business cannot long continue except on a basis of fair profit to the producer and seller as well as reasonable cost to the consumer; that individual graft and government robbery are alike dishonest and destructive; that business cannot be conducted on cast iron principles which leave no room for individual initiative and reward; that men cannot be held to responsibility without commensurate authority; that short of a license which is injurious to the community, development depends upon liberty of thought and action;—these laws, modern reformers are attempting to combat. The result of these attempts will inevitably be men and industries disjointed to draw them out to the standard imposed, or rendered footless to curb their activities. The ultimate will be a revival of sense which will acknowledge that artifice cannot make over human nature, and that individualism cannot be wholly crushed out and be replaced by a dead level of socialism.

In some way in regulating trade and industry, there must be flexibility provided. Rates for service and prices for materials and appliances cannot be everywhere and at all times the same. Nor can any great industry be segregated by law from others and held to a procrustean measurement, without ruining that industry and eventually the others which are interlocked with it.

Standards too fixed and unchanging defeat progress and eventually reverse its wheels. The course of trade and industry untrammelled, except by moral law, has always made for the betterment of the race. When unduly curbed by robbing the individual of his reward and taking away the motives for industry, ingenuity and initiative, the race goes backward.

The applications of this truth to existing tendencies in government are too obvious to need elaboration. The government undertaking to regulate railways has found a rate structure which has grown up under the laws of trade and which it finds to be "about right." It, therefore, proposes to stop further change in accordance with changing prices, universal except for this, and to do away with all conformity to the shifting prices of the world. The transportation machine thus rigidly controlled begins to go to pieces and ruin impends. Some flexibility is absolutely necessary to its preservation; and in regulating it under law, the

flexibility should come with reasonable promptness. Action must conform to the general condition of the world's activities, when the necessity for such action appears—not after the clash has brought about widespread disaster.

Regulation of all other industries is the next move undertaken by the political reformers. The Sherman law was by its exact terms destructively rigid. The U. S. Supreme Court, by construction, gave it a flexibility which, while restraining actual monopoly and oppression, still left room for business to profit by reasonable combination and resulting economy. It is now proposed to make the law rigid by definition; to compel competition but to so curb and limit it as to make business impossible. The next move will be to attack prices and fix them by law. The manufacturer and the business man are no longer to be permitted to develop as in the past. All the details of business are to be turned over to the theorists and the lawyers who are fixing up a bed, developed not from experience, but out of their internal consciousness, and to which everything must conform.

Effect of the Panama Canal on Railroad Traffic.

Two prominent authorities have made public their individual estimates of what the effect of the opening of the Panama canal will be upon railroad traffic of this country. We give in another column of this issue, extracts from the address by John Barrett, director general of the Pan-American Union, Washington, D. C., before the Traffic Club of Pittsburgh, March 27, in which he emphatically voiced his admonition to railroad interests of this country to get ready for the opening of the canal. There was general advice of much value to business interests in this address; but Mr. Barrett also made some very specific prophecies as to the extent to which railroad freight traffic would be affected by the opening of the waterway. In striking coincidence with Mr. Barrett's opinions are the predictions made in the April number of the *World's Work*, by Theodore P. Shonts, who was formerly chairman of the Isthmian Canal Commission and is now president of the Interborough Rapid Transit Co., of New York City. Referring the reader to Mr. Barrett's remarks, in another column, we quote the following from Mr. Shonts' article:

I do not hold what seems to be the popular view, that the opening of the canal will have a serious effect upon the business of the transcontinental railroads of the United States; on the contrary, I am inclined to believe that it will be to their advantage so soon as trade conditions adjust themselves. The traffic of the transcontinental railroads that will be most seriously affected is that which originates at Atlantic coast points, destined to ports on the Pacific, and vice versa. With this traffic the steamers that operate by way of the canal will come into direct competition; and, as their rates will be lower and the time taken in transit approximately the same as is now taken by the railroads, diversion of business is naturally to be expected.

The tonnage actually handled from coast to coast is not, however, as important as that which originates at interior points and is brought to the coast to take advantage of the low rates quoted by competitors of the transcontinental railroads. But this competition will be limited to the movement of traffic only where the railroad rate for the haul from interior points to the seaboard, plus the ocean rate, is lower than the rate charged by the transcontinental railroads from interior points to destination. The railroads may possibly lose some of their cheaper tonnage, but this will be more than made up to them by the inevitable increase in higher class traffic that will be brought about by the development of the territory they serve. The opening of the canal cannot fail to increase to a large degree the shipments, such as canned goods, dried fruits, lumber and other products, that now move by way of the isthmuses of Panama and Tehuantepec from the west coast of the United States to European ports.

Mr. Shonts remarks upon the surprising disinclination of American manufacturers to adapt their packages to export conditions, and states that the principal obstacle to the present development of Pan-American business is the fact that shippers do not forward their goods in containers sufficiently strong to withstand the necessary re-handling at every point of transshipment. With the opening of the canal such transshipment will be eliminated, and delivery can more readily be made in condition satisfactory to the consignees. Following these remarks, Mr. Shonts says, "This may not be the place to say it, but the fact remains that the American shipper has a great deal to learn about the sale of merchandise and its handling for shipment." The counsel which follows sounds very like that offered in Mr. Barrett's address, referred to above, in which he advises American business interests to send their representatives abroad now, or to take some other immediate steps to acquaint themselves with the actual conditions of the Pan-American market.

Bill to Make Labor and Agriculture Classes Exempt from All Restraining Laws.

Congressman Bartlett, on April 7th introduced the following bill in the house of representatives. It was referred to the committee on Judiciary and ordered printed.

"A bill to make lawful certain agreements between employees and laborers, and persons engaged in agriculture or horticulture, and to limit the issuing of injunctions in certain cases, and for other purposes.

"Be it enacted by the senate and house of representatives of the United States of America in congress assembled, That it shall not be unlawful for persons employed or seeking employment to enter into any arrangements, agreements, or combinations with the view of lessening the hours of labor, or of increasing their wages, or of bettering their condition; nor shall any arrangements, agreements, or combinations be unlawful among persons engaged in horticulture or agriculture when made with the view of enhancing the price of agricultural or horticultural products; and no restraining order or injunction shall be granted by any court of the United States, or by any judge thereof, in any case between an employer and employee, or between employers and employees, or between persons employed and persons seeking employment, or involving or growing out of a dispute concerning terms or conditions of employment in any case, or concerning any agreement, arrangement, or com-

bination of persons engaged in horticulture or agriculture with the view of enhancing prices as aforesaid, or any act or acts done in pursuance thereof, unless in either case said injunction be necessary to prevent irreparable injury to property or to a property right of the party making the application for which there is no adequate remedy at law; and such property or property right must be particularly described in the application, which must be sworn to by the applicant or by his agent or attorney.

"In constructing this act the right to enter into the relation of employer and employee, to change that relation and to assume and create a new relation of employer and employee and to perform and carry on business in such relation with any person in any place or do work and labor as an employee shall be held and construed to be a personal and not a property right. In all cases involving the violation of the contract of employment by either the employee or employer where no irreparable damage is about to be committed upon the property or property right of either no

injunction shall be granted, but the parties shall be left to their remedy at law.

"Sec. 2. That no person or persons who are employed or seeking employment or other labor shall be indicted, prosecuted or tried in any court of the United States for entering into any arrangements, agreements, or combinations between themselves as such employees or laborers, made with a view of lessening the number of hours of labor or increasing their wages or bettering their condition, or for any act done in pursuance thereof, unless said act is in itself unlawful; nor shall any person or persons who may enter into any arrangements or agreements or combinations among themselves for the purpose of engaging in horticulture or agriculture with a view of enhancing the price of agricultural or horticultural products, be indicted, prosecuted, or tried in any court of the United States on account of making or entering into such arrangements, agreements, or combinations, or any act done in pursuance thereof, unless said act is in itself unlawful."

The Rate Hearing by the Interstate Commerce Commission

The cross examination of Presidents Smith, Rea and Delano were rather long, but did not develop many points not covered in their direct testimony. Mr. Delano was asked: Would a 5 per cent advance in freight rates enable the railroads in Central Freight Association territory to maintain their properties fully and obtain the new capital necessary to take care of the business? He answered: "No, but it would be a material help. Mr. Brandeis asked me yesterday whether a 5 per cent advance would be sufficient for the Wabash and I replied that it would enable that road to meet its fixed charges. I think the Wabash and, in fact that 50 per cent of the mileage in that territory, needs not only enough to pay interest on their property value, but also to have a fair margin above that. Five per cent won't do that. If this advance is granted, I think these railroads will study the question raised in this case such as terminal expenses and allowances, unduly low commodity rates, etc."

Asked: "Is it feasible to adjust rates in C. F. A. territory in course of time up to the level prevailing in other similar territory?" he replied, "Yes, I think it could be done."

Statistician W. C. Wishart of the New York Central testified: "The important point is that while transportation revenues per unit of traffic appear, since 1902, to have remained fairly constant, in that they are expressed in approximately the same figures year after year, influences beyond the control of any group of men have been at work quietly and constantly to reduce the actual compensation to the carrier to a level which is estimated at almost 40 per cent below that of 1896. Such a heavy reduction could hardly have been brought about by any other agency or cause than the gradual depreciation in money; yet the reduction is quite as effective, if it is not so apparent, as one in which the figures are changed. That this depreciation is likely to continue for years is the opinion of many economists. Its effect upon an important industry is, therefore, worthy of serious study.

"In the adverse report of the Interstate Commerce Commission upon the 1910 case involving advanced freight rates, we find this: 'While there is today no competition worth the name in the railway rate, and while there never will again be such competition, this has not been true of the past. Originally there was the most active competition in the rate of transportation by rail, and these tariffs, especially in official classification territory, are largely the product of that competition. There is a strong presumption that rates so arrived at are reasonable rates.'

"Now, if the conditions just recited are true as to the decline in the purchasing power of money, it follows that a level of

rates which was reasonable and remunerative in 1896 or in 1902 is not necessarily remunerative at this time. Just as the laborer has found it impossible to maintain a given standard of living upon an income no greater than that of 1896, the railroad company would find it impossible now to conduct the same business with the income of that year; but the laborer's wage has increased and the railroad's gross income has increased through its ability to do a larger volume of business. Up to a certain point the carrier has been able to produce transportation at a lower unit cost by improved methods and a heavy investment in better machinery, otherwise it could not have survived the season of increasing cost for all that it buys with a constant price for what it sells. Now, however, it finds itself in a position somewhat like that of a laborer whose total income was increased, not by receiving a higher rate of wages, but by working more and more hours per day until the natural limits of such expansion are reached.

"While the price of rails of the same kind has not risen materially within the last twelve years, the cost of both rails and ties per mile of line has increased considerably; for efforts at economy in the direction of increased train load have required the use of larger locomotives and cars, and these have made necessary the use of heavier and higher grade rails and more ties, as shown by the table, which is made from reports to the commission."

The tons of rails per mile of main track on the New York Central increase from 6.46 in 1903 to 13.65 in 1913; and the number of ties from 333.7 to 379.1.

J. T. Wallis, general superintendent of motive power of the Pennsylvania, and J. S. Rogers, general superintendent of the same road, testified as to the increase in maintenance costs. Their very interesting and detailed evidence is given in full in another column.

In reply to a question by Mr. Brandeis, Mr. Bunting of the Pennsylvania replied that the passenger business of the road is relatively unprofitable. A rough attempt at separation four years ago indicated that the passenger traffic showed a return of about one and three-quarters per cent.

W. C. Maxwell, of the Wabash, testified at length on the relation of Central Freight Association rates to the general level. He declared that the 5 per cent increase alone would not keep the roads in territory out of bankruptcy. He proposed a joint investigation of the situation by the commission and the state commissions in that territory similar to the rate inquiry conducted. Commissioner Harlan asked for an explanation of the

5 cents a ton minimum advance proposed by the carriers. Witness said the 5-cent minimum had been selected as an even number and because if they did not obtain that much increase in C. F. A. territory the advance would not amount to anything. "On some commodities an advance of 5 cents a ton would apply on rates of 30, 40 and 50 cents as on sand and gravel."

Mr. Harlan: "Assume a 30-cent rate; on that 5 per cent would be 1½ cents, and you propose to add 5 cents. (Answer) "Yes, but I think you will find that those rates have been hammered down to a very low level."

Commissioner Clement: "Are there any more extreme cases involving short hauls?" Mr. Maxwell: "There are hardly any rates below 25 cents."

Mr. Brandeis: The Michigan ice shippers claim that the advances applying to them are 30 and 40 per cent. A large part of coal traffic and all the ore traffic moves at less than \$1.

Mr. Johnson, for the Pittsburgh district, declared that the proposed advances amounted from 9 to 10 per cent on Pittsburgh coal.

Mr. Harlan asked if any average rate of advance made by the proposed tariffs had been calculated. Railroad counsel said there had not. Opposition counsel intimated their belief that the average on all traffic must be decidedly more than 5 per cent. Mr. Johnson stated that the annual report of the Pennsylvania for 1913 showed average receipts per ton loaded, all traffic, of 87 cents. The implication was that a minimum advance of 5 cents a ton would be more than the proportion of 5 per cent.

Mr. Maxwell stated that he was confident that the 5 per cent increase would not save those roads, but would only temporarily relieve the situation and added that the higher class freight in that territory, in many, if not most cases, was absorbed by cost of getting the freight through terminals, leaving nothing at all for line haul. He explained that he was speaking of rates wholly within C. F. A. territory.

Commissioner Harlan wanted to know why Central Freight Association roads had never taken the initiative to correct this unsatisfactory situation, and brought out in a general way that local conditions were the chief obstacle, meaning the difficulty of satisfactory information from all the industrial interests involved. Witness declared that the Commerce Commission was in no way responsible for the Central Freight Association rate fabric, which had been built up on a scale framed by "some man out of an asylum" years before the witness himself left the Burlington.

Under Mr. Brandeis questioning the witness testified that at Chicago, where a deplorable situation existed, terminal allowances and the like sometimes left the line carrier no more than \$3 a car for a haul of 200 to 300 miles. Mr. Brandeis testified that the use of the car alone was worth more than that and witness rejoined that a great deal of freight was carried free.

Mr. Barlow for the Chicago Association of Commerce called the commissioners' attention to that organization's investigation of Chicago coal rates and consequent order of Illinois State Commission raising these rates 7½ cents a ton. This based largely on the complaints of carriers about the burden of Chicago terminal allowances.

On Tuesday of this week the subject of lake and rail rates was taken up, and H. C. Barlow, traffic expert of the Chicago Association of Commerce, said that although the United States has spent \$117,468,988 for the improvement of the great lakes for the benefit of all the people the trunk line railroads have obtained a monopoly of package shipping on the lakes, preventing the people from getting any resulting benefits from this tremendous expenditure.

The railroads which have the monopoly are the Pennsylvania, the New York Central, the Lehigh Valley, the Delaware, Lackawanna and Western, and the Erie. These roads control every package freight steamer on the great lakes.

"No one can deny that there is a monopoly of package freight vessels on the great lakes by the great trunk line railroads.

This monopoly has resulted in an increase of freight rates on the lakes to such an extent that much of the shipping formerly done by water now goes by rail. This is shown by the exhibits in this case. It is my belief the monopoly was obtained to give trunk lines the power to force the shippers to send most of their traffic at the higher rail rates."

The work of obtaining the monopoly of lake lines was started in 1901; that since that time there has been a total increase in lake and rail rates of 11 per cent, and if the proposed 5 per cent raise goes into effect there will be an increase of 20 per cent. The lake rates have increased 35 per cent since 1901, according to the Chicago expert.

This is true, however, only of the package freight vessels. The bulk rates have gone down practically a corresponding amount, and instead of being higher now than in 1901 they are about 50 per cent lower. The bulk rate men are not complaining, however, for they testified they are earning good returns on their investments now.

Mr. Barlow said that the exhibits of the rail carriers show they spend practically 77½ per cent of their investment in right of way and improvements thereon.

The United States government and nature have provided the lake carriers with a right of way free of cost, but they want a further increase in rates, though since 1901 they have received a raise of 35 per cent. Not only that, but the government spends annually for the maintenance of this right of way upwards of \$1,300,000, to which the carriers contribute nothing.

Mr. Barlow said the rail carriers' exhibits showed that since 1903 they had spent \$2,400,000,000 on their lines, practically \$2,000,000,000 of which was on right of way.

He charged that Mississippi river cities are favored in the through rates over Chicago. The lake and rail rate from New York to Chicago is 62 cents and from Chicago to Omaha 80 cents, or a total of \$1.42 from New York to Omaha. The ocean and rail rate to St. Louis is 78 cents and the rate from St. Louis to Omaha is but 60 cents, or a total of \$1.38 to ship by that way.

G. Roy Hall, traffic expert of the Duluth Chamber of Commerce, stated that until the railroads got control of the lake lines the latter fought all proposed increases in lake rates. They were making big profits on low rates. As soon as the railroads got control they shoved the lake rates up so close to the rail rates that many shippers quit using the water in order to obtain faster service by rail. He also pointed out that as soon as the railroads gained full control they cut out many lake routes, forcing shippers to use the rail routes exclusively.

"The system of differentials now in force governing lake and rail rates are nothing more than pooling agreements. To prove his argument he said that with more boats than in 1904 the exhibits of several of the transportation companies show great decreases in their lake revenue. The reason for this is that they have driven their lake rates so high they nearly equal the rail rates.

Mr. Hall also pointed out what he regarded as a discrimination against the shipper in the handling of the ocean and rail rates.

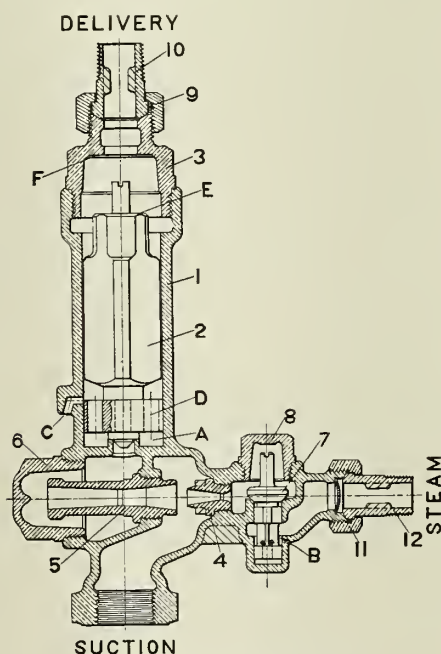
"When there is no competition with the lakes, these roads are allowed to charge 65 cents on New York and Chicago traffic. In the summer, when there is competition, they cut it down to 62 cents. If they can handle at a profit under competition at 62 cents, I do not see why they cannot handle at a profit at 62 cents when there is no competition."

The Ohio state civil service commission, Columbus, Ohio, is to hold an examination, on May 19, for the position of superintendent of bureau of rates and service with the Public Utilities Commission. The salary of the position is \$4500 per year. Applicants are expected to be conversant with the work of public service corporations, as the superintendent will be required to

investigate and adjust claims of shippers as filed against railroads for irregularities in charges and service and to make inspection of railroad tariffs.

The Hancock Coal Sprinkler.

The Hancock coal sprinkler, made by the Hancock Inspirator Co., New York, acts on the principle of an ejector, is so designed as to make it proof against accidents, due to the failure of the usual forms of coal sprinkling apparatus found in the locomotive cab. The principal feature of this sprinkler is a valve which automatically discriminates between steam and water, its action being such that there cannot be a sudden and unexpected discharge of steam through the hose. The sprinkler is generally applied on the strainer or on the suction pipe of the injector of the locomotive by the use of a short connecting



The Hancock Coal Sprinkler.

nipple having a bend so that the sprinkler will be in a vertical position. A valve is placed in the steam pipe at a point where it can be conveniently reached.

In operating the coal sprinkler the steam valve in the pipe is opened wide which action opens the valve 7. This action also closes the drip hole B, the piston end on the lower end of guiding stem covering the hole. Steam will now flow through nozzle 4, forming a jet and combining with water in valve 5. Tubes 4 and 5 being always under water by reason of the location of the sprinkler at a point lower than the tank, there never is a flow of steam in starting. Steam then flows into the pressure chamber A and valve 2 which has been closed heretofore will be lifted. Port C which has been opened heretofore will also be closed and the water will be forced through the delivery pipe and into the delivery hose.

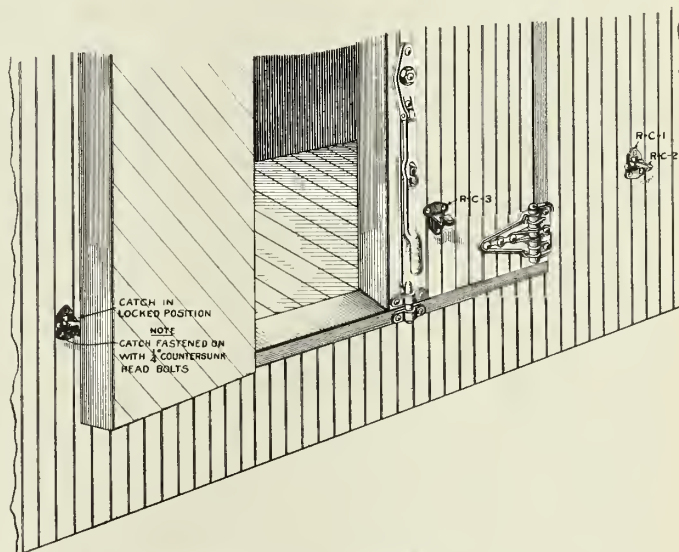
Accidents resulting from the use of a sprinkler have generally been caused by an interruption of the water supply due to an obstruction such as leaves waste or coal at the strainer, or by the failure of the injector to work. Should the flow of water be interrupted or the injector refuse to work, where a Hancock coal sprinkler is used, valve No. 2, which discriminates between steam and water, will close the sprinkler so that no steam can escape into the hose; instead the steam will be blown back toward the suction pipe, will flow into the pressure chamber A, and force valve 2 upward. The end E of valve 2

will seat against the surface F thus making it impossible for steam to flow into the delivery tube.

When not operating, both valves will seat. The discriminating valve No. 2 is heavy enough to prevent water flowing up the delivery pipe, at which time all the water in the delivery pipe will flow out of the drain hole C. At the same time the steam valve 7 will seat, no water will flow up the steam pipe and all water or steam in the steam pipe will drain out at the hole B. The sprinkler uses comparatively cold water, is self-draining and non-freezable.

The Booth Positive Catch Refrigerator Car Doors.

The Chas. W. Booth Co., 332 South Michigan avenue, Chicago, Ill., has introduced an automatic catch for refrigerator car doors, the purpose being to hold them securely in place when in the open position. The construction of the latches, as the illustration shows, is such that they engage automatically when the doors are thrown back against the sides of the car. Besides being more substantial than the hook-and-eye form of fastening occasionally used for this



Booth Positive Catch for Refrigerator Car Doors.

purpose, this latch has the advantage of doing away also with the necessity for the bumping plates that are generally applied with that type of catch. The value of a device of this kind is evident when consideration is taken of the fact that its non-use is not infrequently the cause of injury both to the doors themselves and the objects with which they may come into contact, besides which a swinging refrigerator-car door in a moving train is a constant menace to the lives of employees whose duties take them into close proximity with such trains.

The above named company likewise produces a highly developed variety of positive fastenings for box-car doors.

Baltimore & Ohio Tests New Appliance.

The Baltimore & Ohio R. R. has been experimenting with a speed recording and annunciating device invented and patented recently by Charles Edmunds, a mechanic in the shops of the road at Baltimore, Md. The new appliance consists of a signal system attached to the speed recorder and located in the cab of the locomotive to notify the engineer that the speed limit prescribed by the rules has been reached. The signals are indicated by a gong which rings in the daytime, supplemented

by a light which flashes before the engineer by night. Both signals work automatically and continue while the train is running 1½ miles. The device has been tested on several locomotives in regular service and has been reported upon favorably. The Baltimore & Ohio is considering installing the annunciator on its locomotives in through train service, which with many of the engines used on local runs, are equipped with speed recorders which indicate the rate of speed and make a record for each mile the train travels.

Recommended Form of Freight Bill.

Some time ago the Interstate Commerce Commission instituted on its own motion an investigation and inquiry into the subject of freight bills, being actuated therein by its belief "that the carriers have failed to establish, observe, and enforce just and reasonable regulations and practices affecting the issuance of freight bills and receipts." The purpose was "to determine whether the present rules, regulations, and practices of carriers in regard to freight bills embrace any unjust, unreasonable, discriminatory, preferential, or otherwise unlawful features, and to determine more particularly whether freight bills or receipts, when presented to the consignee, should show on their face information respecting the shipments covered thereby as follows: (1) The point of origin; (2) the date of shipment; (3) the weight of the shipment; (4) the route, including the name or initials of each carrier participating in the haul and the

Accountants' Association Standard Form 123 (revised 1913).

FREIGHT BILL.

STATION 191..

CONSIGNEE.....FREIGHT BILL No.....

DESTINATION.....

ROUTE.....

(Point of origin to destination.)

To R. R. Co., DR., for charges on articles transported:

WAY-BILLED FROM	WAY-BILL DATE AND NO.	FULL NAME OF SHIPPER	CAR INITIALS AND NO.
POINT AND DATE OF SHIPMENT	CONNECTING LINE REFERENCE	PREVIOUS WAY-BILL REFERENCES	ORIGINAL CAR INITIALS AND NO.
NUMBER OF PACKAGES, ARTICLES AND MARKS		WEIGHT	RATE
SIZE: 5½ x 8½ inches		FREIGHT	ADVANCES
NOTE:—This freight bill is spaced and ruled for typewriter use but can be readily adapted to use with indelible pencil. When to be used with pencil, horizontal lines may be added if considered desirable.		TOTAL	
*TOTAL PREPAID \$.....			
RECEIVED PAYMENT..... 191..		TOTAL.....	
..... AGENT			

*For use at junction points on freight subject to connecting line settlement.
[On reverse of freight bill.]

RULES.

1. This form must be prepared with typewriter, pen, or indelible pencil; all information called for to be shown in full and in a clear and legible manner.
2. Weight, rate, and charges must be shown in detail for less carload shipments.
3. Demurrage, switching, icing, or other miscellaneous charges not included in the rate for transportation must be stated in detail, and the points at which such charges accrued shown.
4. When charges are assessed on track scale weights, gross, tare, and net weights on which charges are based and name of weighing station must be shown.
5. The route over which the shipment moved from point of origin to destination, including the initials of each carrier and name of each connecting line junction point, must be shown.
6. Overcharges will be refunded only on presentation of original paid freight bills.
7. Original paid freight bills should accompany claims for overcharge, loss, or damage.
8. All freight will be subject to demurrage or storage charges, or both, as provided in published tariffs

Form of Freight Bill Recommended by the Interstate Commerce Commission.

junction points through which the shipment moved; (5) the initials and number of the car; (6) an adequate description of the property transported; (7) the rate or rates applied for the service; (8) a statement of the nature, amount, and point of accrual of each item of charge for stop-in-transit, reconsignment, switching, car service, storage, and any other charge incident to the transportation; (9) the name of the consignor and the date of arrival at destination."

Shortly after the order of inquiry was entered, the commission was advised that the carriers themselves, through the American Railway Association and the Association of American Railway Accounting Officers, and for the purpose of arriving at an understanding as to an improved form of freight receipt, had voluntarily taken up the matter with shippers represented by the National Industrial Traffic League and with others. As the result of these joint deliberations and of informal conferences between the commission and these representatives of carriers and shippers a standard form of freight bill was agreed upon and has been presented to the commission for its action. The form is so prepared as to require carriers to show all the information suggested for consideration in the order instituting the inquiry.

The commission has now rendered a decision in the matter approving the form agreed upon in the conference between the carriers and the shippers, as above explained. This form, which is illustrated herewith, is earnestly recommended by the commission, for use by all rail lines. In connection with its report the commission makes the following observations:

"Freight bills may be said to have three functions, namely, (a) to serve as a receipt to the consignee or consignor and as prima facie evidence of the payment of the transportation charges; (b) to serve as a receipt to the carrier and as prima facie evidence of the delivery of the property; and (c) to serve as a notice to the consignee of the arrival of the shipment. In addition to these defined functions the freight bill has other uses. It is often a means of identifying the shipment, and to this extent the name of the shipper is frequently essential in effecting prompt delivery. It is also used extensively as a record. The purpose of the inquiry was to ascertain whether in any of these respects the present practices of carriers are defective and have any unlawful consequences and, if so, to take such action as might be authorized by law for the establishment of other and more perfect rules and regulations respecting the form and use of freight bills.

"No question has been made of the right of the commission under section 20 to prescribe by proper order the form and substance of freight bills and require their use by carriers. But in view of the apparent general consensus of opinion among both carriers and shippers as to the information that ought to appear on a freight bill we think it will suffice at this time simply to express our approval of the proposed form,*and also to say that we think it a proper form and one that carriers should at once adopt. It is obviously the duty of carriers in rendering a bill for transportation service to state thereon such information as will enable the consignor or consignee with the aid of the published tariff to verify the correctness of the charges which he is called upon to pay. A freight bill should also show the point of origin, the date of shipment, its weight, the route of movement (this being shown by indicating each carrier participating in the haul and the junction points through which the shipment moves), the initials of the owning carrier and the number of the car, an adequate description of the property carried, the rate or rates applicable to the service rendered, and a statement of the nature, amount, and points of accrual of each item or charge for stoppage in transit, re-

consignment, switching, drayage, car service, storage, or other charge incident to the transaction. We are convinced that the adoption by all carriers of such a form will go far toward establishing uniformity, simplicity, and certainty, and that its general use will remove much of the confusion now existing and will minimize the irregularities and injustices which have heretofore occurred."

Pacific, Peace River & Athabaska Ry.

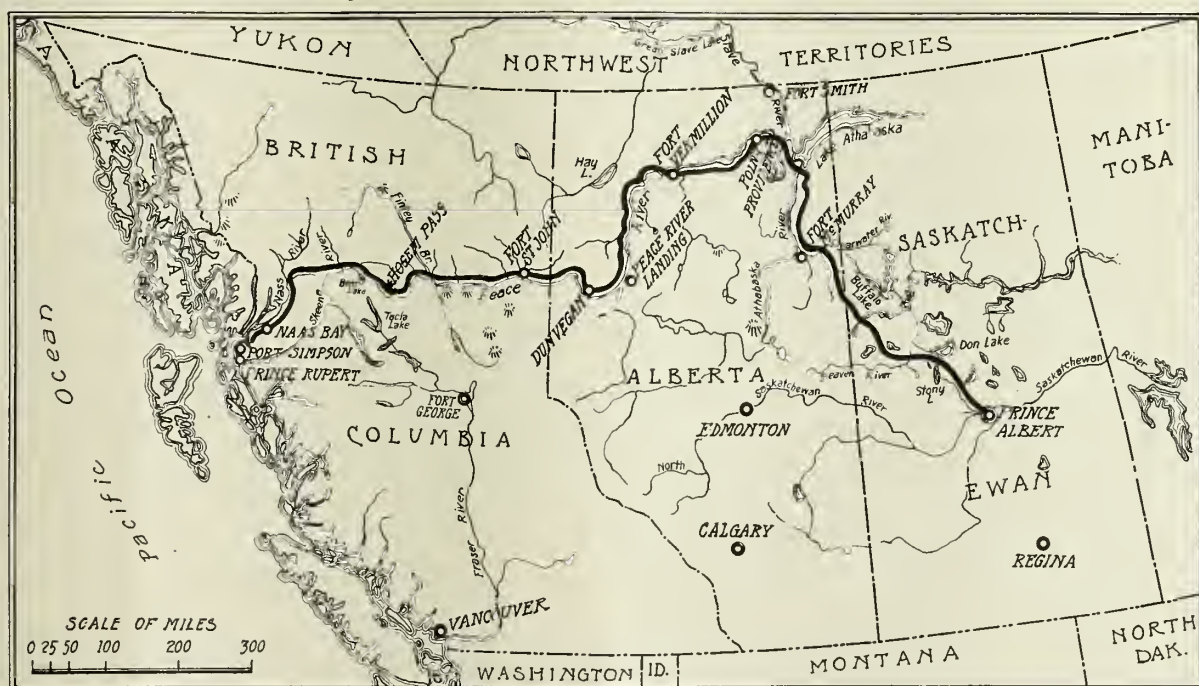
The Canadian government has granted a charter for the Pacific, Peace River & Athabasca Railway. The company proposes the construction of 1500 miles of railroad from a point on the Pacific near Naas Bay in a general easterly direction through northern British Columbia, northern Alberta and Saskatchewan to Prince Albert. The ambitious project arouses interest even though the seriousness of the promoters might be questioned, for it is the farthest north of any of the projected east and west lines. The country for the most part has barely been touched in exploration.

The company's plans call for construction from the mouth

half miles in length, at Vermillion rapids on the Peace river.

At present the best way to get into this country is by boat, but the cost of transportation by water is greatly increased because of the long portages necessary at various points on the Peace and Slave rivers. The two tramways which the company plans to construct would greatly facilitate matters and permit easy access to the Northwest Territories. The company, it is said, will let contract soon for three boats of a type similar to those which ply upon the Mississippi river. These are to be used on the Peace and Slave rivers for general transportation purposes, and also for the transport of the railroad company's materials for construction.

Although the Canadian government in the past has given liberal concessions to encourage railway construction, it has recently been more strict in treating with promoters and many prominent men have been active in defeating legislation in support of such projects. The Pacific, Peace River & Athabaska company asked for no concessions or guaranties, and for this or other reasons won the support of many of these conservatives. The bill to incorporate the railroad was passed at Ottawa, February 17, 1914. The



Route of Proposed Pacific, Peace River & Athabaska Ry.

of the Naas river in British Columbia easterly and northerly for 225 miles, then across the water shed between the Naas and Skeena rivers, down Currier creek to the Skeena and down the Skeena to Bear river; thence up the Bear river to Bear lake and then south and east across the divide to the Driftwood river. The line would go through Hogem Pass to the Omineca river; along which to the Finley branch of the Peace river, and then on the north side of the main branch of the Peace river in an easterly and northerly direction to Vermillion rapids in Alberta. At this point the road will cross the Peace river and continue north and east along the south bank to Point Providence; thence to the mouth of the Athabaska river; south up its east bank to Fort McMurray and thence, in a general southeasterly direction, to Prince Albert.

A part of the same project which has been chartered under the name of the Peace River Tramway & Navigation Co., plans the construction of 16 miles of tramway from Smith's Landing to or near Fort Smith on the Slave river near the northern boundary of the province of Alberta, and another similar but considerably shorter project, one and one-

capital stock is \$15,000,000, with a bonding privilege of \$50,000 per mile. The tramway project is capitalized at \$1,000,000, with bonding privilege of \$35,000 per mile.

Those who know the country through which the line is projected claim for it greater resources in the way of coal, oil, iron, copper and other materials than any other part of the Dominion and the agricultural lands in northwestern British Columbia and northern Alberta are said to offer a soil and climate well adapted for wheat growing or for mixed farming.

The development of coal and oil lands is a big feature in the plans of the promoters. D. A. Thomas, Cardiff, Wales, one of the largest, if not the largest coal operator in the British Isles, is the principal stockholder in both companies. He controls the Cambrian Collieries, with an output of seventeen to eighteen million tons of coal per year, owns vessels with an aggregate tonnage of 70,000 tons, and his interests as a whole are capitalized at £17,000,000. Mr. Thomas is a recognized authority on coal—a chemist and a mining engineer. He was for some time, until about six years ago, a member of the English House of Commons and

his immense holdings have for the most part been acquired since then.

The Peace River Tramway & Navigation Co. will build its proposed tramways, it is said, in 1915. There is promise of the completion of the Edmonton, Dunvegan & British Columbia Railway to Dunvegan, Alta. this fall. If this is accomplished the tramway company will be able to bring in

construction materials during the winter and upon the opening of navigation begin actual work. Announcement of plans for the construction of the railway contains no assurance as to when the railroad will be built. It is stated, however, that the first construction to be undertaken will be north and west from Naas bay along the North river in British Columbia for 200 miles to the coal deposits at Hog Mountain.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Shrinkage in Market Value of Railway Securities.

Newman Erb, president of the Minneapolis & St. Louis R. R., states his belief that even if the application on the carriers for an increase in rates should be granted, the injury and damage which has been done by the delay in granting their petition could be repaired only in a small degree. Mr. Erb presented the loss suffered through shrinkage in the market value of railroad securities in a startling way. He said:

"Any great catastrophe that would wipe out the assessed valuation of the property of a single State would shock humanity the world over, and yet, the shrinkage in the market value of railroad securities since 1906, when the Interstate Commerce Commission was vested with authority to fix rates, aggregates now upwards of \$3,000,000,000, an amount greater than the assessed valuation of real and personal property, including public-service corporations, in the states of Mississippi, Alabama, Louisiana, Florida, Georgia and South Carolina combined; more than the assessed valuation of all kinds of property in the states of Minnesota, North Dakota and South Dakota; and greater than the assessed valuation of all forms of property in the states of Montana, Nebraska, Nevada, New Mexico, Utah, Wyoming, Idaho, Arizona and Colorado combined.

"This almost unthinkable loss has fallen upon investors, principally of this country, and the public fails to realize its important bearing upon our prosperity and further progress. The loss in the aggregate exceeds the entire circulating medium in gold and currency of the country; if distributed, it would amount to more than \$30 per capita of our entire population. A loss so enormous must necessarily be world-wide in its effect, and we must not expect to recover from its serious influence for years to come. If the conditions which produced it are not fundamentally corrected, it will be irreparable in its consequences. Its influence upon the commercial and industrial interests are just beginning to be felt, and the application for the increase of rates, now pending before the Interstate Commerce Commission, if granted, can only in a very small degree repair the injury and damage which has been done."

The Canadian Rate Decision.

Sir Thomas Shaughnessy, president of the Canadian Pacific Ry. is credited with the following expression of opinion on the western Canadian freight rate decision.

"I have followed the proceedings before the board very closely and have no hesitation in saying that the judgment goes beyond anything warranted by the facts as presented. The evidence proved conclusively, as the board of commissioners found, that there was no discrimination as charged in the complaint and the reasonableness of existing rates in existing circumstances was not seriously disturbed by the attacks of the complaints. Apparently the board, actuated no doubt by what they consider to be the ultimate best interests of the country, have put into effect reductions in rates which, while they might have a semblance of justification some years hence, are such as, viewed in the light of present commercial and transportation

conditions, cannot but be regarded as unnecessarily and unjustifiably drastic in character. The Canadian Pacific can stand it, and this seems to be about the only excuse that can be urged in support of the commission's findings. How other companies, still in the process of construction, and which have not been able to build up supporting traffic and are faced with the necessity of heavy borrowing for the next few years at least, regard the decision is for them to say."

Restore Credit and Confidence First.

"Let the Interstate Commerce Commission decide the rate increase first.

"Then let it deal with the administrative abuses that have come to light in the management of certain railroads.

"That is a simple and common sense program.

"Government has no more important function than the restoration of credit and confidence by the just exercise of lawful powers. When the railroads are asking for a small increase in freight rates as a matter of financial life or death, and the great body of shippers are willing to pay these increased rates for the sake of the stimulation they will give to business in general, why should government block the way? And more especially, why should government block the way when these increased rates can be withdrawn whenever it is found that the railroads no longer need them?"—New York World.

Railway and Engineering Literature.

INSPECTION OF CONCRETE CONSTRUCTION.—By Jerome Cochran. Published by Myron C. Clark Publishing Co., Chicago. Cloth, 6x9 in., 595 pages.

Mr. Cochran is the author of "A Treatise on Cement Specifications" and "Principles of Municipal Refuse Collection and Disposal." This work is intended to convey practical hints for concrete inspectors, superintendents and others engaged in the construction of public and private works. The duties of inspectors are dealt with at length, and numerous sets of instructions for methods of performing various kinds of concrete work are included. The various chapters relate to inspection of cements, sand, stone and miscellaneous concrete materials; forms, molds, centering and falsework; steel reinforcement; handling of concrete; surface finishes; waterproofing; concrete sidewalks, curbs and pavements; molding and driving concrete piles; and of concrete products in general.

* * *

AMERICAN RED CROSS ABRIDGED TEXT BOOK ON FIRST AID.—By Maj. Charles Lynch, Medical Corps, U. S. Army. Published by P. Blackiston's Son & Co., 1012 Walnut St., Philadelphia, Pa. Paper, 5x7 in., 150 pages; price, 30 cents. net.

This is known as the "Railroad Edition," a manual of instructions prepared and indorsed by the American Red Cross. The American National Red Cross has two specially-equipped cars in service on the railroads for use in giving instructions as to first aid to the injured. These cars are equipped with first-aid material for teaching and carry doctors representing the Red Cross. By a special arrangement made with the different railroads these cars stop at points where large numbers of employees can be reached, and lectures are given on first aid methods. The experience gained from these campaigns has led

to the compilation of this special book on first aid for the instruction of railroad men. It is well illustrated, showing the application of first-aid methods to the most common classes of injuries.

* * *

Industrial Works, Bay City, Mich., has a new catalogue on "Locomotive Cranes." It is illustrated with views of crane construction, for industrial and railroad purposes, with various accessories, such as clam shell buckets, lifting magnets, special cars, booms and attachments. There is a good account of the historical development of locomotive cranes, wrecking cars and similar machinery. The new catalogue is known as "Book No. 108."

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The next regular meeting of the New York Railroad Club will be held at the building of the United Engineering Societies, 29 West Thirty-ninth street, New York, on Friday evening, April 17, 1914. At that meeting, Mr. C. A. Seley, president of

the American Flexible Bolt Co. will present a paper on "The Art of Locomotive Staybolts."

The sixth annual meeting of the International Railway Fuel Association will be held at Hotel LaSalle, Chicago, Illinois, May 18 to 21, 1914.

The executive committee has selected the following list of subjects on which papers are being prepared, same being such as should be of interest to representatives of coal companies and railroad companies alike:

Storage of Coal—Its Feasibility and Advantages to Producer, Carrier and Consumer.

Sizing of Coal for Locomotive Use.

A Uniform Method of Computing Locomotive Fuel Consumption for Office Statistics and Trip Performance.

Honey-combing and Clinker Formation.

Coal Space and Adjuncts of Locomotive Tenders.

Relation of Front End Design and Air Openings of Grates and Ash Pans to Fuel Consumption and Sparks.

Economies in Roundhouse and Terminal Fuel Consumption.

Pre-heating of Feed Water for Locomotive Boilers.

The Railway Supply Man's Point of View

What's in a Name?

Some of these familiar expressions must have some basis of fact for being so well known. Names given to railway supply manufacturing companies are many and varied. Probably many of them receive their names with a reason, and many of them without. The question, however, is "is there anything in a name, and what is there in a name?" Has it any bearing upon the success or standing of a company? Has it any influence in the business world?

In the early commercial life of England, and later among the English settlers in this country, most businesses were given the name or names of the founder or founders, and in keeping with the solidity of things Anglo Saxon, the name of the founder was generally perpetuated in the business by the sons and grandsons. Possibly it was a good deal more common two hundred years ago for a son to follow in the footsteps of his father. There was a certain family pride taken in maintaining business honesty as well as business success, due to the pride taken in the family name which was given to the business.

There is in this country a concern that has been doing business for a great many years, and is still doing business, and doing it successfully, under the name of the individual who founded the parent business in England many years ago. Such concerns, of course, are rare, but they remind us of the customs which prevailed in the seventeenth and eighteenth centuries as regards the firm name or partnership.

The last few years especially have seen a great many consolidations, amalgamations, and reorganizations of businesses. Two or three, or eight or ten, comparatively small companies have been consolidated; a number of plants bearing names of individuals or localities where they are situated have been brought under the control of one large corporation. The Union Company, the Standard Corporation, are familiar names in the business world. Use has been made of the words General, Universal, United States, National, International, American, Columbian, Illinois, New York, etc., as names for business institutions. There has been a gradual drifting away from the naming of a business from the name of some individual prominent in it to some name that is impersonal—non-committal,—that means nothing, except that it may be a name well known and connected with bigger national

affairs. Has such a change been beneficial, or is it immaterial as to what the name of a company may be?

Not only have such general names been used in the formation of corporations embracing many smaller companies, but many times, not only in the railway supply manufacturing field, but in the general business world, some one individual patents an idea, puts the successful idea into operation, and conducts a business. Just as soon as he has reached any degree of success, the individual name is dropped, and some more general term like "National" or "American" takes its place. A man who yesterday was working for a railroad develops an appliance which is of undoubted value in railroad operation. He forms a small company, which is given his own name; he proceeds a short way toward success, and his individuality is swallowed up to a certain extent by changing the name of the company from one that is individual to one that is general, and more impersonal. There are, of course, exceptions to this, but it seems to be the general and prevailing custom in the business world, and it is especially true in the world of railway supply manufacturing, to drop the name of the individual most prominently represented in the company, and take some name that has no meaning.

Some of the oldest manufacturers of railway supplies in this country,—none of them, of course, can be very old in so young an industry as railroading,—still bear the names of their founders,—the men who established the business,—who brought to it the ideas and methods that have made its success possible.

A machine may be run as a machine. It can be run that way because it is lacking the human element. But are we trending too much toward machine methods in business organizations, and will business organizations and corporations stand and endure if machine methods only are applied to them? It may be possible some day to make out of man a machine, but that possibility is doubted. So long as this sphere on which we live turns around in its daily and yearly revolutions, and the human race continues to exist, we must take human personality into account. We may make men more machine-like, but when we have made them machines, entirely so, we have destroyed the human being. We may approximate machine methods with men, but we never can make out of any man a machine. We never can entirely destroy his personality.

No student of human affairs will admit for a moment that there is anything stronger, even in commercial life if you

please, than human personality. Personality,—the ego,—the individual, term it what you may, stands for all time, so far as we are able to judge the dominant controlling influence in every activity of life. We cannot eradicate it from the business world, nor from the railway supply manufacturing field, and in just so far as we try to eliminate it, we lessen the values to be derived from it.

It is hardly necessary to mention any name to serve as an illustration of the value of personality, and we can just as well take an imaginary business institution,—call it the Brown and Smith Company, establish it in 1856, analyze it as a business institution for fifty or sixty years,—and take some other company in direct competition, calling it the American Appliances Corporation, established about twenty years ago, when such names became the style. What is the history of these two companies, and do the two names signify anything?

The Brown and Smith Company no longer have either Brown or Smith; they are both dead and gone. Younger men took their places, and have grown old in the company. But has the personality of Brown and Smith no longer any influence on the business? You go and talk with some of the employees of the Brown and Smith Company, and you will find that there are traditions gathered around that institution. You may say that sentiment has no part in business, but those traditions nevertheless have a very active influence on the ideals and methods pursued by the Brown and Smith Company in the transaction of business. The older men in the company knew Brown and Smith personally. They knew their ideals, and they have followed them. They have passed these ideals on to the younger men of the company who are to take their places. There is a pride, among each and every employee of that institution who really amounts to anything, in the very name itself of the company from which he draws his salary.

What about the other concern, the American Appliances Corporation? Do they have any traditions? Naturally they would not have as many, because they are a younger company. However, examine the company more closely, and you will find that they have no traditions,—no sentiment. It is all machine-like business. True, there was a man, whose name some of them know, who was the first President of the institution. Any loyalty which the employees of this concern may have, and we must grant them some loyalty, has been to a machine-like name, and to a name lacking personality. The concern was established in a cold, business-like way. A machine has no special ideals. Its methods are machine-like, and if machine-like, are precise and accurate. However large the corporation may become, it never possesses the interest, the strength, and the durability of the company that is built on personality.

Why not conduct the operations of an army active in the field by a book of rules, or by a governing board, so that the final authority is impersonal? Some one has said that war was formerly a business, and that now business is war. Isn't inspiration and loyalty just as necessary in business today as it was in war yesterday? Great leaders during all time have inspired men to further progress. Is there any indication in the trend of our civilization that we have reached the point where it is no longer necessary to do as we have done in the past?

It may seem that a discussion of "What's in a Name" is more or less theoretical,—gains nothing,—gets nowhere. Stop for a moment, however, and look over the railway supply manufacturing field, without detracting at all from the businesses that are known by some general name, and decide for yourself what are some of the larger, more substantial, and more progressive concerns. We recognize at once that some of our very best railway supply manufacturing concerns bear the names of the men who brought such businesses into existence. A man attaches his own name to his business, and he guarantees at least his own belief in the honesty and integrity of his business operations. General, non-committal, impersonal names have been too often used by unscrupulous promoters in the organization

of businesses, in the honesty and success of which they had but little faith. This is not said to intimate for even a moment that such concerns are being organized in the railway supply manufacturing business. We have just brought up the question of "What's in a Name," and want to emphasize the fact that there is a difference between a machine and a personality, with the advantage very largely in the latter.

Iron and Steel Industry.

Opinions differ as to the cause, significance and end of the present dulness in iron and steel trade. There is no disposition to buy beyond absolutely necessary or customary requirements. The weakening in prices is less than such existing conditions usually cause. The mills have a large volume of assured work. The pending orders that will or may seek the market within two months are very large. New enterprises are smouldering. Despite all unfavorable views, the early future is fraught with a compensating activity that will give tone and character to the market indefinitely.

SUPPLY TRADE NOTES.

—The Continental Railway Supply & Equipment Co., Chicago, has been incorporated with a capital of \$300,000 and will manufacture and market railroad equipment. The incorporators are Oglesby Allen, Jr., Joseph P. Williams and Thomas P. McDonough.

—James C. Boyd, formerly with the United States Engineering Corps, has been elected vice-president of Westinghouse, Church, Kerr & Co.

—The general offices of the Orenstin-Arthur Koppel Co. have been moved from Pittsburgh, Pa., to Koppel, Pa, the latter city having been built up by the Koppel company and its plant was established there some years ago. A handsome new office building has now been erected and many new additions have been completed, making it one of the largest plants of its kind in the world.

—Quincy T. Hall, formerly engineer of tests of the Isthmian canal commission, has associated himself with the Morgan T. Jones Co. of Chicago, as secretary and engineer of tests. Mr. Hall is a graduate in mechanical engineering from the University of Illinois and recently resigned his position with the commission after over six years' service in the mechanical department.

—Frederick T. Connor, formerly with the Joliet Railway Supply Co. of Chicago, has recently been appointed western railway sales agent for the Carbon Steel Co. of Pittsburgh, Pa., with offices at 819 Railway Exchange building, Chicago.

—F. A. Schaff, who has been connected with the Chicago office of the Locomotive Superheater Co., has been transferred to the New York office of the same organization.

—The Southern Locomotive Valve Gear Co., Knoxville, Tenn., has applied for a charter. The stockholders of the company, which is capitalized at \$300,000, are: J. Allen Smith, D. C. Chapman, J. H. Anderson, Geo. W. Baxter, Joseph T. Brownlee, Geo. W. Callahan, James B. Wright, J. Wylie Brownlee, William C. Ross, Ben A. Morton, Hugh W. Sanford, L. D. Tyson, E. L. Cholman, W. E. Mynderse, F. L. Fisher, C. M. McClung, W. S. Murrian, W. S. Brown, N. N. Boyden and W. J. Murrian.

—James T. Gardner, a prominent railway supply man with offices in Chicago, died suddenly April 9 at his residence in that city. He began his career in railway service as telegraph operator with the Pennsylvania lines in 1876. Two years later he was made superintendent of the Buffalo, New York & Philadelphia railroad, which position he relinquished in 1881 to become general superintendent of the

Buffalo, Rochester & Pittsburgh Ry. From 1887 to 1890 he was general manager of the Cincinnati, Saginaw & Mackinac railroad, and the following year he went into the railroad equipment business.

RAILWAY NEWS.

Alabama Great Southern.—Plans of the Alabama Great Southern R. R. for the double-tracking of its lines in Alabama, we are informed, have not yet been worked out far enough to warrant making a public announcement. Just which portion of the line will be double-tracked is not known.

Thrasher & Gunter, of Knoxville, Tenn., who have the contract from the Alabama Great Southern R. R. for construction of a line from Chattanooga, Tenn., two miles to the tunnel on the Wauhatchie extension, are reported as preparing to begin that work at once.

Ann Arbor Railroad.—Application has been made to the Ohio public utilities commission by the Ann Arbor Railroad for authority to issue \$1,000,000 in two-year notes bearing interest at 6 per cent. The proceeds are to be used to take up bonds of \$608,000 and to reimburse earnings for extensions and improvements.

Arkansas Southeastern.—The Security Trust Co., Detroit, Mich., has asked the federal court to appoint a receiver to take charge of the property of the Arkansas Southeastern R. R. The trust company declares it holds the mortgage covering all the property of the railroad to secure a loan of \$500,000, and that the company has defaulted on the payment on the interest due on bonds.

Carolina, Atlantic & Western.—The organization of the Carolina, Atlantic & Western Ry. is reported, with capital of \$2,525,000. The new company is a merger of the South Carolina Western Ry., North & South Carolina Ry., South Carolina Western Extension Ry. and the Charleston Northern Ry. The latter is now under construction and when completed will connect Andrews and Charleston, S. C. W. R. Bonsal, Hamlet, N. C., who was president of these lines previous to the merger, is president and treasurer of the new company, D. J. McKeithan, vice-president, and S. O. Bauerfeld, secretary.

Charleston Northern.—See Carolina, Atlantic & Western Ry.

Cleveland, Cincinnati, Chicago & St. Louis.—The Cleveland, Cincinnati, Chicago & St. Louis Ry. report for the year ended December 31, 1913, compares as follows:

	1913	1912
Miles operated	2,014	2,011
Revenues	\$33,840,298	\$32,714,238
Expenses	29,599,362	24,359,744
Net operating revenue	4,240,936	8,354,494
Outstanding operating debit	10,645	28,482
Total operating revenue	4,230,290	8,326,011
Taxes accrued	1,287,962	1,190,242
Operating income	2,942,328	7,135,769
Other income	812,015	756,808
Total income	3,754,343	7,892,577
Renew. lease lines	242,856	267,093
Interest on funded debt	3,915,071	3,855,168
Hire, equipment, interest, rent, etc.	2,293,962	1,425,964
Total deduction	6,451,889	5,548,225
Net deficit	2,697,546	*2,344,352
Preferred dividends		500,000
Deficit for year	2,697,546	*1,844,352
Previous surplus	1,497,940	2,169,153
Total deficit	1,199,606	*4,013,504
Profit and loss credit	311,681	
Profit and loss debit	†501,718	2,515,564
Profit and loss deficit	1,389,643	*1,497,940

*Surplus. †Includes preferred dividend payable from net income of year ended June 30, 1913, \$250,000; discount on bonds, \$22,440, and discount, commission and expenses of equipment trust certificates.

Delaware & Hudson.—The annual report of the Delaware & Hudson Co. for the year ended December 31, 1913, has been published. The income account of the railroad department compares with that of the previous year as follows:

	1913	Increase
Gross operating revenue	\$24,153,494	\$1,673,391
Gross operating expenses	15,210,306	1,143,528
Net operating revenue	8,943,187	529,863
Taxes accrued	623,107	22,162
Operating income	8,320,080	507,700

Other income	1,363,403	93,985
Gross income railroad department	9,683,484	601,685
Deductions from income	4,756,507	86,572
Net income railroad department	4,926,976	515,113
Other net income	59,333	*11,024
Net income to profit and loss	6,174,735	668,646

*Decrease.

The program of renewing and strengthening bridges has been followed up and will probably be completed in 1914. Terminal improvements have been completed at various points and other work of this kind is under way. All of which has been previously mentioned in these columns.

Additions and betterments to equipment during the year cost \$336,872.99. Arrangements have been made to equip 10 consolidation (2-8-0) locomotives with superheaters at an estimated cost of \$25,000.

The causes adversely affecting railroad income are treated at some length. Increased wages and decreased efficiency, increases in prices of material and supplies, federal and state regulations, increase in taxes, rates, decrease in net corporate income, difficulty of obtaining necessary capital, are discussed. Then the report says: "In its earlier stages, the movement which has been set forth was met, more or less effectively, by economies in operation, principally secured by additions to the capital employed. Heavier and more efficient locomotives, larger cars, heavier rails, stronger bridges, additional main tracks, more sidings, passing tracks and yard tracks and facilities, and improved appliances of many kinds, all involved heavy permanent investments, but leading to more efficient performance. By such means, for example, the average freight train load of this company was increased from 339.92 tons in 1903 to 558.27 tons in 1913, and the average car load from 14.24 to 18.63 tons. It is now felt that the limit upon economies of this sort has been at least approximately attained. In other words, with the mechanical arts in anything like their present state, additional capital cannot longer be so economically employed to offset increased operating costs." Further comment is made on the pressing need of additions to railway capital and how a remedy is sought in the recent application of the railroads for an advance of 5 per cent in freight rates.

Erie Railroad.—The Erie Railroad has announced that after April 15 its Ohio division would operate on eastern standard time instead of central. This is the first railroad to follow the lead of the city of Cleveland, which adopted eastern time, effective May 1.

Grand Trunk.—Press reports state that the last spike in the transcontinental line of the Grand Trunk Pacific Ry. was driven April 7 near the Nechaco river, at Fort Fraser, B. C., 220 miles east of Prince Rupert.

It is reported in London that the Grand Trunk Ry. is about to make an issue of 4 per cent consolidation debenture stock to the extent of £1,500,000 at 90.

Lake Shore & Michigan Southern.—The Lake Shore & Michigan Southern Ry. has issued its annual report for the year ended December 31, 1913. The income account compares as follows:

	1913	1912
Miles operated	1,853	1,872
Revenues	\$57,941,920	\$54,283,616
Expenses	42,445,400	35,534,644
Net operating revenue	15,496,711	18,748,972
Outside operating credit	11,002	115,404
Net operating revenue	15,607,713	18,864,376
Taxes accrued	2,126,437	1,771,098
Operating income	13,481,276	17,093,279
Other income	10,473,212	10,348,777
Total income	23,954,488	27,442,055
Interest funding debt	6,632,067	6,678,440
Other interest, rentals, etc.	4,834,081	4,179,231
Total deductions	11,466,148	10,857,671
*Net corporate income	12,488,340	16,584,384
Dividends	9,000,000	9,000,000
Year surplus	3,488,340	7,584,384
Previous surplus	41,187,168	36,154,623
Total surplus	44,675,508	43,739,007
Profit and loss net debit		2,551,839
Profit and loss credit	4,460,436	
Profit and loss surplus	49,135,944	41,187,168

*Equal to 24.95 per cent on \$50,000,000 capital stock, as compared with 33.17 per cent earned on same stock previous year.

Michigan Central.—The Michigan Central R. R. reports for the fiscal year ended December 31, 1913, a surplus equal to 6.84 per cent on the capital stock, compared with 14.63 per cent in the preceding year. Below is a comparative income account:

	1913	Increase
Gross operating	\$36,011,885	\$ 3,100,132
Expenses	27,313,273	4,304,517
Operating net	8,698,613	*1,204,384
Auxil. deficit	15,418	*43,517
Net operating revenue.....	8,683,194	*1,247,901
Taxes	1,392,813	25,828
Operating income	7,290,380	*1,273,730
Other income	1,246,056	185,393
Gross income	8,536,437	*1,088,336
Deductions	7,253,277	354,835
Net income	1,283,160	*1,443,172
Dividends	1,124,280	.....
Surplus	158,880	*1,443,172
Profit aux. sales.....	134,520	.....
Old surplus .....	.....	13,228,542
New gross surplus .....	.....	13,521,944
Deductions .....	.....	365,945
Final surplus .....	.....	13,155,998

*Decrease.

New York Central & Hudson River.—The New York Central & Hudson River R. R. has issued its report for the year ended December 31, 1913. The income account compares as follows:

	1913	1912
Miles operated	3,753	3,732
Operating revenue	\$116,904,304	\$109,697,588
Operating expenses	87,932,041	81,129,839
Net operating revenue	28,972,263	28,567,750
Outside operations (net).....	54,807	324,026
Total net revenue	29,027,071	28,891,776
Taxes accrued	6,356,546	5,893,996
Operating income	22,670,525	22,997,780
Other income	16,668,228	17,880,142
Total income	39,338,753	40,877,922
Rent leased lines.....	8,518,857	10,055,192
Interest on bonds.....	10,603,317	9,661,603
Hire, equipment, rent, interest, etc.	6,973,021	7,278,434
Total deductions	26,095,195	26,995,229
Net corporate income.....	*13,243,558	13,882,693
Dividends	11,243,021	11,136,465
Year's surplus	2,000,537	2,746,228
Previous surplus	13,185,413	13,448,668
Total surplus	15,185,950	16,194,896
Profit and loss net debit.....	2,220,156	3,009,483
Profit and loss surplus.....	12,965,794	13,185,413

*Equals to 5.86 per cent earned on \$225,581,413 stock, as against 6.23 per cent earned on \$222,729,300 stock previous year.

Several very extensive and important projects for the improvement of facilities have been carried on during the year, chief of which are the following.

Improvements at Utica, N. Y., consisting of a new brick and stone passenger station, a new engine terminal, increase of terminal yard tracks and the installation of new signal apparatus, for which has been expended during the year the sum of \$1,645,881.88.

Improvements at Rome, N. Y., comprising a change of line, including grading tracks, signals, new passenger station and new water station. The charges on account of this improvement reached the total of \$483,173.01 during the year.

Improvements at Rochester, N. Y., comprising a new stone passenger station, purchase of land for enlargement of Kent street yard, new freight facilities, extension and reconstruction of several bridges, the closing of Joiner street, placing additional tracks, the building of a new power house for heating the passenger station and other buildings and the erection of several auxiliary buildings, involving during the year an expenditure of \$689,505.64.

Four-tracking the Hudson division from Storm King to Chelsea and through Poughkeepsie to Germantown. Included in this plan are new passenger stations at Staatsburgh and Rhinecliff; new ferry house, yard tracks, etc., at Fishkill Landing; elimination of grade crossing, new sidings

and grading at Poughkeepsie; extending and reconstructing various bridges and purchase of land at various points. The charges on account of this improvement reached the total of \$2,592,885.97 during the year.

Four-tracking from Mott Haven to Peekskill and the electrification of line from Mott Haven to Croton, including the consequent changes in bridges, stations and signals, cost during the year \$1,727,830.35. In this is included the development of a new terminal of the Electric division at Harmon and an important and comprehensive plan of improvements at Yonkers, consisting of the elevation of tracks and the construction of additional main tracks, a new passenger station, a new freight station, a new freight yard layout and a new passenger station at Glenwood; elimination of grade crossings at Irvington and Ossining, including new stations, additional tracks and signal work.

The construction of a connection between this company's main line and the West Shore R. R. at Harbor, east of Utica, has cost during the year \$287,908.16, of which amount \$36,075.85 has been charged to the West Shore as advances for new construction.

The changing of grade crossings in the city of Buffalo, which has been in progress for many years, has been continued at a cost of \$112,553.68 for the work done during the year.

In connection with the Grand Central Terminal improvement, the main concourse, the waiting room and many of the permanent facilities were opened to the public on February 1, 1913, and since that date rapid progress has been made towards the completion of the station. The shell of the incoming station has been completed and contract awarded for the interior finish, and this important part of the terminal is expected to be ready for use by the middle of 1914. The Vanderbilt avenue store and office building was completed and occupied during the summer and the Biltmore hotel finished and opened on December 31. The foundations for the Yale Club building at the corner of 44th street and Vanderbilt avenue have been commenced and this structure, in architectural harmony with the rest of the terminal improvements, is expected to be completed during 1914. The new building for the railroad branch of the Young Men's Christian Association at 50th street and Park avenue, is nearly finished and should be ready for opening by the summer of 1914. The hospital building at 42d street and Lexington avenue and the old Grand Central Palace have been demolished and removed and the work of excavation for the loops was commenced immediately on their removal. All the multiple-unit trains are now run in and out of the suburban level and many of the temporary tracks on the Lexington avenue side have been put at the disposal of the engineering department in connection with the work of excavating for the loops. It is expected that the inner loop tracks in the suburban level will be placed in service during 1914, but the outer loop tracks on both levels will probably not be finished before the early part of 1915.

New York, New Haven & Hartford.—Press reports state that the Mercantile Trust & Deposit Co., Baltimore, Md., representing a syndicate, has purchased the holdings of the New York, New Haven & Hartford R. R. in the Merchants' & Miners' Transportation Co. The number of shares that pass in the transaction is 25,317, out of a total of 50,000. It is understood that the Mercantile Trust company has also bought the New Haven holdings of debenture bonds of the steamship company.

North & South Carolina.—See Carolina, Atlantic & Western Ry.

South Carolina Western.—See Carolina, Atlantic & Western Ry.

Southern Railway.—It is stated that the building of the extension of the Southern Ry. from Stevenson, Ala., to Chattanooga, Tenn., about 38 miles, will be undertaken immediately.

Tampa & Gulf Coast.—See New Roads and Projects under Florida.

Toledo & Ohio Central.—The Toledo & Ohio Central Ry. has passed the dividends on the common and preferred stocks. Five per cent was paid on these issues in 1912 and 1913.

Union Pacific.—Work of grade revision has been begun on the line of the Union Pacific R. R. in eastern Colorado. Kilpatrick Brothers have the contract for this work beginning at Wild Horse, Colo., and extending east for 24 miles.

Western Pacific.—The Western Pacific Ry. proposes to make the following improvements: Lining all tunnels in the

Feather River Canyon with concrete, \$240,000; replacing wooden bridges with reinforced concrete structures, \$180,000; widening cuts and fills and ballasting tracks, \$250,000.

Wheeling & Lake Erie.—Judge Day in the United States district court at Cleveland, Ohio, on April 1, ordered the foreclosure sale of the Wheeling & Lake Erie R. R. The upset price is \$20,000,000. The company is given four months to pay its obligations, after which the road is to be advertised for four weeks. The upset price would take care of the \$8,000,000 notes of 1905, with about \$2,000,000 accumulated interest, \$5,441,850 receivers' certificates, costs of court, attorney fees, etc., and leave some equity for the shareholders. If the latter are able to finance the debts within the time allotted, their stock will remain intact and the control vest in them.

PERSONALS.

C. Harsch has been appointed general agent and superintendent of terminals of the Pere Marquette R. R., with headquarters at Chicago. R. S. Black, trainmaster at St. Thomas, Ont., has been appointed assistant superintendent, Canadian lines, with headquarters at St. Thomas.

J. E. Roberts, superintendent of the Quebec, Montreal & Southern Ry. at Sorel, Que., has been appointed general superintendent and general passenger agent of the Greenwich & Johnsonville Ry., at Greenwich, N. Y., succeeding T. J. Lynch, who becomes chief clerk to the vice-president and general manager of the Delaware & Hudson Co., at Albany, N. Y. A. J. Currie has been appointed superintendent of the Quebec, Montreal & Southern Ry. at Sorel.

H. O. Dunkle, general manager of the Chicago Terminal division of the Erie Railroad, with office at Chicago, has been appointed assistant to president in addition to his other duties.

H. M. Kochersperger, vice-president of the New York, New Haven & Hartford R. R., resigned at a meeting of the board of directors April 2. The directors have granted him leave of absence until July 1, after which time he will be retired on a pension.

Sidney F. Andrews has been appointed general counsel of the Manufacturers' Ry. Co., of St. Louis and the St. Louis & O'Fallon Ry., with office at St. Louis, Mo.

William A. Winburn, vice-president of the Central of Georgia Ry., Savannah, Ga., was elected president April 8, succeeding C. H. Markham.

R. Stephens, superintendent of the Wichita Terminal Association of Wichita, Kan., has been appointed also superintendent of the Wichita Union Terminal Railway, in charge of the new union station and elevated track terminals at Wichita.

C. L. Hamilton has been appointed trainmaster of the Pennsylvania Lines West of Pittsburgh, Northwest system, with headquarters at Ft. Wayne, Ind., succeeding J. F. Patterson, promoted.

D. F. Schaff has resumed his duties as superintendent of the Chicago and White Water divisions of the Cleveland, Cincinnati, Chicago & St. Louis Ry., vice C. S. Millard, who has been appointed superintendent of the Peoria and Eastern division, vice E. H. Zeigler, transferred.

E. W. Grice, assistant to vice-president of the Chesapeake & Ohio and Hocking Valley railways, with headquarters at Richmond, Va., has been appointed assistant general manager and his former office is abolished.

Thomas C. McCampbell has been elected secretary and assistant treasurer of the Tennessee, Kentucky & Northern R. R., with office at Nashville, Tenn. He has also been appointed auditor and claim agent.

D. B. Carson, whose appointment as acting general manager of the Nashville, Chattanooga & St. Louis Ry. has been announced in the Railway Review, began his railroad career as a telegrapher with the Louisville & Nashville R. R. in 1876. He soon afterwards took service with the Nashville, Chattanooga & St. Louis. In 1881 he became agent at McMinnville, Tenn., and he was afterwards for a time traveling freight agent. He was appointed agent at Atlanta, Ga., in 1898. On January 1, 1913, Mr. Carson was appointed assistant general manager at Nashville, Tenn. His recent promotion was effective April 1. The system of re-weighing and inspection of freight which is in use on most of the lines and which is now supervised by and known as the Southern Weighing and Inspection bureau, was first inaugurated by Mr. Carson some years ago when he was engaged in agency work.

E. W. Wrenne, whose appointment as assistant superintendent of transportation of the Nashville, Chattanooga & St. Louis Ry., has been noted in these columns, was born at Nashville, Tenn., October, 12, 1872. He was educated in the public schools and at Montgomery Bell Academy of Tennessee and entered the service of the Nashville, Chattanooga & St. Louis in 1889 as yard clerk at Nashville terminals. From 1891 to 1895 he was stenographer to superintendent; 1896 to 1897, station master, Union station, Nashville; 1898 to 1904, chief clerk to general superintendent and 1904 to 1912, chief clerk to superintendent transportation. Mr. Wrenne was appointed assistant superintendent of the Chattanooga and Nashville divisions and branch lines in 1913. His recent promotion was effective April 1, 1914.

James Russell whose appointment as assistant to vice-president of the Denver & Rio Grande R. R. has been mentioned in a previous issue, was born in February, 1865. He entered service of Grand Trunk Ry. in 1879 and employed by that company as agent and operator until 1882. He was subsequently telegraph operator on the Chicago, St. Paul, Minneapolis & Omaha, Kansas Pacific and Atchison, Topeka & Santa Fe railways from 1882 to 1883; telegraph operator and train dispatcher, Canada Southern and Michigan Central railroads, 1883 to 1887, and train dispatcher, chief dispatcher and superintendent on St. Paul, Minneapolis & Manitoba & Great Northern railways, 1887 to 1903. He was superintendent of the Missouri Pacific Ry. from 1903 until 1907; superintendent Chicago, Burlington & Quincy R. R., to 1909; general superintendent of the Spokane, Portland & Seattle Ry., 1909 to 1914, and general superintendent of the Great Northern Ry. from January 1 to February 19, 1914. Mr. Russell was appointed to his new position with the Denver & Rio Grande April 1.

W. B. Wood, whose appointment as general manager of the Grand Rapids & Indiana Ry. has been announced in these columns was born September 11, 1876, at Harrisburg, Pa. He was graduated from Sheffield Scientific school in June, 1897, and the following October became rodman in the chief engineer's office of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. From November, 1897, to August 31, 1899, he was rodman, levelman and transitman, chief engineer's office, Pennsylvania Company; September 1, 1899, to December 31, 1900, assistant engineer, Cleveland & Pittsburgh divisions; January 1, 1901, to June 6, 1901, engineer maintenance of way, Cincinnati & Muskingum Valley R. R.; June 7, 1901, to June 30, 1903, engineer maintenance of way, Cleveland & Pittsburgh division; July 1, 1903, to December 31, 1905, superintendent of the Richmond division of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry.; January 1, 1906, to June 30, 1911, superintendent, Cleveland, Akron & Columbus Ry.; July 1, 1911, to January 1, 1912, superintendent of the Akron division, Cleveland, Akron & Columbus Ry.; January 1, 1912, to December 31, 1912, superintendent, Cleveland & Pittsburgh division, Pennsylvania Company, and January 1, 1913, to March 31, 1914, superintendent of the Eastern division of the same lines. Mr. Wood's promotion to become general manager of the Grand Rapids & Indiana has already been noted.

H. T. Malcolmson, whose appointment as superintendent of the Toronto, Hamilton & Buffalo Ry. has been noted in these columns, was born at Hamilton, Ont., May 22, 1877. He was educated in public and private schools in Hamilton and entered railway service in May, 1899, as stenographer in the superintendent's office of the Grand Trunk Ry., Toronto, Ont. He was subsequently stenographer to general superintendent of the Toronto, Hamilton & Buffalo, until June, 1903, chief clerk to general superintendent and until April 1912, chief clerk to general manager of the same road. From April, 1912, to January 14, 1914, Mr. Malcolmson was car accountant of the Toronto, Hamilton & Buffalo and from January 14, 1914, to March 31, superintendent car service. He was made superintendent as already noted, effective April 1.

Elisha Lee has been appointed general superintendent of the Philadelphia, Baltimore & Washington R. R., as noted in a previous issue. A portrait of Mr. Lee appears in this issue. A sketch of his career was published in the Railway Review of April 4.

John G. Walber, whose appointment as head of the Bureau of Information of the Eastern Railways, was noted in our issue of March 21, began his railroad career in 1885 as clerk with the Ohio & Mississippi railroad, a line which was later merged with the Baltimore & Ohio Southwestern R. R. One year later he secured a clerkship in the office of the president and general manager of the

Ohio & Mississippi, and when this line became a part of the Baltimore & Ohio system he was appointed private secretary to the second vice-president and traffic manager with headquarters at St. Louis. In March, 1899, he was promoted to the chief clerkship in the office of the vice-president and general manager of the Baltimore & Ohio Southwestern at Cincinnati, Ohio, and later was advanced to the position of assistant general manager. Mr. Walber was transferred to Baltimore from Cincinnati, becoming general superintendent of transportation and assistant general manager. In December, 1912, Mr. Walber was appointed assistant to third vice-president of the Baltimore & Ohio system, in charge of wage, discipline and employment bureaus. He had charge of the preparation of the case for the railroads in the recent firemen's and conductors' and trainmen's arbitrations, and appeared as their principal witness in the hearings.

G. D. Brooke, superintendent of the Shenandoah division of the Baltimore & Ohio R. R., at Winchester, Va., has been promoted and transferred to the Ohio division of the Baltimore & Ohio Southwestern as superintendent, with headquarters at Chillicothe, Ohio. Mr. Brooke succeeds J. D. Stack, who resigned to enter the service of another railroad. S. A. Jordan, formerly district engineer of maintenance of way on the lines between Philadelphia and Parkersburg, has been appointed superintendent at Winchester.

TRAFFIC.

J. L. West, general freight agent of the Missouri, Kansas & Texas Ry. of Texas, with office at Dallas, Tex., has been appointed to the newly created office of freight traffic manager, with office at Dallas. J. F. Garwin, assistant general freight agent, has been appointed general freight agent at Dallas, succeeding Mr. West.

W. M. Lowrie has been appointed passenger traffic manager of the steam ship and railway service of the United Fruit Co., with office at New York City.

W. M. Porteous has been appointed district freight agent of the Canadian Pacific Ry. with office at St. Louis, Mo.

L. D. Knowles has been appointed general agent of the Missouri Pacific-Iron Mountain, Denver & Rio Grande and Western Pacific railways at Kansas City, Mo. Mr. Knowles has been assistant general freight agent at Omaha and succeeds F. C. Gifford, who retired from the service to engage in private business. A. R. Malcolm, formerly commercial agent at Milwaukee, Wis., succeeds Mr. Knowles at Omaha, and H. N. Atwood, agent at Pine Bluff, Ark., becomes commercial agent at Milwaukee.

H. G. Benedict, commercial agent of the Atlanta, Birmingham

and Atlantic R. R. at Kansas City, Mo., has been appointed general eastern agent, with headquarters at New York city, succeeding R. W. Crowell, resigned. John A. Groves, traveling freight agent at Kansas City, succeeds Mr. Benedict.

Prof. W. H. Olin has been appointed commissioner of agriculture of the Denver & Rio Grande and Rio Grande Southern railroads, with headquarters at Denver, Colo.

Charles L. Chandler has been appointed South American agent of the Southern Railway, Cincinnati. New Orleans & Texas Pacific Ry., Alabama Great Southern R. R. and Mobile & Ohio R. R., with office at Chattanooga, Tenn.

W. C. Ragin is appointed division freight agent of the Atlantic Coast Line R. R. at Montgomery, Ala., succeeding G. A. Cardwell, promoted; H. C. Gettier is appointed commercial agent at Albany, Ga., succeeding Mr. Ragin and N. H. Brand is appointed Commercial agent at Ocala, Fla., succeeding Mr. Gettier.

J. K. Dyer has been appointed commercial agent of the Lehigh Valley R. R., at Boston, Mass., and M. J. Ormond, commercial agent at New Haven, Conn.

E. B. Coolidge has been appointed general Western agent of the Wheeling & Lake Erie R. R., with office at Chicago.

F. E. Godfrey has been appointed assistant general freight agent of the Tennessee Central R. R., with headquarters at Nashville, Tenn.

Thomas G. Smiley, freight traffic manager of the Western Maryland Ry. at Baltimore, Md., having resigned, his former position has been abolished and the duties heretofore performed by Mr. Smiley have been assumed by D. G. Gray, general freight agent at Baltimore.

ENGINEERING.

J. B. Myers, division engineer maintenance of way of the Baltimore & Ohio R. R. at Cumberland, Md., has been appointed district engineer maintenance of way on the lines between Philadelphia and Parkersburg, with headquarters at Baltimore, succeeding S. A. Jordan, appointed division superintendent at Winchester, Va. He is succeeded by Phillip Petri, of the Connellsville division. F. G. Hoskins, assistant division engineer of the Pittsburgh division, with headquarters at Foxburg, Pa., goes to Connellsville and will be succeeded by H. L. Gordon, assistant engineer at Baltimore.

Charles Hansel, in addition to his duties as consulting valuation engineer of the Pennsylvania Railroad, has been made chairman of the valuation committee of the Philadelphia & Reading Ry. and the Central R. R. of New Jersey, and also consulting valuation engineer in the direct administra-



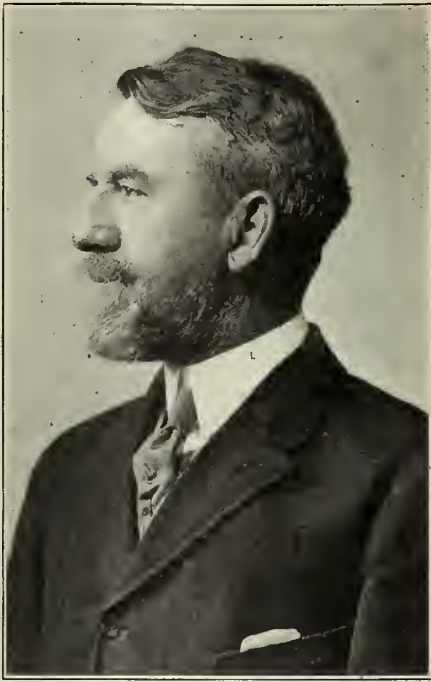
E. W. Wrenne, Assistant Superintendent of Transportation of the Nashville, Chattanooga & St. Louis Railway.



D. B. Carson, Acting General Manager of the Nashville, Chattanooga & St. Louis Railway.



Elisha Lee, Recently Appointed General Superintendent of the Philadelphia, Baltimore & Washington Railroad.



Charles Hansel, Consulting Valuation Engineer of the P. R. R., C. R. R. of N. J. and P. & R. Ry.

tion of the work of valuation to be conducted on these several properties.

Hugh E. Hale, whose appointment as engineer for the Presidents' Committee on Valuation, Eastern group, with office at New York has been noted in these columns, was born on April 8, 1874, in Minnesota, and was educated at Lehigh university, and in 1891 began railway work as a rodman on the Pennsylvania Railroad. From April, 1898, to February, 1901, he was assistant supervisor, and then was supervisor of signals of the same road at Camden, N. J. From March to May, 1902, he was assistant engineer of the Baltimore & Ohio R. R. and he then was appointed division engineer of that road at Philadelphia, Pa. He was promoted to superintendent at Butler, Pa., in December, 1903; from September of the following year to June, 1905, he was division engineer at Baltimore, and then to June 1908, was engineer of maintenance of way of the same road at Baltimore. On the latter date went to the Missouri Pacific Ry. as assistant engineer at St. Louis, Mo. From September, 1909, to April, 1910, he was engineer of design on the same road, and was promoted in April, 1910, to principal assistant engineer at the same place; since August, 1911, he has been engineer of maintenance, Southern district of the same road with headquarters at Little Rock, Ark.

MECHANICAL.

L. A. Stoll, assistant superintendent of shops of the Chicago, Burlington & Quincy R. R., at Aurora, Ill., has resigned to engage in other work, and his former position is abolished. C. W. Robertson has been appointed general foreman locomotive repairs at Aurora, and Harry Modaff, foreman locomotive repairs.

J. S. Sheafe, engineer of tests of the Illinois Central R. R., has been appointed master mechanic of the Staten Island lines of the Baltimore & Ohio R. R., with headquarters at St. George, Staten Island, N. Y.

D. J. Mullen, assistant to the superintendent of motive power of the Cleveland, Cincinnati, Chicago & St. Louis Ry., has been appointed superintendent of motive power, with headquarters at Indianapolis, Ind., succeeding S. K. Dickerson, resigned. F. K. Murphy, master mechanic at Beech Grove, Ind., succeeds Mr. Mullen, and M. K. Tate, assistant master mechanic at Bellefontaine, Ohio, takes the place of Mr. Murphy.

W. M. Bosworth, whose appointment as mechanical engineer of the Louisville & Nashville R. R. at Louisville, Ky., was recently noted in these columns, was born on June 13, 1879, at Baltimore, Md., and graduated from the Baltimore Polytechnic institute in 1898. He began railroad work in July of the same year as a special apprentice on the Baltimore & Ohio R. R. at the Mt. Clare shops and three years later became draftsman at the same place. From January,

1906 to October, 1911, he was chief draftsman of the same road and then was appointed mechanical engineer of the Kansas City Southern Ry., with headquarters at Pittsburgh, Kan., leaving that position on March 1, to go to the Louisville & Nashville R. R. as mechanical engineer.

OBITUARY.

William Kline, formerly superintendent of telegraph of the Lake Shore & Michigan Southern Ry., at Toledo, Ohio, died in that city on March 19, at the age of 78.

W. J. Hunter, division freight agent of the Grand Trunk Pacific Ry. at Winnipeg, Man., died April 8, after a short illness.

J. C. Higgins superintendent of Atlantic Coast Line R. R. at Sanford, Fla., died in that city April 3, aged 54 years.

Cy Warman, the popular writer of railroad stories, died in Chicago April 7, aged 59 years. His early experiences as an engine wiper, fireman and locomotive engineer were later turned to good account. He saw the interest and romance of railroading. Though his material was rejected at first, stories of the road began to appear at length and proved immensely popular. This most successful work was "Tales of an Engineer."

NEW ROADS AND PROJECTS.

Alabama.—See Railway News under Southern Railway.

Alberta.—Reports from Edmonton, Alta., state that 60 steel and wood bridges, ranging from 75 to 125 feet in length, will be required in a distance of 18 miles on the Central Canada Ry., north of Edmonton, for which the route plans have just been filed with the provincial department of railways for Alberta. The survey shows a road from the main line of the Edmonton, Dunvegan & British Columbia Ry., at Round Lake, along the North Heart river to Peace River Crossing. Engineers report that at least 50,000 yards of earth will have to be removed from every mile of line of the right-of-way along the North Heart river. It is estimated that the construction cost of this stretch of line will be more than \$50,000 a mile. The Central Canada Ry., upon which, it is announced, work will begin this season, is to be the connecting line between the Edmonton, Dunvegan & British Columbia and the Pacific Great Eastern railways.

The Canadian Northern Ry., says a report, has begun grading on the proposed line from Calgary to Edmonton, Alta.

Arizona.—The incorporation of the Tucson, Phoenix & Tidewater R. R. was reported in our issue of March 28. The company proposes the construction of a railroad from Tucson, Ariz., to Phoenix, Ariz., and thence in four different directions. A franchise is being asked of the City of Phoenix for right of way through Madison street. It is stated that work will be begun on the road as soon as the matter of the



H. E. Hale, Recently Appointed Engineer, Presidents' Committee on Valuation, Eastern Group.

franchise is settled. James S. Douglas, Douglas, Ariz., is president of the company; Geo. A. Olney, Phoenix, Ariz., vice-president; J. J. Hawkins, Prescott, Ariz., secretary and chief council, and Edmund W. Wells, Prescott, and W. C. Foster, Phoenix, directors.

California.—See Oregon.

Florida.—The Tampa & Gulf Coast Ry., which is building an extension along the west coast of Florida, via Port Richey, Tarpon Springs and Clearwater to St. Petersburg, has opened for passenger traffic, the first section of the extension to Green Springs. It is expected that the line will be open for operation to Clearwater next month.

Georgia.—The Moultrie & Pelham R. R. has applied for a charter to build a line of railroad from Moultrie, Ga., via Funston, Hartsfield and Cairo to Pelham, Ga., a distance of about 50 miles. J. L. Hand of Pelham, Ga., and others are the incorporators.

Iowa.—The Cedar Rapids Terminal Transfer Ry., Cedar Rapids, Iowa, has been incorporated with \$200,000 capital stock, to construct and operate freight and passenger terminals for all steam and electric lines entering Cedar Rapids. The other officers are: W. G. Dows, president; L. S. Cass, Waterloo, Iowa, vice-president; Isaac B. Smith, secretary; C. D. Cass, treasurer, and J. A. Reed, general attorney.

Mississippi.—The Yazoo & Mississippi Valley R. R. is building an extension from its present terminus at a point south of Chancey, Miss., nine miles to Swan Lake.

New York.—The New York Southern R. R., \$2,000,000 capital, has been incorporated to operate a steam railroad from Auburn to Ithaca, N. Y. The Ithaca Traction Corporation has also been incorporated to take over the property and franchises of the Ithaca Street railway, which were sold in January under foreclosure. The same parties are interested in the New York Southern R. R.

Ohio.—Contract will be let immediately for the first construction work on the Ohio & Pennsylvania Belt R. R. projected between Hazelton, Ohio, and a point near Ebensburg, Pa., a distance of about 14 miles. The contract will call for the building of three miles of track between Lowellville, Ohio, and the sheet and tube plant. It will be used for the transportation of hot metal for the plant. Ultimately the line will connect all the industrial plants of the valley.

Oklahoma.—The Oklahoma, New Mexico & Pacific Ry. is expected to start work soon on its proposed extension from Ringling, Okla., to Oklahoma City, Okla. Amis & Deen of Guthrie, Okla., are reported as having the contract to build the extension from Wilson to Ringling, Okla., 11 miles. Giddings & Giddings, Oklahoma City, are attorneys for the company and E. B. Ross, Cordell, Okla., is chief engineer.

Ontario.—The Cornwall & Hawkesbury Ry. has made application for incorporation for the construction of a railroad from Cornwall, Ont., to near Greenville or Calumet, Ont., a distance of about 50 miles.

Oregon.—The Southern Pacific Co. has let a contract to the Utah Construction Co. for the construction of 50 miles of line from Westwood, Lassen county, Cal., north to Klamath Falls, Ore.

It is stated that tracklaying has been resumed on the extension of the Oregon Short Line R. R. from Juntura, Ore., 50 miles west of Vale, to Lakeview and Alturas.

Tennessee.—See Railway News under Southern Railway.

The Morgan & Fentress R. R. has been chartered, according to report, to construct a railway from near Nemo Station, Tenn., to Jamestown, Tenn. The incorporators are Frank E. Enwright, Thomas J. Brennan, Charles W. Whitcomb, Jr., William A. Henderson and Horace M. Carr.

The Charleston, Parkersburg & Northern R. R. proposes the construction of a line of railroad from Parkersburg to Charleston, W. Va. Franchises and rights of way have been obtained, it is reported, and construction is to be begun within a few months. The undertaking will be financed by the West Virginia Securities & Construction Co., Parkersburg. The officers of this company are: President, E. H. Watson, of South Bend, Ind.; vice-president, Henry H. Archer, of Parkersburg, formerly General Manager of the Parkersburg, Marietta & Interurban Ry., and secretary and treasurer, K. B. Stephenson, of Parkersburg.

Wyoming.—O. O. Baker, Edgemont, S. D., reported as interested in a project to build a railroad from Casper, Wyo., to Belle Fourche, S. D., states that he and others are leasing mineral lands along the proposed line. The company will build a line of railroad providing these lands develop sufficient tonnage.

ELECTRIC RAILWAYS.

Calumet & South Chicago Ry. has applied to the Illinois public service commission for authority to issue \$600,000 bonds for improvements.

Citizens of Clarkson and Vineland, Wash., have decided to begin the construction of a five-mile railway, the cost to be met by assessment for front foot real estate in the community.

A. N. Boudreaux, P. O. Box 111, Thibodaux, La., writes that he is interested in a proposition to build a 22-mile electric or gas-electric car line through a prosperous district in Louisiana and this could be extended to a total of 67 miles advantageously. He has secured a goodly portion of the rights of way and as soon as financial backing is assured will proceed to organize a company to build the line. The population of the three parishes through which the line would run is about 80,000.

Plans are being made by the Anthony & Northern Ry. to extend its line from the present terminus north of Pratt to Larned, Kan. This is said to be part of a plan to build a line from Anthony northwest to Pratt, Larned, Lacrosse, Hays City, Stockton and Smith Center to Hastings, Neb. R. A. Cox, Hutchinson, Kan., is interested.

Articles of incorporation have been filed by the Ismay, Ekalaka & Southern Traction Co., which proposes to construct an electric or gas-electric railway from Ismay, Mont., to Ekalaka and thence southward to such points as may be decided upon later. The capital is \$500,000.

Contracts will be let in the near future by the Janesville & Madison Traction Co. to build 50 miles of track between Beloit, Wis., and Madison. The work will include the construction of a 380-ft. steel bridge, a 220-ft. viaduct, and 3000 ft. of trestle work.

The railroad commission, of California, has rendered a decision granting authority to the Marin County Electric Rys. to construct a street railway line in Mill Valley, Marin county, and to sell stock for its construction. The commission finds that the nature of the enterprise is such that the stock should be sold only to residents or property-owners in Mill Valley.

Press reports state that State Senator W. C. Sproul, of Pennsylvania, has bought the Lackawanna & Wyoming Valley R. R. for \$1,000,000 from the Westinghouse interests. It is rumored that Senator Boise Penrose is deeply interested in the syndicate which has taken over the company. The railroad is a third-rail system connecting Wilkes-Barre and Scranton, Pa., and has branches running from Scranton to Petersburg and Dunmore. There are about 25 miles of track.

Contract has been awarded by Sacramento Valley West Side Electric Ry. Co. to J. Hughes Construction Co., San Francisco, Cal., for grading 12½-mile section from Dixon, Cal., south to a connection with Oakland, Antioch & Eastern R. R. This line will extend through the west side of the Sacramento valley to Red Bluff. H. R. Timm, of Dixon, is secretary.

The Montreal & Southern Counties Ry. which at present operates to Marieville, Que., 23 miles from Montreal, the line to the former being opened through from Richelieu in August last, will open another nine miles, to St. Cesaire, about the end of the present month. Further extension to Granby is planned for the near future.

A bill has been introduced in the Maryland legislature to incorporate the Salisbury Interurban Ry., capital stock \$100,000, to build an electric line from Nanticoke Point, or some other place on the Nanticoke river, upon the western side of Wicomico county, to Willards, on the eastern side of the county, 35 or 40 miles. The incorporators are E. Riall White, H. James Messick, Wade H. Bedsworth, Raymond K. Truitt, Henry W. Ruark, Wade H. Insley and Mark Cooper, all of Wicomico county, of which Salisbury is the county-seat.

A bill to incorporate the Eastern & Western Shore R. R. has been introduced in the Maryland legislature. The company proposes to build an electric railway from Annapolis southward to Fair Haven, Md., and to operate a ferry across Chesapeake bay to a point in Dorchester county, thence building another electric railway to Cambridge, Vienna, Sharptown, Salisbury and Ocean City, Md., and Franklin City, Va. There will be a branch from Salisbury to Crisfield, Md. It is also planned to build from Fair Haven to Washington, D. C. About 200 miles of line would be built. Washington capitalists are said to be interested.

The Michigan-Chicago Railways Co. will file amended articles of incorporation changing its name to the Michigan Railways Company. It is likely, according to Grand Rapids

advices, the company will take over the 999-year lease of the Michigan United Traction Co., which is now held by the closely allied interests, and that the other electric railway properties controlled by the Commonwealth Power, Railway & Light Co. will be merged into it, putting all these properties under a single control, making a system of about 250 miles. The system will connect up Grand Rapids, Holland, Kalamazoo, Allegan, Battle Creek, Jackson, Lansing, Saginaw, Bay City, St. John's, Owosso and Flint, Mich., and will connect with the Detroit United at Jackson for Detroit and Toledo. Construction work on the Kalamazoo line will begin about April 15. The work yet to be done, ballast the 34 miles of track between Wayland and Grand Rapids, install the third rail and build the stations, will take most of the summer.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Southern Railway, reported in the Railway Review of March 21, as having ordered 34 locomotives from the Baldwin Locomotive Works and the Lima Locomotive Corporation, has ordered 25 Mikado (2-8-2-S), 5 Pacific (4-6-2-S) and 2 eight-wheel switching (0-8-0-S) locomotives from the former company and 13 six-wheel switchers (0-6-0) from the Lima Locomotive Corporation. A recent order to the American Locomotive Co. calls for 20 Mikado type (2-8-2-S) locomotives, instead of 17 as reported in these columns, and 10 Pacific type (4-6-2-S) locomotives.

—The Bangor & Aroostook R. R., it is said, is contemplating the purchase of 2 Mikado (2-8-2) locomotives.

—The Delta Land & Timber Co., Kansas City, Mo., has ordered one Mikado type (2-8-2) locomotive from the Baldwin Locomotive Works.

—The Jackson Iron & Steel Co. has ordered one locomotive from the American Locomotive Co.

—W. R. Grace & Co. have ordered one locomotive for export from the American Locomotive Co.

—The Intercolonial Ry. recently placed orders for 20 locomotives, which were divided equally between the Canadian Locomotive Works and the Canadian Foundry Co.

—The Korean Government Rys. have ordered 9 super-heater ten-wheel (4-6-0-S) locomotives from the American Locomotive Co. These engines will have cylinders 21x26 ins., driving wheels 66 ins. in diameter, and a total weight in working order of 156,000 lbs.

—The Norfolk & Western Ry. has asked for bids on 40 Mallet type (2-6-6-2) locomotives.

—The Louisville & Nashville R. R. has ordered 18 locomotives, to be built in its Louisville shops and is in the market for 10 additional locomotives.

—The St. Louis & San Francisco R. R., it is said, is inquiring for 10 locomotives.

—The Cincinnati, New Orleans & Texas Pacific Ry. is reported in the market for 5 locomotives.

Freight Cars.

—The Great Northern Ry., according to report, has ordered 2,000 automobile and box cars from the Haskell & Barker Car Co.

The New York Central Lines are inquiring for 500 automobile cars for the Michigan Central R. R.

—The Southern Pacific Co. has sent out inquiries asking for prices on about 5000 box, flat, stock and gondola cars.

—The Southern Railway has recently ordered 1450 30-ton box cars and 500 50-ton flat cars from the American Car & Foundry Co.; 1050 30-ton box cars, 100 stock cars, 25 poultry cars and 200 cabooses from the Lenoir Car Works; 750 30-ton box cars from the Mt. Vernon Car Manufacturing Co., and 650 50-ton coal cars from the Pressed Steel Car Co. This statement supplements and corrects previous reports.

—The Lackawanna & Wyoming Valley R. R. has ordered 15 steel hopper cars from the Pressed Steel Car Co.

—The Chicago & North Western Ry. has ordered 2000 box cars from the Pullman Company.

Passenger Cars.

—The Southern Railway, reported in previous issue of the Railway Review as ordering passenger cars, has ordered 5 60-ft. combination mail and baggage cars and 5 60-ft. baggage and express cars from the American Car & Foundry Co., 35 coaches and 5 combination passenger and baggage cars from the Pressed Steel Car Co., and 7 dining cars from the Barney & Smith Car Co.

—The Chicago, Milwaukee & St. Paul Ry. is contemplating the purchase of additional passenger cars.

Signals and Interlocking.

—The Delaware & Hudson Co., according to its annual report, will complete the installation of block signals between Plattsburgh, Rouses Point, N. Y., during 1914.

Bridges.

—The New York legislature has under consideration a bill to incorporate the Niagara-Ontario Connecting Bridge Co., to build a bridge across the Niagara river from Lewiston, N. Y., to the Canadian shore, for electric and steam railways. The incorporators are E. G. Connette, H. Holden, C. L. Sugham, F. A. Dudley, L. Albright. The Canadian Northern Ry. is said to be interested.

—The Southern Railway, according to report, will construct a two-track concrete arch bridge about 650 ft. long and 25 ft. above low water across the Dan river at Danville, Va. It is said that construction will probably begin within 90 days.

—The Northern Pacific Ry. has awarded contract for 780 tons of steel for the proposed Lewis river bridge to the American Bridge Co.

—The Maryland & Pennsylvania R. R. has ordered 400 tons of bridge material from the Phoenix Bridge Works.

—The Oregon-Washington R. R. & Navigation Co., according to report, has awarded the contract for the erection of a bridge across the Fifteenth street waterway in Tacoma, Wash., to the Missouri Valley Bridge Co., Leavenworth, Kan., at \$240,000, for the bridge and \$80,000 for its erection.

—Plans and specifications for the new Cumberland Valley R. R. bridge across the Susquehanna river in Harrisburg, Pa., have been received by the state water supply commission. Material is being delivered and it is proposed to have work under way by May 1.

Buildings, Terminals, Etc.

—The annual report of the Delaware & Hudson Co., states that \$24,483 was expended during the year for development of the company's yards at Carbondale, Pa. The work will be continued during 1914 and 1915, with an estimated expenditure of \$130,000 each year.

—The Delaware & Hudson Co. undertook extensive station and yard improvements at Ticonderoga, N. Y., during 1913, an expenditure of \$45,128.82 up to December 31.

—The Pennsylvania Railroad is reported to have abandoned for the present the plan of building a new freight station in Harrisburg, Pa.

—The New York Central & Hudson River R. R. is planning to enlarge its yards and build a new freight station at Lockport, N. Y.

—The Atlantic Coast Line R. R. has completed a temporary station at Thomasville, Ga., and the old station will be torn down at once to make room for a new permanent structure, to cost about \$25,000.

—The Chicago, Rock Island & Pacific Ry. is reported to have let contract to T. E. Leake Construction Co., Chicago, to erect a freight station at McAlester, Okla.

—The Charleston & Western Carolina Ry., it is said, will soon start work on its proposed terminals at Anderson, S. C. Grading work is to be done by the company's forces.

—Work has been begun on the new passenger terminal for the Delaware, Lackawanna & Western R. R. at Buffalo, N. Y. The Hedden Construction Co., New York, has the contract to build the station.

—The Atchison, Topeka & Santa Fe Ry. is reported as about to build new shops at Albuquerque, N. M., at a cost of \$200,000.

—The Chicago & North Western Ry. has let contract for passenger station to be erected at Redfield, S. D., to G. A. Johnson & Co., Chicago.

—The Chicago & North Western Ry. has let contract for a combined passenger and freight station at Iron River, Mich., to G. A. Johnson & Co., Chicago.

—The Grand Trunk Ry. is asking bids for a passenger and a freight office building at Black Rock, N. Y.

—The Chicago & North Western Ry. will let contract for office buildings at South Pekin, Ill., and South Norfolk, Neb.

—The Chicago & Western Indiana R. R. is asking for bids for coal docks and water station for the new yards at Clearing, Ill.

—The Carolina, Clinchfield & Ohio Ry., according to report, is preparing to begin work at once on extensive coal

terminals at Charleston, N. C. It is said that about \$1,000,000 will be invested and that the company is considering proposals for 600,000 yards of dredging preparatory to construction.

The Watson-Stillman Shaft Straightening Press.

The Watson-Stillman Co., 50 Church street, New York, has recently produced a shaft straightening press that has a capacity of 325 tons, which is sufficient for taking the bends out of any steel shaft up to a diameter of 10 inches. The length of shaft that can be handled by the press is limited only by the extent of the foundation provided. As shown in the illustration this machine is a motor driven self contained unit, requiring no outside air or hydraulic power. Its three independent parts are: the head stock which is stationary, the press, and the tail stock, the two latter being mounted on rollers to permit of their adjustment to varying lengths of shafts. The bed rails are flush with the floor so that when not in use the movable parts can be rolled to one side leaving the floor clear of obstructions. The head and tail stock are similar to those of a lathe, except that the centers are hinged to follow the movement of the shaft ends when the bend is made.

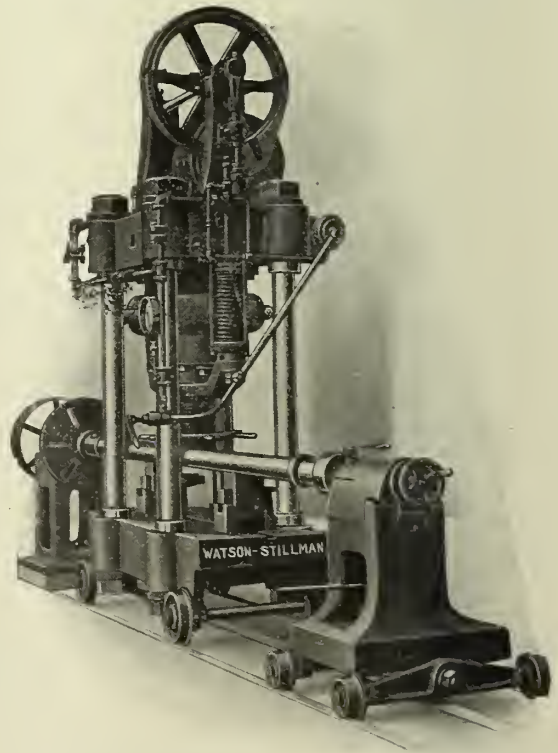
In using the machine the shaft to be straightened is revolved from the head stock end and the "high point" is marked. The press is then moved to that point and the bending blocks are adjusted. The ram has a maximum movement of two inches and screwed concentrically into it is a square threaded adjustment screw which compensates for the different diameters of the shafts and also enables the operator to predetermine the degree of flexure desired. This serves to eliminate the danger of overbending. The entire hydraulic power plant, including 5 h. p. motor, pump, reservoir, etc., is mounted on the top platen of the press. The floor space required is 3 ft. 6 in. wide by the length of the shaft, plus 6 ft. The total net weight of the press is 19,300 lbs.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE MARCH 31, 1914.

Metallic tie and rail fastener, 1,091,530—Richard W. Oswald, Pittsburgh, Pa.
Collapsible stake-pocket, 1,091,546—John J. Tatum, Baltimore, Md.
Buffer-coupling for railroad-vehicles, 1,091,547—Emil Ullmann, Berlin, Germany, assignor to The Firm of Orenstein & Koppel-Arthur Koppel Aktiengesellschaft, Berlin, Germany.
Electromagnetic bell, 1,091,548—Eugene W. Vogel, Chicago, Ill., assignor to The Railroad Supply Co., Chicago, Ill.
Signal apparatus, 1,091,578—Christian G. Kamiske, Milwaukee, Wis.
Load-controlled air-brake, 1,091,596—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Percy E. Donner, Allegheny county, Pa.
Engineer's brake-valve, 1,091,597—Jacob Rush Snyder, Pittsburgh, Pa., assignor, by mesne assignments, to Pittsburgh Air Brake Co., Pittsburgh, Pa.
Double-lever car-brake, 1,091,602—Stonewall Tompkins, Brooklyn, N. Y.
Rail stay, 1,091,603—Joseph M. Vail, Bryan, Ohio.
Automatic train stop device, 1,091,610—Walter E. Wells and John H. Maguire, Gardner, Mass.
Sprinkler device for locomotives, 1,091,631—Joseph Chidley, Cleveland, Ohio.
System of Vehicle Propulsion, 1,091,632—Alexander Churchward, New York, N. Y., assignor to General Electric Co., Schenectady, N. Y.
Rail joint, 1,091,651—Peter Hadnagy, Detroit, Mich.
Pressure and Temperature control valve, 1,091,660—John C. Hornung, Chicago, Ill.
Method of building railway cars, 1,091,693—Charles F. Murray, Evanston, Ill., assignor to The Fowler Car Co., Chicago, Ill.
Automatic train stopping system, 1,091,694—John L. Neble, Omaha, Neb.

Railway car coupling, 1,091,740—Josef Zygmunt Floryanowicz, Wierzbniak, and Tomasz Maryan Juljusz Kicinski, Zmudz, Russia.
Motor car, 1,091,745—Erich Grindel, Bremen, Germany, assignor to General Electric Co., Schenectady, N. Y.
Auxiliary pressure control valve, 1,091,754—Spencer G. Neal, Los Angeles, Cal., assignor to California Valve and Air Brake Co., Los Angeles, Cal.
Method and means for forming diaphragms, 1,091,763—Guy Carleton Pierce, Los Angeles, Cal., assignor to California Valve and Air Brake Co., Los Angeles, Cal.
Car construction, 1,091,770—Victor von Schlegell, New York, N. Y., assignor to Hale & Kilburn Co., Philadelphia, Pa.
Rail fastener, 1,091,790—John B. Atwood, Pittsburgh, Pa.
Selective Signaling System, 1,091,832—Edwin R. Gill, Yonkers, N. Y., assignor, by mesne assignments, to Hall Switch & Signal Co.
Method of facilitating the detection of steam boiler seam cracks, 1,091,847—Sherwood Frank Jeter, Hartford, Conn.
Draft rigging for railway cars, 1,091,848—George A. Johnson, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.
Car coupling adjuster, 1,091,956—Max Poeth, Denver, Colo.
Railway track tamping machine, 1,091,984—Nicola Talarico, Turner, Me.
Rail joint, 1,092,003—Willis Armsworth, Cerro Gordo, Ill.
Railroad signal, 1,092,004—Clyde Aurand, Lewistown, Pa.
Railroad tie, 1,092,005—August Baca, Fayetteville, Tex.
Connecting rod for locomotives, 1,092,025—Henry T. Crook, Asheville, N. C.
Car stake, 1,092,032—Harris A. Fayssoux, Vaughan, N. C.



The Watson-Stillman Shaft Straightening Press.

Crossover connection for fluid-brake systems, 1,092,043—Walter F. Hammond, Rocky Mount, N. C.
Extension step for railway cars, 1,092,044—Thomas F. Hardiman, Oxford, N. J.
Apparatus for shifting rails, 1,092,057—Richard Kleber, Tepitz-Schönau, Austria-Hungary.
Self coupling for fluid train lines, 1,092,061—Charles Edouard Oscar Langlais, Montreal, Quebec, Canada.
Railroad tie and fastener, 1,092,069—Daniel McLellan, Hibbing, Minn.
Rail fastening device, 1,092,072—John H. Messner, Pittsburgh, Pa.
Rail tie, 1,092,073—Ives A. Miller, Grapeville, Pa.
Car door, 1,092,108—William F. Keiser and Charles Ryan, Terre Haute, Ind.
Train brake, 1,092,116—Cornelis Robert Nijssen, Rotterdam, Netherlands.
Connecting rod, 1,092,118—George T. Strite, Minneapolis, Minn.

RAILWAY REVIEW

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Five Per Cent Rate Increase Case.

The Interstate Commerce Commission, gave the following notice under date of April 13: "Pursuant to the announcement heretofore made, the Interstate Commerce Commission will hear arguments in these cases on April 27, 1914, by which time also all briefs touching the issues involved must be filed. The argument will embrace all the questions presented on the record. That part of the record that deals with the financial condition and requirements of the carriers and with the rate schedules under suspension in the proceeding is now closed except as to such exhibits as have been requested of record and except as to the replies from the carriers to the questions touching their financial condition and requirements submitted by the commission in its circular letter of December 20, 1913. It will be understood, however, that the record will not be closed as to the related matters involved in the inquiry instituted by the commission until the replies of the carriers on those questions submitted by the commission in its circular letters of Dec. 20, 1913, and Feb. 26, 1914, have been filed, the investigations by the commission in connection therewith, now approaching completion, have been placed of record, and until the hearings, now in contemplation, upon these last mentioned matters, have been had."

Ask Review of Hocking Valley-Sunday Creek Case.

The Hocking Valley Ry. and the Sunday Creek Coal Co., have filed in the United States Supreme Court an application for a writ of certiorari in the case which resulted in the conviction of the two corporations in the federal courts of Ohio for violating the interstate commerce laws against discriminations. The companies base their plea on a denial that the acceptance by the Hocking Valley Ry. of notes of the Sunday Creek Coal Co. as evidence of indebtedness for freight charges constitutes a violation of the Elkins act, prohibiting rebates. The services out of which the case arose were performed by the Hocking Valley for the Sunday Creek company in August, 1909, and amounted to \$30,182. In settlement \$182 was paid in cash and five-per-cent notes for \$30,000 were accepted by the railroad. These notes were renewed and, with other debts were converted into debenture bonds of the coal company in April, 1910. The petitioners deny that the coal company was charged rates different or less than those named in the tariffs of the railroad and cites numerous authorities to show that a railroad may extend credit to one patron and demand cash from another without discriminating between them in an unlawful manner. The notes, it is claimed, were not accepted as payment of the debt, as each count against the railroad states that the freight charges "still remain unpaid." The petitioner also states that "the extension of credit under the circumstance alleged in this indictment is not prohibited by federal statutes and the prohibitions of the statutes against undue and unreasonable preference are too indefinite to be good as penal provisions." The company further contends that the question of fact has not been passed upon by the Interstate Commerce Commission, as contemplated by the Elkins act, under which the indictments were found. "No count of the indictment states facts

sufficient to constitute an offense, because they fail," asserts the petitioner, "to allege that the legality of the giving of such credits and extension of time for the payment of such freight charges was submitted to and passed upon by the Interstate Commerce Commission before this indictment was returned. Without such an allegation the court did not have jurisdiction of the matters alleged in the indictment. The Supreme court is expected to rule on the application this month.

New Passenger Tariffs Effective May 1.

New passenger tariffs filed by all interstate railroads of this country readjusting their fares in conformity with the provisions of the long and short haul clause will become effective May 1. Soon after the enactment of the long and short haul provision the Interstate Commerce Commission ordered the carriers to readjust their passenger fares in conformity with that principle. At the request of the roads the commission postponed the effective date of its order pending the decision of the Supreme court in the Minnesota rate cases, and in the other cases involving the power of states to fix rates. After the Supreme court upheld the authority of states to make rates, the commission directed the roads to readjust their passenger fares by May 1 of this year. Except in such instances as the commission may grant permission to the carriers, for well defined reasons, to exact a higher rate for the shorter than for the longer haul, the roads will be required precisely to conform to the law's provisions. The tariffs which are now about to become effective indicate a material reduction in fares, particularly from important terminals and rate-basing points to intermediate points. It is estimated by the commission, after an analysis of the tariffs, that "95 per cent of the changes in fares will be reductions" and 5 per cent increases. Such advances as are made are between terminals, or basing points, and in such instances the increases are made only when the traffic to intermediate points is so great as to affect seriously the revenues of the roads. What the ultimate results will be with respect to passenger earnings, the commission has no means of determining accurately, because that will depend largely upon the volume of traffic, which is a variable quantity.

Tour by University of Illinois Railway Students.

A party of students from the railway department of the University of Illinois, numbering about fifteen and accompanied by Professor E. R. Dewsnap, were recently personally escorted through the new passenger terminal of the Chicago & Northwestern Ry., and inspected the interlocking towers, power plant, mailing department, express and baggage department and the many other complete features of the terminal. After this they were taken to the 40th Avenue shops, Chicago, and escorted through the plant, all the points of interest being explained to them. Addresses were made by Professor Dewsnap and various officials of the Chicago & Northwestern Ry.

Eastern Wage Award Interpreted.

The disputed points as to the meaning and application of the award handed down November 10, last, by the board of arbitration in the dispute between the eastern railroads and their conductors and trainmen, were made the subject of a new ruling, April 10. The board had reconvened for the purpose of construing the terms of the previous award, and it filed in the United States District court, in New York city, its ruling on the claims of the employees that the roads misinterpreted some of the awards in a manner to affect the men adversely. Nearly all the complaints had reference to technical points. The principal dispute centered around article P of the original award, which provides that the earnings of the men shall not be diminished by the award

in case the rates of pay were higher previously. Under the ruling now filed it appears that the question is one which must be decided by both sides without arbitrary intercession by the federal board. A statement signed by Seth Low, chairman of the board, and John H. Finley, also representing the public, says that the question of the right to apply the provision in article P only to irregular runs was submitted to Alton B. Parker, whose opinion was that it was not within the power of the board to make such a ruling. It was stated that this opinion is to be taken into consideration by the roads and the men in applying the awards. Both sides in recent hearings here accepted the ruling that the board was without power. The members of the original board who signed the present ruling are Seth Low, chairman; John H. Finley, A. H. Smith, Jno. G. Walber, L. E. Sheppard, D. L. Cease.

Electrocution of Tereido Naval.

A government official has reported to Washington that a new method of destroying tereidos, by turning an electric current into piles that stand in salt water, is being tried in Seattle.

Federal Board of Mediation Settles Telegraphers' Dispute

Differences between the Baltimore & Ohio R. R. and about 2000 of its telegraph and telephone operators were adjusted, April 11, through the good offices of the federal board of mediation and conciliation. Negotiations have extended over several months and at one time a strike was threatened. The settlement provides for a direct increase of about \$75,000 a year or an approximate increase of about 6 per cent. The new schedule is to go into effect March 1. Vacation privileges have been extended to about 1200 men. The overtime rate was increased 5 cents an hour.

Railway Electrification in Norway.

State railway authorities of Norway have had the question of electrification under consideration for several years, and have now worked out a scheme for the electrification of the railway between Wrammen and Kristiania, which has the largest traffic, and will be the first section to be taken in hand. A report on the project has been submitted to the department for the interior, and the single-phase system at 15,000 volts and about 15 cycles per second is recommended. It is considered desirable to increase the maximum speed, which was 70 km. per hour, according to a previous estimate, to 80 km., which would reduce the time for the express trains between the two towns by 10 minutes. The locomotives would be constructed for a maximum speed of 90 km. A new schedule has been worked out in accordance with the altered speed, and the estimate of the consumption of energy is 6,500,000 kw. hours per year, and the maximum local between 5300 and 5600 kw. As it would be difficult to employ steam locomotives as a reserve, the power stations are to be capable of supplying the whole amount of energy at any given time, on the basis of the full maximum load. This first electrification project will be considered largely in the light of an experimental plant, from which experience can be gained before the other sections of the railways are taken in hand.

Swedish Railway Electrification.

A plan recently made public by the state railway authorities of Sweden, and submitted to the government for approval, proposes a scheme of extension and improvements running ten years into the future. It will involve a capital expenditure of more than \$83,000,000. Of this amount it is proposed to expend some \$13,000,000 on the electrification of considerable sections of the main lines, among which may be mentioned the line between Jorna, Malmo and

Trelleborg, and the lines between Stockholm and Gothenburg and Malmo and Gothenburg. It is further proposed to electrify the railway between the large iron mines in the north and the port of Lubac in the bay of Bothnia, which will require a sum of about \$2,000,000. The continuation of this line from Kuruna to the Norwegian frontier is now being electrified; in fact it is practically completed, as it was the intention to run the first electric trains April 1.

Chicago, Milwaukee & St. Paul Commences Electrification.

The Chicago, Milwaukee & St. Paul Ry. has commenced the actual work of electrification of its Rocky Mountain division. In the Railway Review, Dec. 17, 1913, it was stated that the first section to be electrified would be from Three Forkes to Deer Lodge, Mont., 113 miles, and that probably the whole of this distance would be operated electrically by the close of the year 1914.

Practice of Rebilling Interstate Shipments Upheld.

The United States Supreme court rendered a decision, April 13, in which it upheld the practice of rebilling interstate shipments of commodities as intrastate shipments without the reloading of cars. The ruling is adverse to the Chicago, Milwaukee & St. Paul Ry. in a case in which the road endeavored to compel the Clark Coal & Coke Co. and other shippers of Illinois coal to Davenport, Ia., to reload the commodity in C. M. & St. P. Ry. cars for reshipment to other points in Iowa. The Iowa railroad commission and the state Supreme court decreed that the coal should be reshipped without reloading, and this decision the federal Supreme court now upholds. The fact that the commodities received on interstate shipments are reshipped by the consignees in the cars in which they are received to other points of destination does not necessarily establish continuity of movement or prevent the reshipment to a point within the same state from having an independent and intrastate character declares the opinion, which was delivered by Justice Hughes. It cannot be said that the plaintiff in error (the St. Paul) had a constitutional right to burden trade by insisting that the commodities should be unloaded and reloaded in its own equipment. *

D. L. & W. R. R. Now Trying Wireless Telegraphy.

The Delaware, Lackawana & Western R. R. is using the apparatus which has been proving successfully, experimentally, in accomplishing radio-telegraphic communication from fixed station to moving trains, to perform some tests with wireless telegraphy. The results are stated to have demonstrated in a preliminary way the success of the scheme.

Scoop Car For Clearing Slides, Norfolk & Western Ry.

The rapid removal of material that has slidden onto track in cuts, tunnels or other places is a matter of some difficulty when the only opportunity to attack the job is "end on." The Norfolk & Western Ry. has a car, designed by President L. E. Johnson of that road, which is fitted with a large scoop at one end, which can be thrust under debris covering the track, lifted clear of the rails, pulled back to some convenient point, and then dumped sideways off the track.

The general appearance of the car is shown in the accompanying illustrations. An ordinary flat car is strongly braced at one end to support the low-hanging hinges for a so-called "scoop-carrying" plate. To this plate a large scoop, made of boiler plate, is removably hinged on both sides. The scoop is provided with excavating teeth, like the dipper of a steam shovel, and for handling it the car is equipped with a swinging crane and hoisting machinery. The car is then housed in with a well braced roof.

Approaching a slide, the scoop is let down and the car is

pushed forward by the locomotive until the scoop is filled, when the forward end of the carrying plate, which, in working position, slides upon the rails, is lifted clear of the rails by the crane or derrick, through a doubletree carrying chains at either end. When the car arrives at the dumping ground the pins are pulled from the hinges on the side opposite that

at which it is desired to dump the material, the chains are quickly attached to the hinge straps of the scoop on that side, by means of two bails, and the scoop is then hoisted, the crane is turned and the material dumped at the side of the track. The car is then returned to the bank and the operations continue as before.

The car, constructed as is here shown, is an improvement over one built by President Johnson about ten years ago, in which the scoop itself was hinged to the end of the car direct, and the sides of the scoop were hinged to the bottom plate, so that either could be lowered to permit the material to be removed by shoveling or other manually operated means. With the new car, as is evident, all hand operation is dispensed with. The car has been found useful for removing earth, rock and other rubbish from the track in case of slides, and particularly for removing material from tunnels where the roof had caved in. In one instance, especially, this machinery was found particularly helpful in removing rock and debris which had fallen as a result of fire in the timber and packing of the tunnel.

Government Figures Explain Rise in Maintenance Cost.

REPORT BY DEPARTMENT OF LABOR TRACES DRASTIC GROWTH IN WAGES WHICH FALLS ON UPKEEP OF RAILWAY EQUIPMENT.

In figures showing that wages paid to labor engaged in the building and repair of railway cars increased from 27 to 50 per cent in the fifteen years between 1897 and 1912 and from 7 to 18 per cent in the four years between 1909 and 1912, just compiled by the bureau of labor statistics of the United States Department of Labor, railway managers of the country have been given by one branch of the national government a direct answer to recent charges made against them before another branch, the Interstate Commerce Commission, that expenditures for maintenance have been excessively expanded.

The government's figures, which have been analyzed by the Bureau of Railway News & Statistics in Chicago to show their inevitable effect on the maintenance expenses of the railways, are compiled from private car building shops and railroad shops engaged wholly or mainly in the building and repairing of steam railroad cars, both passenger and freight, and both wooden and steel. In selecting the establishments from which to secure the data the government bureau of labor statistics undertook to represent every state in which the building and repairing of steam railroad cars is of important proportions so that the results obtained are of the most representative character possible.

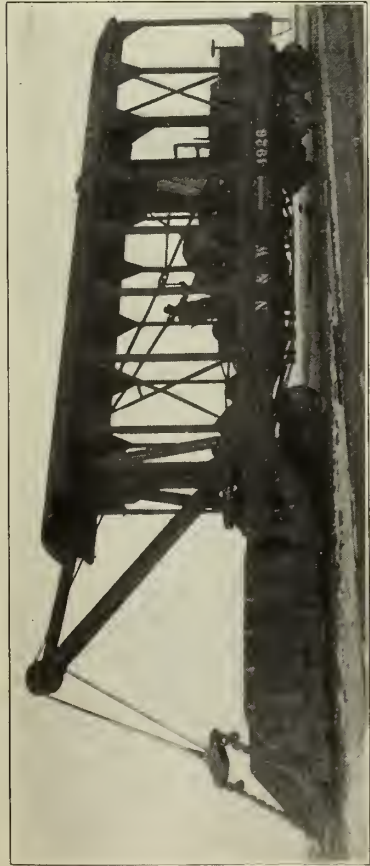
The data afforded are the first of the kind compiled and given out by the government in almost six years and are of graphic significance as a reflection of the serious inroads made upon the railway dollar in recent years in the important branch of maintenance of equipment.

Taking as 100 the average wage per hour paid distinct classes of workers in car building and repairing in the ten year period 1890 to 1899 the government figures give the relative hourly wage in each year from 1890 to 1912. There is shown a gradual decline from 1890 to 1896 and then a decided and unchecked rise which in the fifteen years since has resulted in the following enormous changes:

	Relative Wage per hour	
	1897	1912
Cabinet makers.....	97.2	136.7
Carpenters and car builders, wood....	98.2	127.6
Laborers	98.5	127.1
Machine woodworkers.....	95.4	133.1
Machinists	99.4	139.7
Painters	100.8	128.0
Pipe fitters	99.6	136.3
Tinners	102.3	150.1
Upholsterers	96.2	144.2



Scoop Car, Norfolk & Western Ry., Fig. 2—Dumping the Scoop.



Scoop Car, Norfolk & Western Ry., Fig. 1—Working the Scoop.

The rise in wages per hour represented ranges from 27 per cent in the case of painters to 50 per cent in that of upholsterers. In power to purchase a painter's labor the railway dollar of 1897 shrank to 79 cents by 1912, while in the case of upholsterers it shrank to 66 cents.

What this means is appreciated only in connection with the fact that 60 per cent of equipment maintenance represents wages. On this basis \$268,000,000 of the \$448,000,000 paid by roads of class I and II in 1912 went in pay to labor. Had 25 per cent of this wage been saved (less than the rise in payments of any class above) the equipment maintenance account would have been smaller by over \$67,000,000.

In four years from 1909 to 1912 the advance in wages per hour ranged from 7.2 per cent for machine woodworkers to

8.9 for machinists; 10.0 for carpenters, 10.5 for car repairers; 12.1 for painters; 13.0 for laborers; 13.3 for cabinet makers; 13.8 for truck builders; 15.2 for tinnners; 17.4 for pipe fitters and 18.1 for upholsterers.

Were the general average only 10 per cent higher, \$27,000,000 could have been saved on the 1912 bill for equipment maintenance had the 1909 wages been in effect. As the total increase for equipment upkeep in the same time was \$84,000,000 there is accounted for thus some 33 per cent of the expansion which has so horrified the soul of Clifford Thorne.

Moreover the bureau's figures for 1913 show that there was a further increase in the wages of railway shopmen for that year over 1912.

New Soo Line Freight Terminal in Chicago

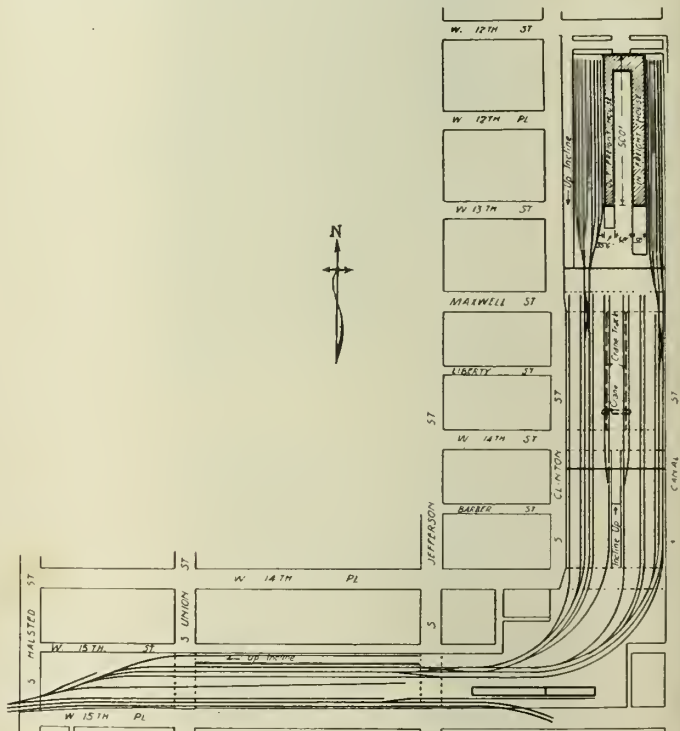
Local freight and storage house for the Minneapolis, St. Paul & Sault Ste. Marie Ry., in Chicago, a block wide and 3½ blocks long, with 6 miles of tracks and capacity for 445 cars. It covers 18½ acres of ground, with 17.9 acres under roof, and has a working space of 34.7 acres. Built largely of reinforced concrete.

The Minneapolis, St. Paul & Sault Ste. Marie Ry. (Soo Line) has just opened for business, in Chicago, a new freight terminal, built, on modern ideas, by the Central Terminal Ry. It occupies eleven city blocks, the northern end, with a four-story (and basement) head house, being at 12th street, between Canal and Clinton streets. From this point it extends southward, crossing 12th place, 13th street, Maxwell street, Liberty street, 14th street, Barber street, 14th place and 15th street, and then, turning to the west, as seen in Fig. 1, the approach tracks cross Clinton, Jefferson and Union streets and, at Halsted street, connect with the Baltimore & Ohio-Chicago Terminal R. R. tracks, which the Soo Line uses in entering the city.

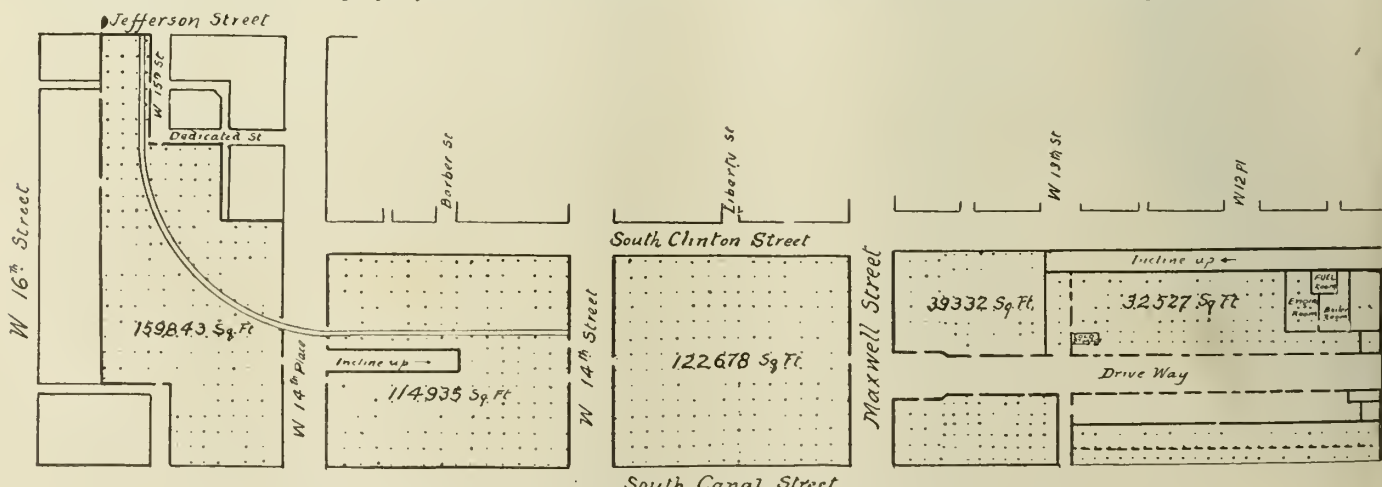
The terminal was planned by the M. St. P. & S. S. M. Ry., under the general direction of President E. Pennington and Chief Engineer C. N. Kalk. The Leonard Construction Co., of Chicago, carried out the construction, under the general charge of Mr. H. H. Hadsell, of that company. Mr. Arthur R. Lord, also of that company, made the design and cost computations, and to that gentleman we are indebted for the data used in this description of the work. The structural design was licensed and checked by the Concrete Steel Products Co., of Chicago, Mr. H. Hanselmann, architect.

As the city would not permit such a large terminal to be built at street level, it was constructed with elevated tracks on a deck structure that continues uninterruptedly across the streets, almost the entire area of the property beneath this structure,

except the five streets left open for traffic, being available for storage purposes, amounting in all to over 600,000 sq. ft. All of this space is at the street level, directly accessible to teams for city distribution and served also by the tracks of the Chicago Tunnel Co. From the street the track deck is reached



Chicago Terminal of the Soo Line, Fig. 1—Track Layout.



Chicago Terminal of the Soo Line, Fig. 2—Ground Floor Plan of Warehouse.



Chicago Terminal of the Soo Line, Fig. 3—Twelfth Street Front.

by two incline driveways, one from 12th street, on the north, and the other from 14th place, on the south. These lead directly to the team tracks, the traveling crane and the driveway between the freight houses.

The Chicago Tunnel Co. is providing several connections with its system of freight-carrying tunnels, which serve all the principal buildings in Chicago. Universal freight station No. 4 of this company will be located at 12th and Canal streets under the in-freight tracks. Three elevators connect the tracks of the tunnel company with the tracks of the Universal freight station and the freight houses of the Central Terminal Ry.

The freight houses and office building are located at the north end of the terminal, adjacent to 12th street. The main "in" and "out" freight houses are 460 ft. long, provision being made for a future increase in length. The in-freight house is four stories high, but designed for two additional stories when the need for additional space arises. The in-freight house is served by five tracks along Canal street with a capacity of 80 cars. The building is 50 ft. wide, with a floor space of about 100,000 sq. ft., which will be doubled when the extensions now contemplated are made. The plans call for a cold storage chamber on the first floor. Five elevators distribute the freight received on the second floor to the upper and lower floors. One tunnel elevator serves the second floor directly, and there are three spiral chute conveyors. At present one scale is provided on the first floor and four on the second, set flush with the floor at shipping doors. There are 14 team shipping doors on the first

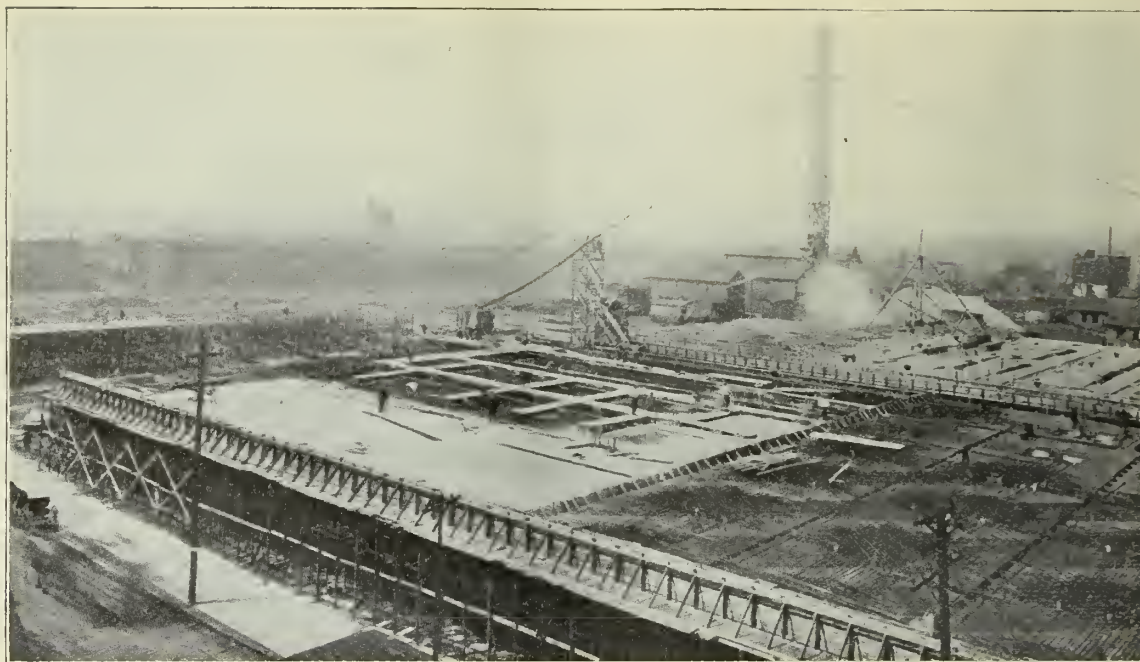
floor and 19 on the second. The entire east side of the in-freight house is open, with columns 20 ft. on centers and with full-width doors between, permitting cars to be spotted with great ease. A screen wall of concrete and brick hides the freight tracks from 12th street boulevard.

The out-freight house is two stories high and is served by eight tracks with a capacity of 105 cars. The building is 35 ft. 6 ins. wide, the present floor area being 65,000 sq. ft., with provision for future increase. The freight is received from the driveways through 16 team doors on the first floor and 18 on the second. Fifteen scales flush with the floor serve these doors. The entire west side of the second story of the out-freight house is open to the tracks with columns 20 ft. on centers and full width doors between. Two freight elevators serve the first and second floors. A 10-ton, 20-ft. radius pillar crane for handling heavy castings, etc., is located on the out-freight platform, so as to serve cars, trucks and the platform from one fixed position.

Between the in and out-freight houses is a 58-ft. driveway on both the ground and the second floors. The ground floor driveway is entered directly from 12th, Maxwell and Canal streets. The second floor driveway is reached by the incline from 12th street and 14th place. The floors of the in and out-freight houses are 3 ft. 6 ins. above the top of the paving. The second floor of the in-house is 4 ft. above top of in-freight rail, while that of the out-house is 4 ft. 3 ins. above top of out-freight rail.



Chicago Terminal of the Soo Line, Fig. 4—General Perspective, Looking from Northeast.



Chicago Terminal of the Soo Line, Fig. 5—Progress View of Work on Track Slab.

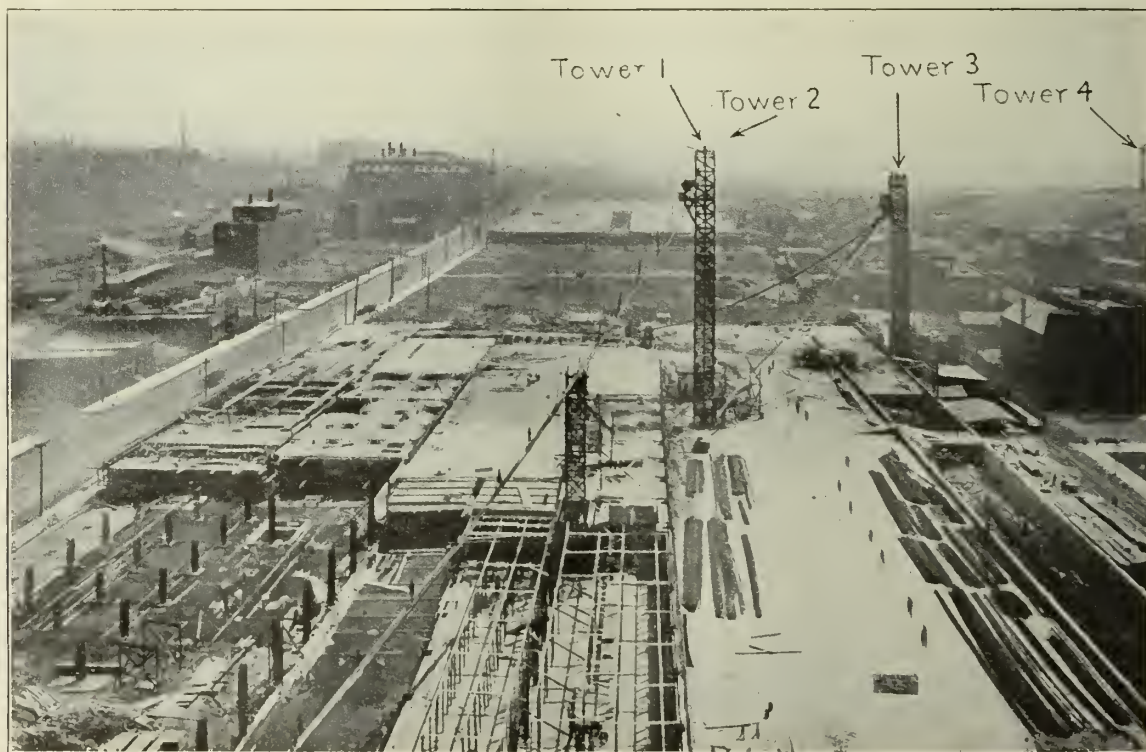
The freight and business office, on 12th street, four stories in height, will ultimately be six stories high. The building is 143½ ft. x 36 ft. in plan. The ground floor driveway entrance is through this building.

The power and heating plant is located under the out-freight tracks near 12th street. The coal is received on the west out-freight track and dumped directly into the bin below, and the ashes are hoisted to cars on the same track. Ultimately all heat and power required for the operation of the terminal will be developed by this plant. Provision has been made for expansion in the future. There is a reinforced concrete chimney, 140 ft. high, constructed by the Custodis Chimney Co.

The team tracks are located south of Maxwell street and have a total capacity of 259 cars, which can be greatly in-

creased when the need arises. A traveling crane serves four tracks near the south incline driveway. A 9 ft. x 20 ft. auto truck scale is located in a central position with regard to the inclines and driveways. The flat unobstructed deck permits the track to be rearranged at any time as experience may show to be desirable for the more efficient operation of the terminal.

The elevated structure is designed to carry any arrangement of tracks on 12 ft. centers with the heaviest loading which it is considered that the future may by any possibility impose upon them. The track deck is unbroken by beams and is ballasted. The structure is built of reinforced concrete throughout, with the exception of the columns at the track side of the in-freight house. Almost all types of reinforced concrete



Chicago Terminal of the Soo Line, Fig. 6—Progress View Showing Towers for Concrete Distribution.

construction are to be found in the structure, the requirements of each case being studied and the type best suited being used. For the track slab, with the heavy load of ballast and trains, computations showed that the flat slab with depressed heads led all other types by a very wide margin from the standpoint of cost and desirability in every way. This construction gave a minimum of thickness over the streets, which in turn determined the elevation of the entire structure.

In the freight houses proper, with a loading of 350 lbs. per sq. ft., the flat slab also enjoyed considerable advantage in cost over its nearest competitor, as well as making possible a more attractive building. For the office building and the out-freight house roof, where the loads are light, tile-concrete joist construction was used as being somewhat superior in the matters of condensation and noise conduction. For the driveway slab between freight houses a reinforced concrete girder, beam and slab construction was used, as the panels were extremely rectangular. The retaining walls are of a semi-gravity type, being lightly reinforced for temperature and bending stresses. On account of the vibratory nature of the load Havemeyer deformed bars, furnished by the Concrete Steel Co., New York, were used very largely. Some square twisted bars were used and a small number of plain rounds.

Construction work was started on the footings in August, 1912, and continued with a small force, which was increased as rapidly as the clearing of the site and acquisition of property would permit, with very few interruptions throughout the fall and winter. There are about 2000 columns in the structure. The footings rest on hard blue clay at an elevation of 2 ft. above city datum. The top of the slab is 31.18 ft. above this

Concrete in freight and office buildings.....	13,000 cu. yds.
Concrete in retaining walls	13,350 cu. yds.
Concrete in driveway and pavements	17,700 cu. yds.
Concrete in entire structure, about	108,000 cu. yds.
Reinforcing steel .....	.6500 tons
Area of ground covered.....	18.5 acres (800,000 sq. ft.)
Area of working space.....	34.7 acres (1,500,000 sq. ft.)
Area of working space under roof..	17.9 acres (780,000 sq. ft.)

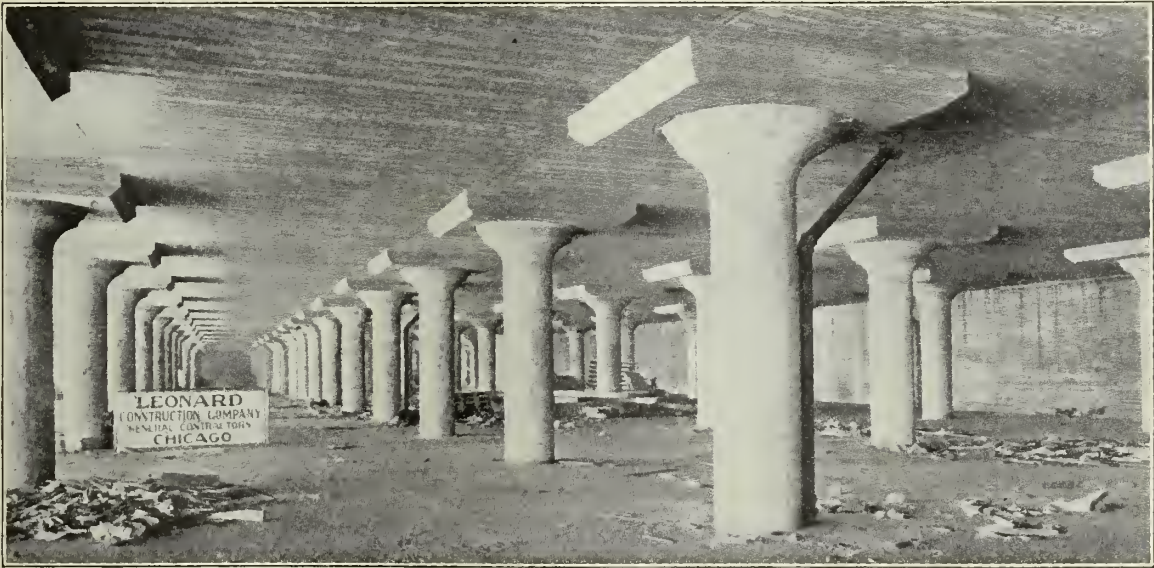
The entire deck of the track slab was waterproofed by the Johns-Manville Co., using three-ply asbestos membrane protected by 1 in. of asphaltic mastic. In general the membrane was not sealed to the slab, but left entirely loose, except at the downspouts and walls. About 630,000 sq. ft. of slab surface was waterproofed in this manner.

Reconnaissance and Location

By CARL STRADLEY, ASST. GEN. MGR., OREGON SHORT LINE R. R.

From an address before the Salt Lake City Transportation Club, Nov. 1, 1913. Mr. Stradley, with the title of assistant general manager, is the chief engineer of the Oregon Short Line R. R. Principles of preliminary and location surveying gained from wide experience. Methods applicable to territory of varying character of topography. Organization of field parties and cost of the work. Equipment for preliminary surveying.

Possibly the first reconnaissance connected with any project is through the mind of the one with whom originates the idea that a line of railroad between two different portions of the



Chicago Terminal of the Soo Line. Fig. 7—Typical View in Storage Space, Showing Columns Supporting Track Slab.

datum at the crossing of Jefferson street, running down on a very slight grade to 26.23 ft. at the freight houses.

All the reinforcing steel in the track slab was bent in position, which resulted in a large saving, and in better work. The Havemeyer 3/4-in. round bars used on the larger portion of the work bend easily, but the 3/4-in. square twisted bars used in one section were more difficult to bend, although even here bending in position was believed to be cheaper and preferable to shop bending. The concrete was placed by a combined gravity chute and cart method, as shown in the illustrations. With a 33 cu. ft. mixer the output of a single plant ran from 375 to 450 cu. yds. per day of eight hours. Some of the quantities involved were originally estimated as follows:

Excavation	125,000 cu. yds.
Concrete in track slab and columns	36,300 cu. yds.
Concrete in footings	25,300 cu. yds.

country will develop a business sufficient to give a return on the money necessary to construct and equip it. While without this original reconnaissance there would probably be no development of the physical portion, there is not the bodily fatigue attached to this part of the work that necessarily follows the actual exploration of some portions of the country with which I am familiar.

There is not now the difficulties encountered in reconnaissance that had to be met and overcome by those who were associated with the selection of routes for our earlier railroads. In earlier times there was but little knowledge concerning location of different passes through the hills and few trails making easy the examination of them. Now but little of our country is unsurveyed or unmapped, and while some regions are sparsely settled, the area unfamiliar to the scattered residents is very small. With wagon roads and trails traversing even the most

isolated portions, there is but little reason and no excuse for failure to discover the best route for a railroad between a given initial and objective point.

The engineer is rarely the promoter, and never the financier, of an extensive railroad project. Therefore, his province is not so much the determining of the initial and objective points of line under consideration as it is to determine the line of lowest grades, shortest distances and greatest freedom from curvature between points already determined upon, especially if the line proposed or being investigated is to be a through line, or any portion of one, where competitive business will probably constitute the greater percentage of the tonnage. Reconnaissance then takes on more of the work of elimination.

The number of alternate routes between two given points will vary with the character of the country and the length of the line proposed for construction. The difference between the various routes is sometimes so apparent that only a superficial examination is necessary to determine the ones not to be considered. It must not be understood, however, that examination of any one of the routes is to be made carelessly or reported against without sufficient information to justify the decision that they do not warrant further consideration.

In making examination of the country the engineer should be sure to not confine his investigation of routes to too narrow an area, for the reconnaissance work is the exploration and examination of an area, rather than working out the details of a line, this latter being more particularly the work of the locating engineer.

I have always found it convenient and a great aid, when assigned to report on possibilities for a line where the termini have been determined, to provide myself with maps on two different scales: one, the ordinary map of the state in or through which the line is to be located, and which is generally found published to a scale of 12 miles to the inch; the other one of my own make on a scale of 2 miles to the inch, with a range on each side of a direct course between termini that will cover any probable deviation from a straight line. On this map is shown the section, township and range lines, and to it is transferred from the published map only the more prominent geographical points, leaving the streams and drainages, mountain ranges, hills and passes through them and any other topographical features to be indicated as their location is proven on the ground.

The range of territory at right angles to the course of line under investigation is always made so wide that if a favorable route is not found inside of it a change of initial point would suggest itself. With such width of limits set I always feel, after an examination, that the possibilities for the line have been fully covered. The report is not confined to a description of the physical characteristics of line that may be obtained, such as alignment, rate of grade, approximate cost per mile, etc., but should cover also the character of the country, giving possibilities of growth and development. Resources of whatever character should be noted and reported.

A reconnaissance may take on the character of a preliminary instrumental survey, depending upon the character and ruggedness of country and whether the view of any particular area is interfered with by timber growth or other obstructions.

In my own experience, where I was advised that a location was desired and generally knew I was to make the location, I found that the rate of grade to be obtained, the distance could be approximated, comparative height of summits measured and total rise and fall approximately determined with a modest equipment of instruments. These generally consisted of three aneroids, a hand level provided with an appliance for measuring vertical angles, a compass and an attachment to place upon a buggy for measuring distance. Usually through a country with established government land surveys where monuments may easily be found, thereby assisting in estimating the distance, and the country is open enough for a general view, the equipment mentioned is sufficient to permit one to determine approxi-

mately close the physical character of the line that this country will afford. Where this is not the condition a light transit equipped for making stadia measurements, a level rod and two or three assistants are required.

In a timbered country, or one where excessive elevation is to be overcome with a lighter rate of grade than the natural fall of country with a line on direct course will permit, requiring instead the following of center control and the introduction of extra length of line, instrument work of preliminary character is necessary. In the character of country in which so much of my work has been performed, where there are long stretches of territory without promise of future local development of business, the matter of shortening distance becomes an important one. To assist in making investigations with this object in view and to make a reliable comparison between alternate routes, a line is drawn on the maps previously referred to, connecting the initial with the objective point. It is always found necessary on lines beyond a very few miles in length to deviate from a direct course, and on lines of 50 miles or more in length many absolute controls are encountered, fixing, without possibility of change within small limits, the location of the line.

When the first of these is found and located on the map, then a new direct line is drawn from this point to the terminal point again, and the most feasible route closest to the direct course is determined to the next absolutely control. This operation is repeated until the entire length of line has been covered in this manner. Of course, between the points of absolute control there is much minor and adverse curvature introduced to avoid unwarranted construction cost, but by the method explained is determined the points to which the line is forced, because no reasonable expenditure of funds would warrant taking a more direct course.

Work of a reconnaissance nature is often performed at such seasons of the year and under such conditions as to make physical hardships extreme, but I believe that none worthy of being associated with the profession ever found the conditions so severe but that the interest in the work overbalanced the fatigue, and the hardships are not recalled until the work is completed, and then only as an incident to the work.

Often two or more routes are so similar in possibilities of grade rate and other features that it is necessary, unless there is territory along one line not obtaining along the other giving promise of future development of tonnage and becoming a determining factor, to run angular lines before selection of routes may be decided. This work, however, becomes a part of the locating engineer's duty, that of the reconnaissance man having been performed with his recommendation that such lines be run and his admission that decision may not be made without such work.

As a general rule, it is the difference in cost that is in doubt, for it is nearly always possible to decide the other points without the preliminary staking of line or lines. Sometimes the reconnaissance engineer is limited in his exploration by those engaging his services, but such cases are limited to projects where the only intention is to interest capital in the construction of a line of road which, while it may be feasible, need not necessarily be the best route between the points served; and the object behind the enterprise is immediate personal gain, instead of consideration of the future of the road, or the best interests of all concerned. In such instances the engineer owes it to himself to incorporate in his report a statement that he has examined only the route reported upon in compliance with instructions. With the legitimate enterprise the information contained in the reconnaissance engineer's report and the knowledge furnished as to resources to be developed locally along the various routes investigated, added to the estimate of thorough business between termini, are the factors that influence those who furnish the money for the project in deciding how much money can be expended in construction of the line under con-

sideration. From this basis it is easy to determine the grade rate and general character of the line to be constructed.

Oftentimes a line is not constructed on the lightest rate of grade the country affords within a practicable expenditure, but is planned to come within such cost that prospective early tonnage promises to be sufficient to give a fair return upon the investment.

The idea behind the building of a road generally is, and should be, that it is profitable as an investment. However, whatever the course or origin of the project rests with the promoters or those furnishing the capital necessary, and is a matter with which the locating engineer has no concern, and for this reason it is not usually left with him to decide upon the maximum grade rate, maximum curvature, etc., but instead he is governed by instructions covering these features, issued by some one whose responsibility is greater than his.

The reconnaissance engineer's duty is to cover the field in a general way. The locating engineer's requirement is to cover the line in detail. His responsibility is large enough if his work is confined to getting the best line the country affords at the least expenditure within the standards given him. If standards have not been laid down governing grade rates, maximum curvature, etc., and no limiting amount as to expenditure has been set, his responsibility is greater and his obligation is not discharged until he has secured a line that cannot be duplicated in grade rates with less expenditure at the same unit prices.

The location of a line giving the smallest expenditure for first cost of construction is almost universally at the expense and disregard of many of the features that affect operation and is not, therefore, good location. A line may be secured that will not exceed a maximum grade that has been determined upon, and yet may have many features warranting criticism. There may be an unnecessary introduction of curvature, or an avoidable use of ruling or maximum grades, introducing rise and fall that could have been avoided at only a slight increase in cost over the profile adopted. Values may be had for all these different features, and if careful study is made they may be applied to all items, controlling the engineer as to just what limit he may go to in warrantable expenditure. These values may vary with different sections of the country and with varying conditions, and have to be determined for each road system. Even different values for the same system have to be compiled if that system is extensive enough to reach widely separated sections of the country.

This subject is too extensive to deal with thoroughly in brief space and limited time, and is referred to only as calling attention to matters that control and affect a location; and explains to those unfamiliar with the work why there will be a long heavy fill or cut and a straight line where introduction of heavier grade or curvature would have reduced cost of construction.

The cost of construction is ended with the completion of the line, while the cost of operation and maintenance corresponds in length of time with the life or existence of the road. In the prosecution of surveys, it is economy to have all preliminary work performed before final location is started. By this is meant that the entire length of line should be covered.

What is generally called a preliminary survey is an angular line fitted as closely to the final position as is possible to do through the engineer's ability to judge of the country, and it should be rerun until it is near enough to the proper place to be used as a base for taking topography accurately enough from and by which to project the final fitting. While the preliminary or trial lines have just as much care exercised in reading angles and obtaining other data as is applied to the final line, it is not necessary to fit them to the exact position and, therefore, does not require the time necessary on the finished location.

If the territory traversed is a canyon one line, and sometimes two lines, are sufficient to develop possibilities. Unless the difference between the two sides of a canyon is so apparent that there cannot be any question concerning which side affords the

cheaper and better line, both sides should be covered by an actual survey. It is preferable, anyway, to furnish evidence to those who are concerned in expenditures, but who do not visit the territory until after construction of the lines, that there was no mistake made in the side of canyon selected for construction.

Whether in a mountainous or plains country, the irregularities of the ground on either side of the center line is shown on maps by means of colored lines, representing elevations, generally given with contour intervals of 5 ft. A close canyon country does not require as wide range of topography as is necessary in a more open or plains country, although, even in the latter, beyond a certain narrow limit or distance, if additional topography is desired, it is better to run additional lines as a base for the purpose of securing it.

Maps are quite generally prepared on two scales: one on 2000 ft. to the inch, to meet local and government requirements and for ready and convenient reference at the head offices of the company; and the other on a scale of 400 ft. to the inch, for working purposes, upon which to show ownership of properties, all topography, and as a general map of record for the company. In territory where slopes are steep and where indication of contours at intervals of 5 ft. would be unintelligible on account of smallness of the map scale, it has been found advisable to make a field working map on a scale of 200, and even as large as 100, ft. to the inch. On this latter it is possible to make projection from the location of the final line that rarely needs revising or shifting after having once been staked.

To have all preliminary or trial lines on the entire length of the line, as heretofore referred to, before any portion of the final location is started enables the locating engineer to study the entire line, to see the relation which the different sections of line have to the line as a whole. It is assumed that this would be seen at some time, but, by the method mentioned, the necessity of abandoning the line which has been located and relocating it to fit conditions that should have been known earlier is not as frequent as it is where all the elements controlling the location are not fully known. It further enables the locating engineer to make his projected location and verify the same on the ground ahead of the time of actual staking. It further enables him to lay out work for the party and gives him the needed time to make examination of drainages, determining their areas, that conclusions may be reached as to the size and type of openings to provide.

It is his business to judge of the class of material that will be encountered in each cut along the line, where material is to be obtained from which to make the fills, and the type and size of openings for all streams and drainages. He should inform himself as to the value of right of way necessary to be acquired in connection with the construction of the line and recommend the location of the stations. The latter are not determined wholly by distance spacing, but must be governed partly by needs and requirements of adjacent country. The locations of water stations for locomotive use have to be determined and, of course, this requires considerable investigation to see whether there is some more economical supply to be obtained than through the sinking of wells.

In all the different matters that enter the detail cost of line and on which information is necessary in preparation of a reliable estimate, the engineer receives valuable aid from such assistants as transitman, levelman, and topographer, but this is only as verifying his judgment; for while a part of the duty of each of those mentioned requires that they obtain data on the various items given, the responsibility being the locating engineer's, he, of course, wishes to see to these personally and accepts the reports of others only as confirming his opinion.

No engineer can accomplish what he should, or prosecute surveys to best advantage, without having the data obtained in the field placed upon the map at the completion of each day's work for study. Where several trial lines are run these should

all be shown on one map with results of comparative features calculated and given for reference and purpose of selecting the proper line.

Grading quantities, of course, should be known, as well as difference in length of lines, curvature, rise and fall, etc.; otherwise decisions oftentimes would be based on guess after the trouble and time had been taken to run the lines.

It was my practice while in the field to have comparative values of related lines on the end of the profile roll of the platted line, this in tabulated form available for reference at any time.

A locating party sufficiently large to prosecute the field work without delay to any portion of it will, under ordinary conditions encountered, comprise, including teamsters, sixteen to eighteen men, and the monthly cost of the same, including salaries and subsistence, is about \$1800. The parties are not dependent upon local accommodations, but are equipped with sleeping and dining tents and are supplied with a cook and commissaries, so that whether the territory through which they

are working is unsettled or populated makes no difference, so far as ability to prosecute work is concerned; and, personally, I prefer the desert country as long as the base of supplies is not so remote as to make the securing of them add to the problems already belonging to the work.

While those who are unacquainted with the character of the work, or not familiar with the profession which is the subject of this talk, may think that the work of reconnoissance and location require men of different abilities, such is not the case. The two pieces of work are as interrelated as are that of running a preliminary line that is of value and the making of location that requires but minor revision; for, understand, no man makes a location that cross-sectioning or developments on construction do not suggest some slight shift in center line or some change in the recommendations earlier made. In my own experience and practice, while it was within constantly narrowing limits, I never wholly discontinued reconnoissance of a line until the final stake on the location was driven, and I believe it a mistake to do otherwise.

Cleaning Ballast with Screens, Baltimore & Ohio R. R.

The use of screens for cleaning broken stone ballast instead of forking it over. The dirt is more thoroughly separated from the stone and more conveniently disposed of. The work is done cheaper than by forking. Contributed to the report of the committee on ballast, of the American Railway Engineering Association by W. I. Trench, division engineer, Baltimore & Ohio R. R., and presented at the annual meeting, March 19, 1914.

In 1913 the report of the ballast committee contained a description of a ballast screen, as developed on the Baltimore & Ohio R. R., which showed that double-track ballast could be cleaned at a cost of \$640 per mile, or 56 per cent less than by the use of forks, leaving the ballast dressed up complete, the dirt being deposited in wheelbarrows ready for disposal. At present rates of pay, viz., foreman \$2.54 and laborers \$1.75 per ten-hour day, this would have been \$692.80 per mile. The object of the present discussion is to show that by certain improvements in the screen and in gang organization, 200 ft. per day is a conservative figure, with a gang of foreman and 12 men, costing per mile \$622, which includes dressing up complete, stone line laid by hand, shortage of ballast due to cleaning left between the rails, where a shower from a Rodger ballast car will fill the cribs without shoveling. (Note between rails, Fig. 1.)

The screen under discussion consists of woven $\frac{1}{4}$ -in. rods, making a mesh $\frac{3}{4}$ by 8 ins. This accomplishes a separation of stone and dirt far superior to that obtainable by forks. The rods are carried in a light channel frame, which is reversible, end for end, giving double wear. The main frame of the screen is made of light angle iron. The screen is made for use either outside of the track or in the center ditch. (Figs. 1 and 2.)

When using outside of the track, it sits at right angles thereto, and is supported at the lower end by horizontal



Screening Ballast on the B. & O. R. R.—Fig. 3.

legs, which ride upon the ties, and at the upper end by adjustable legs, which regulate the inclination of the screen. When in this position it clears the longest Pullman cars on curves of 10 deg. and under. For curves sharper than this, the screen must be drawn back from the track a little. Dirty stone is thrown onto the screen from in front and the side, and clean stone is delivered back on the berm, being piled high in a windrow, clear of the ballast line, so that in dressing, a board is laid down on line, one line of stone is placed by hand, and the dressing is completed by drawing down the stone with a fork against the board. (Note dressing, Figs. 1 and 4.)

An apron has been attached, which is pushed forward when sufficient stone has been placed on the berm, and the remainder is allowed to run between the rails. (Note Fig. 1, the apron of one side screen is down for use and the other withdrawn). A pan can still be used, if it is desired to take the stone some distance. The screen is entirely backed with galvanized iron, to collect the dirt, an opening being left at the proper place, which is closed by a door. When this door is opened, it acts as a chute delivering the dirt into a wheelbarrow. When closed the screen holds about a wheelbarrow-load of dirt, giving opportunity for exchanging the full for an empty wheelbarrow. When the screen is moved, one man raises each of the rear legs and one man pulls the front end along on the ties.

When the screen is used in the center ditch the front horizontal legs are replaced by short vertical legs; the long rear adjustable legs are replaced by shorter adjustable legs, the door is removed as dirt is discharged directly into a pan placed under the screen, from which it is shoveled by a man with a long-



Screening Ballast on the B. & O. R. R.—Fig. 1.

handle scoop shovel into a wheelbarrow placed across the outside rail. (Of three methods of relieving the center screen pan, viz., scooping out, exchanging pans and catching dirt in a sack, the first was found to make this man available for dressing up behind the screen by about one-third more time than the last two, as it requires only about six or eight scoopfuls to clean out the pan.) The apron is removed, as it is not used in the center ditch, and the hood which formed the top of screen in its side position is thrown forward. In this position the screen progresses backward, dirty ballast is thrown over the top and deflected down by the hood, clean ballast being left behind in the center ditch, and the dirt being dropped into the pan underneath. In moving this screen the two men behind it place the rear legs well forward in the direction of progress and pull the screen forward, repeating this walking movement until the required distance has been covered. The pan beneath moves with the screen. The screen is let down flat on the passage of trains.

The improvements since the last report consist of an apron

progress of the gang and using, without exception, one tool only.

The ballast in all cases is cleaned 12 ins. below the bottom of the ties on the berm and 6 in. below bottom of tie in the center ditch, and to bottom of tie in crib. This line is indicated in Fig. 4, by heavy line "B." One crib on the most available side is cleaned to line "A" every 50 ft., so as to afford drainage to the center ditch. The center ditch screen leaves the center ditch full as indicated. A side screen leaves it piled up to line "C," free of the ballast line, so that it can be forked down against the board with minimum labor.

All figures below were made on territory where actual train detention was 15 per cent, men clearing both tracks when a train passed on either track, in accordance with safety rules.

Arrangement of Screens and Gang Organization for Various Classes of Work.

(a) See Fig. 2 for photograph and Fig. 5 for diagram. To clean standard depth and dress up ballast complete where track is not to be raised, six men operate screen "A," cleaning



Screening Ballast on the B. & O. R. R.—Fig. 2.

for depositing clean stone on the berm or in the crib at will; change in horizontal legs and in the pitch of lower end of the screen, so that the ballast on the berm is left clear of the ballast line, from which position it can be drawn down against the board with a minimum of labor.

For center ditch use the lower legs have been modified so that in yard use, where there is no place to dispose of or leave dirt standing open, it is dropped directly from the screen into a sack and left in the center ditch to the rear to await removal by a work train. The change of the legs also increases the speed of this screen by clearing cleaned ballast behind without the assistance of a shovel.

The use of scoops was adopted instead of track shovels in the center ditch and on the berm, as this was found to increase the speed by a large percentage. Track shovels must still be used in the crib, on account of the limited space.

After a screen has been evolved which will clean the ballast satisfactorily, the entire problem remaining is to give it such form and to so organize the gang that from the time the dirty ballast is disturbed until the time the clean ballast reaches its resting place in the track, both stone and dirt progress in an orderly manner, without interference or back movement and the disposition of the stone is so arranged that the additional stone required occasioned by loss of volume in cleaning can be dumped directly into place from the car without handling, and each member of the gang has prescribed duties which do not interfere or depend on any other member of the gang. The pickers, shovelers and dressers have designated and uniform strips of ballast to work over, always moving in the direction of the

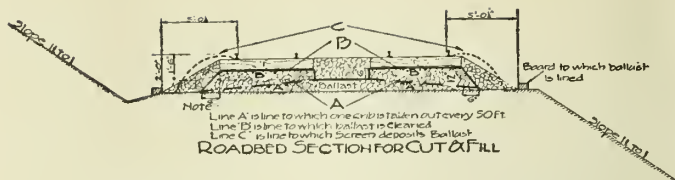
the center ditch and cribs 12 in. inside of inside rail, of each track, so as to get ballast enough to fill the center ditch complete; three men each operate screens "B" and "C," cleaning the berm and the remainder of the cribs not cleaned on the center screen; men numbers 11 and 12 are the architects of the berms. They take from their wheelbarrows of dirt enough for dressing purposes and waste the rest; they level up the berm for reception of stone line, haul forward the dressing board, pin it down; lay one line of stone by hand, and dress down the ballast from the position in which screen has left it, to standard section. These men quickly learn how much stone is required on the berm and pull down the apron, allowing the rest to go between the rails. A slight shower of new stone from a Rodger ballast car, between the rails, completes the dressing.

The progress is 200 ft. per 10-hour day, track 12-ft. centers; cost per mile of double track, foreman \$77 per month and twelve laborers at \$1.75 each day, total \$622.

(b) (See Fig. 5.) To clean standard depth without dressing where track is to be raised, same as "A," except that man 12 is eliminated, no dressing being done; man 11 empties the wheelbarrow for both side screens and assists in moving both screens and smooths down the ballast on both berms with a fork. In this case, sufficient stone would be run between the rails from the side screen to raise the track on, leaving the berm shy, which will facilitate the renewal and respacing of ties.

The progress is 200 ft. per 10-hour day, track on 12-ft. centers. Cost per mile of double track, complete: Foreman, \$77 per month; 11 laborers at \$1.75 per day each, total \$576.

(c) (See Fig. 6.) To clean to standard depth on berms and



Screening Ballast on the B. & O. R. R.—Fig. 4.

center ditch only, no cleaning being done in the cribs, no dressing except a little smoothing up, as more ballast will be required, whether track is raised or not. This is shoveled between the rails from a Rodger ballast car and shoveled in the center ditch and on the berms in dressing up; six men operate screen "A" and three men each screens "B" and "C." This method is approved by some important roads; the cribs being cleaned in connection with tie renewals.

The progress is 475 ft. per day, track on 12-ft. centers. Cost per mile of double track, complete: Foreman, \$77 per month; 12 laborers at \$1.75 per day each, total \$262.

Cleaning Ballast in Yards.

In yard work it is obvious that the disposal of dirt is more difficult than out on the line, where it can be thrown over the bank or used in dressing. Even in territories on the line where we have grassed slopes and would not throw the dirt down the bank on that account the dirt can be left in a windrow along the shoulder and loaded up on to work trains, but this cannot be done in large yards, as the clean ballast occupies all the available space. This may also be true on main-track territory, which is grassed, and there is no room to leave dirt temporarily. An attachment has been provided for this class of work in the shape of a spout, which is attached by bolts beneath the screen, and delivers the dirt into a common sack.

There has been provided an arrangement which shuts off this spout during the exchange of sacks. A sheet-iron slide rests in the bottom of the center ditch with front end upturned, sled fashion. This moves with the screen, being brought along by the front legs. A sack to receive dirt is set on this slide, hooked up around the spout by two sharp hooks, and the filling proceeds. When full, one man ties up the sack, pulls another sack under the spout, dumps the filled sack over on the side, under the low end of screen and it passes out behind the screen as the latter is moved, leaving sacked dirt in the center ditch to be picked up by the work train. Man doing sacking also dresses up behind screen. These sacks can be bought by the thousand at a small cost. Two classes of work are shown for yard:

(a) (See Fig. 3 and diagram 7.) Cleaning 6 in. below tie in the center ditch and to the bottom of the tie in the crib, half way on each adjacent track. Man No. 1 picks from center line of tracks; men Nos. 2, 3, 4 and 5 shovel onto the screen and man No. 6 sacks the dirt. The center ditch is filled complete, and space is left between the rails to be supplied by a shower of new stone from a Rodger ballast car. Excess stone not required in the center ditch is caught in a pan and carried over the rail into cribs.

The progress is 190 ft. per 10-hour day, 12-ft. centers (exclusive of switches). Cost per mile: Foreman, \$77 per month; six laborers, \$1.75 each per day, total \$363. These figures are based upon 15 per cent detention. In yards of heavier movement, they should be increased accordingly.

(b) (See Fig. 6.) Cleaning in cribs only to bottom of tie. The center ditch organization shown in Fig. 6 is applicable here, except that man No. 6 sacks instead of shovels. This gang consists of a foreman and six men, leaving dirt in the center ditch behind sacked complete.

The progress is 475 ft. per 10-hour day, 12-ft. centers (exclusive of switches). Cost per mile: Foreman, \$77 per month; six laborers at \$1.75 per day each, total \$145. These figures are based on 15 per cent detention. Organizations "A" and "B" may be doubled or tripled in yards by putting screens in adjoining center ditches, to be worked abreast under the same foreman.

Should the Ballast in the Cribs be Cleaned by Extra or Regular Section Gangs?

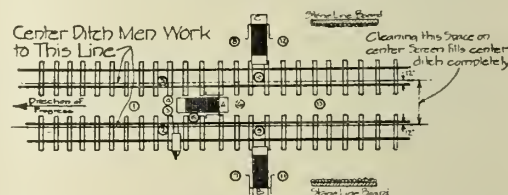
Railroads representing a large mileage are requiring that when regular tie renewals are made, the ballast in the crib each side of the new tie be cleaned. Supposing the life of the tie to be eight years, this cleans the crib on an average of once in four years. If, then, the center ditch and berms are cleaned every two or three years, we have an ideal condition. We have shown that this can be done at a cost of \$262 per mile. All cleaning could then be done by the regular section gangs. A gang consisting of a foreman and 12 men, equipped with three screens, moving at a rate of 475 ft. per day, or a mile of double track every 12 days, should, along with their regular work, clean a mile per month. On a section of four miles of double track, complete cleaning of center ditch and berms could be expected every three years, the tie-renewals taking care of the cleaning of the cribs every four years.

Screening With the Renewals by Regular Section Gangs.

For this purpose one screen is used, equipped with fixtures for side of track use. Three men operate this screen, ahead of the tie renewals, going only so far as the ties will be renewed that day. One man picks on each side of the tie to be taken out and disposes of the dirt from the screen. Two men follow, one shoveling out each crib adjacent to the tie to be removed, throwing the dirty stone on the screen. Dirt is delivered by screen into a wheelbarrow and clean stone is caught in the pan at the foot of the screen. This is pulled over the rail and dumped from the pan close along the edge of the crib to be filled, and the cleaners proceed to the next crib. The men renewing ties then proceed with the tie renewals, working in pairs, withdrawing old ties, putting in new and tamping up. A few trains are allowed to pass over the new tie before it receives its final tamping. The cleaned stone which has been left lying along the edge of the crib is forked into the crib, and the renewal is complete. By this method of combining the tie renewals and cleaning, the one shoveling out the cribs answers both purposes and a saving is made which the use of screens greatly increases.

General Instructions to Supervisors and Foremen on the Care and Use of Screens.

The screen is equipped with two pairs of separable long

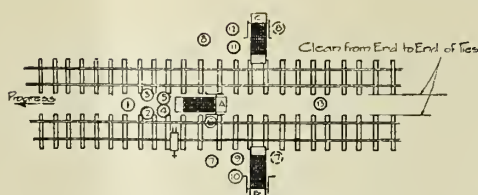


Cleaning ballast where track is not to be raised 12 in. below tie on berm, 6 in. below tie in center ditch, and to bottom of tie in crib, cleaning one crib every 50 ft. deep enough to drain center ditch. Dress up berm to hand-laid ballast line and dress center ditch to standard, leaving cribs between rails partially empty for future dumping of ballast.

Output of this gang 200 ft. of double track per 10-hour day. This supposes putting dirt into wheelbarrows, additional men being required for long haul of dirt.

Men.	Duties.	Tools.
No. 1.....	Picks for 2, 3, 4, 5	1 Pick
No. 2.....	Shovel on center screen	1 Track Shovel
No. 3.....	Shovel on center screen	1 Scoop Shovel
No. 4.....	Shovel on center screen	1 Scoop Shovel
No. 5.....	Shovel on center screen	1 Track Shovel
No. 6.....	Shovels out of pan onto wheelbarrow and dresses up behind screen	1 Long-handle Scoop Shovel
No. 7.....	Shovel on side screen	1 Ballast Fork
No. 8.....	Shovel on side screen	2 Wheelbarrows
No. 9.....	Shovel on side screen	1 Scoop Shovel
No. 10.....	Shovel on side screen	1 Scoop Shovel
No. 11.....	Dress ballast behind side screen and empty wheelbarrow	1 Track Shovel
No. 12.....	Same as No. 11	1 Pick
No. 13.....	Foreman	1 Track Shovel
Total—13 men		1 Pick
Total of Tools—		1 Track Shovel
5 Picks		1 Ballast Fork
6 Track Shovels		1 Pick
1 Long-handle Scoop Shovel		1 Track Shovel
3 (or more) Wheelbarrows, depending on haul		1 Ballast Fork
2 Boards 16 ft. by 1½ in.		1 Pick

Screening Ballast on the B. & O. R. R.—Fig. 5.



GANG ORGANIZATION.

Cleaning ballast 12 in. below tie on berm, 6 in. below tie in center ditch—cribs not being cleaned except one every 50 ft. deep enough to provide drainage for center ditch. A shower of ballast between rails will be necessary to complete dressing of berm and center ditches.

Output of this gang 475 ft. per 10-hour day of double track. This supposes putting dirt in wheelbarrows. Additional men being required for long haul of dirt.

Men.	Duties.	Tools.
No. 1.....	Picks center ditch end to end of ties	1 Pick
No. 2.....	Shovel on center screen	1 Scoop Shovel
No. 3.....	Shovel on center screen	1 Scoop Shovel
No. 4.....	Shovel on center screen	1 Scoop Shovel
No. 5.....	Shovel on center screen	1 Scoop Shovel
No. 6.....	Shovel out pan into wheelbarrow	1 Long-handle Scoop Shovel
No. 7.....	Empties wheelbarrow, picks ahead of side screen, levels up berm	1 Wheelbarrow
No. 8.....	Same as No. 7	1 Pick
No. 9.....	Shovels on side screen	1 Track Shovel
No. 10.....	Shovels and picks side screen	1 Wheelbarrow
No. 11.....	Same as No. 10	1 Pick
No. 12.....	Shovels on side screen	1 Scoop Shovel
No. 13.....	Foreman	1 Pick
Total—13 men		1 Scoop Shovel
Total of Tools—		1 Pick
5 Picks		1 Scoop Shovel
9 Scoop Shovels		1 Long-handle Scoop Shovel
1 Long-handle Scoop Shovel		2 Track Shovels
2 Track Shovels		2 Wheelbarrows
2 Wheelbarrows		

Screening Ballast on the B. & O. R. R.—Fig. 6.

legs for the bottom and top ends for use on the outside of track, and two pairs of separable short legs for the bottom and top ends of the screen for use in center ditch; a removable door, which is not used in the center ditch; hinge pin, and galvanized iron pan and wrench attached to the frame; iron hook for removing stone from the screen. The supervisor should make his foremen personally responsible for the care of the screen parts. He should see that the parts are stored when not in use. Small parts should be put in the tool box over night so they will not be picked up or mislaid, and the screen is painted throughout with black paint if it is to lie idle for a few weeks. Much valuable time may be saved by maintaining screens in perfect order. The bolts should be kept tight and screens should be reversed from time to time in the frame, so as to keep it from wearing all one way and becoming sagged. If stones become caught in screens, do not attempt to knock them through with a shovel, but remove them with a hook, so as not to injure the screen.

To set up for double-track use, equip two screens with long legs, top and bottom, and apron, to put stone between the rails, for outside of track and throw the hoods back. Equip one screen with short legs, top and bottom, and remove the door for the center ditch, throwing the hood forward. The screens on the outside of the track will clear the trains. The screen in the center ditch must be lowered on the passage of trains, throwing the hood back. It is not necessary to remove the pan from under the screen to lower it. The chain which holds up the door on the side screen is fastened in the hole in front of the dirt pan, holding up the front edge, so it will slide with the screen.

Decide on the depth to which the ballast is to be cleaned. Recommend that this be 18 inches below the base of rail on the outside of the berm, and 12 in. in the center ditch, after the track is raised, to afford drainage of the center ditch, a crib being cleaned out to grade to these levels at intervals to run off water from the center ditch.

As the screens work on these surfaces, a space of about 8 ft. should be shoveled down to these levels before the screen is set up, and the work of cleaning should be done uniformly to these depths, so that there will be no water holes in center ditch and a level berm will be presented on the outside to dress up ballast

line on. If the desired depth is within two or three inches of the bottom of the old stone on the outside berm, it will be found to advantage to go below the stone, as this saves picking and shoveling is easier, allowing enough dirt to fall back to build up the berm to the desired height. Scoop shovels should be used, as they carry a heavier load and increase the amount of ballast cleaned about 10 per cent.

It is found that two men can move the screen on the side of the track, but as there are three men working around each of these screens, it is found easier to get all to assist in moving the same. One man holds each of the long legs in the rear of the screen and one man pulls the screen. Two men can pull the screen in the center ditch. Placing legs forward and walking, it is unnecessary to remove the pan underneath the screen, as it will slide with the screen.

Attached are diagrams showing working positions of screens and men. The position of these screens and men will vary somewhat, depending upon conditions and the work being done. The screen works in the direction of the arrow. Men Nos. 2, 3, 4 and 5 shovel over the top of the screen in the center ditch, working backward, in the direction of the arrow, preferably two right-hand and two left-hand men. No. 1, using a pick, works ahead of these men loosening up stone. No. 6 shovels dirt out of the center ditch onto a wheelbarrow, which straddles one of the rails, as shown in the sketch. This man should be equipped with a long-handle shovel of the scoop type. This man also keeps the stone leveled down behind the center ditch screen. Men 11 and 12 empty the dirt from the side screens, deposit it in wheelbarrows, and level up on the berm where necessary. If all the dirt is required on the spot, then it is allowed to drop directly upon the ground and is spread out without the use of wheelbarrows. These men watch the stone falling from the side screen, and when enough



GANG ORGANIZATION.

Cleaning in yards from center of track to center of track on screen in center ditch—one or more screens with the same organization for each can be added for adjacent center ditches, and worked by same Foreman. Clean 6 in. below ties in center ditch and to bottom of tie in crib dress up center ditch complete, leaving deficiency of stone between rails for future dumping of ballast. Leave dirt sacked behind in center ditch.

Output of this gang 190 ft. complete in 10-hour day. This supposes sacking all dirt and leaving in center ditch behind.

Men.	Duties.	Tools.
No. 1.....	Picking from center line to center line	1 Pick
No. 2.....	Throwing on screen	1 Track Shovel
No. 3.....	Throwing on screen	1 Scoop Shovel
No. 4.....	Throwing on screen	1 Scoop Shovel
No. 5.....	Throwing on screen	1 Track Shovel
No. 6.....	Sacking dirt, dressing ballast	Sacks, String and Ballast Fork
No. 7.....	Foreman	
Total—6 men		
Total of Tools—		1 Pick
2 Track Shovels		2 Scoop Shovels
1 Ballast Fork		Sacks and String

Screening Ballast on the B. & O. R. R.—Fig. 7.

has fallen to dress up the berm, pull down the apron and allow the rest to run between the rails. The screen leaves the stone on the berm free of the ballast line. Boards are brought along by these men, pinned down and ballast pulled down against the board, completing dressing, except between the rails, where the ballast will later be showered from a Rodger ballast car. The efficiency in the use of these screens is largely dependent upon the foreman in charge. It requires a live man, who will properly place the screens, watch the disposition of the ballast and line up men, to get results.

Conclusion.

The railroad of the future will clean its ballast oftener and reap the many benefits of so doing. The output per man in cleaning ballast has been increased something over 100 per cent, which will change the entire situation, and encourage this class of work.

RAILWAY REVIEW

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WILLARD A. SMITH	- - - - -	President and Manager
HAROLD A. SMITH	- - - - -	Assistant Manager
W. M. CAMP	- - - - -	Editor
CLYDE F. BURNS	- - - - -	} Assistant Editors
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H. H. WALL	- - - - -	

Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, APRIL 18, 1914.

The outrageous criminal prosecution of Chas. S. Mellen, former president of the New York, New Haven & Hartford, on charge of manslaughter in connection with the Westport disaster on that road, has been dismissed. He was discharged "for lack of evidence," over a year and half after the prosecution was instituted. It was merely an attempt to establish the responsibility of high officers of railways for whatever might happen through the negligence of any one of thousands of employees. The special counsel employed by the state could not find that Mr. Mellen had neglected any proper precaution against accidents.

In our editorial of last week relating to scales an error occurred with reference to the counterpoise weights recently adopted by the Southern Ry. The standard shapes there referred to are for use with platform scales in freight houses, and not with track scales.

One of the most fascinating, and in fact, one of the most important subjects brought up before the convention of the Railway Storekeepers' Association each year, is that pertaining to the handling and classifica-

tion of scrap and the reclamation of usable materials and parts that have so marked a tendency to find the way out of service. Were the storekeepers to concentrate their activities on this feature alone, it is believed that they could amply justify the existence of their organization. No inconsiderable discount on the cost of materials to any sizeable road can be and is affected every year through the sale of scrap. Respecting this latter phase of the matter, the Iron Trade Review observes a discrepancy in the practices of different roads in that some sell on the short and others on the long ton basis. The Chicago district particularly, is charged with fostering this practice. Our contemporary avers that "confusion, crookedness, and, in some cases, according to well informed scrap dealers, positively dishonest practices result from the present double method of handling old material." If this be true, the railroads are undoubtedly the losers, and the storekeepers in their convention next month, might well take steps seeking to place this prolific branch of their interests on a sound and uniform basis.

Powers of Public Utilities Commissions.

The act constituting the Public Utilities Commission of California which came into authority not long since, is more stringent and comprehensive than most other statutes of that class. It goes to the length of declaring, for example, that powers previously given to municipalities within the state should cease when they came in conflict with the supposedly superior powers of the Public Utilities Commission. To this clause there was an amendment, however, which provided that the commission should not assume control of the utilities within a city until the city has surrendered its right in this respect by vote. These particular terms of the act have recently been subjected to the test of a court decision, in a case involving the rights of the Oro Electric Co. This company had been granted a franchise to operate within the city of Stockton, but the commission refused to allow such operation and rejected the company's application for a certificate of convenience and necessity on the grounds that better service could be given the public without competition. In its decision the state Supreme court said: "The people, voting for the law under which the railroad commission was created, believed that the cities would retain their powers of regulating the operations of public utilities until they chose to surrender them. The amendment allows the cities to decide if they shall keep or relinquish such powers, and the courts cannot take away this right. In denying a corporation holding a franchise from the city the right to exercise such franchise, the state railroad commission acted in excess of its authority and jurisdiction in Stockton."

Another contest on the "home rule" phase of public

utility regulation probably will be witnessed in Chicago soon. The Public Utilities Commission of Illinois took office January 1, last, and exercise of its authority is distasteful to the present city administration of Chicago, because the latter officials wish to retain jurisdiction over their own public utilities. For that reason the constitutionality of the act which created the commission is to be contested, although the grounds upon which the contest will be based have not been made public.

Another obstruction to the exercise of its authority was encountered this week by the Illinois commission, in the defiance of its orders by operating officials of the Chicago & Oak Park Elevated R. R. This company had been ordered by the commission to elevate its tracks which run on the surface for a considerable distance near the western limits of the city. About one million dollars would be required for the improvement. The road is now in the hands of a receiver appointed by the federal court; and the contention of its officials is that the state commission has no jurisdiction over a property in the custody of the federal court.

Influencing Public Opinion.

Senator Cummings of Iowa in a diatribe in the United States Senate has undertaken to bull-doze the Interstate Commerce Commission and to mislead the public. He expressed great indignation that the railways have endeavored to influence public sentiment by giving to the press summaries of the evidence they have been presenting to the Commission in connection with their application for advanced rates. The senator has not won any particular applause for this from any quarter. It was too evident that he was making a bid for future political preferment. The public does not object to being taken into the confidence of the railway companies. It wants to be informed and to be given facts and argument upon which to base intelligent opinion. Cummings's assumption that this is a matter which is incorrect and that the public ought to keep its hands off, is ridiculous. The Commission is an administrative body exercising power delegated by Congress. Public sentiment should influence it, just as it is supposed to influence Congress. The senator does not put himself in good position when he demands that the public be kept in ignorance and take only such pabulum as he and his demagogic colleagues choose to offer it.

Indirectly and unintentionally he pays the railways a compliment. He says that 95 per cent of the present rate structure was made by them without any government interference. They based these rates on existing prices and operating costs, and did not attempt to fix them high enough to cover possible advances in operating expense. They are now made the victims of their own moderation; instead of being

treated with the same fairness which they showed the public when they had power.

While admitting that present railway conditions are "distressing," because he believes them to be temporary, he is opposed to any relief. Yet when the railways themselves place before the public the hardship of their present position, he declares that they "are trying to mislead and pervert the judgment of the people * * * with exaggerated stories of suffering and distress." It does not seem to politicians of this clan, to be necessary to be consistent, even in the same address.

His figures of net earnings, in which he mixes up the prosperous and the bankrupt roads together, seem to be characteristic of the Iowa type of politicians. The voice is the voice of Jacob, but the figures are from the hands of Esau Thorne, the champion figure juggler of eight states.

And, behold, on the same day which the Iowa senator had chosen for his phillipic, comes J. Hamilton Lewis, senator from Illinois, and introduces to the same august body a "trinity of bills" for a commission form of government for all business. He would have the government buy all the railways and lease them to private operation "retaining the power of regulation of rates and of earnings of operatives." He would have the government operate a merchant marine on the same plan. His great commission bill would establish a commission of 21 members to control in three branches, transportation, banking and manufactures.

Thus are all the perplexing business and governmental problems settled to our hand; and the usual silly season is yet some weeks off.

Cleaning Stone Ballast by Screening.

The proposition of handing over and screening the ballast filling of track, periodically, to remove accumulations of dirt, may seem like an expensive matter; moreover, track can be maintained in some shape without so doing, and hence it might appear to many who will regard only the expense of such work that it would be an undesirable plan to follow in track maintenance. Nevertheless, dirty ballast is no small impediment to economical and efficient maintenance of track for best service, and that such a condition of the ballast must occur sooner or later is a fact which the trackman or the engineer cannot get away from.

Some of the chief advantages of broken stone over other kinds of ballast material are that, in clean condition, it affords ready drainage, does not support vegetation, and fast trains may run over it without raising a dust. When it becomes filled up with coal ashes, dust or dirt, all of these advantages disappear, and the material is then, perhaps, no better than, if, in some respects, it is even as good as gravel. This

fact has long been recognized, and various methods have been practiced for improvement of the conditions of things when the ballast has become so filled up with dirt that it no longer fulfills the purpose of stone ballast, as such.

A very common plan has been to pick up the ballast and go through it with forks, in this way separating the clean stone from the dirt. Such is an expensive operation, and, unless a good deal of care be exercised, as by casting the ballast from place and removing the dirt, the material is not thoroughly cleaned. Simply forking the ballast over in place, permitting the dirt to drop to the bottom and bringing the cleaned stones to the top, comes far short of accomplishing what it is desirable to bring about in cleaning stone ballast. Such work, in the end, amounts to but little more than a makeshift, for the clean ballast on the surface then becomes underlaid with a stratum of dirt to choke up the drainage of water from the track.

Another plan very extensively practiced, in order to get away from dirty ballast, has been to boost the track a few inches, "out of face," resurface it to the new level, fill it with new ballast and dress it off. Many a maintenance man who has followed this method supposed that he had greatly improved his track, whereas (supposing there was a proper depth of ballast in the first place) he only covered up the objectionable ballast material and made an unnecessary demand for a large amount of new material and labor of placing it, all at large expense, and that to no permanent advantage. In fact, there has in the past been a very large class of foremen so accustomed to raising track "out of face" in order to smooth up the surface or to get away from dirty ballast that they have continued to follow this plan as a matter of course, and without instructions, or even without the knowledge of the roadmaster or supervisor that such was to be done. No great amount of argument is necessary to prove that such a method of surfacing track or cleaning the ballast is an expensive one.

It is thus apparent that the maintenance of track with clean stone ballast involves considerable expense, no matter what method of work is pursued. The method of digging up the ballast and passing it over screens, in order to remove the dirt, has not been extensively practiced, but a good description of such work, in detail, as done on a part of the Baltimore & Ohio R. R. system, is found in a paper presented at the recent convention of the American Railway Engineering Association, by Mr. W. I. Trench, division engineer of the road named. Extracts from this paper are published elsewhere in this issue. The equipment required for the work is not extensive, the devices are not costly and do not greatly add to the ordinary tool outfit of a section gang. The work can be done either by the regular section crews or by an extra gang, and the figures presented seem to show that with such an outfit the ballast can be cleaned much cheaper than by forking; in any event, cleaning

can be done much more thoroughly with the screens than by simply turning it over with ballast forks. Whatever may be thought of the method, this one fact is assured, that by passing the ballast over screens it can be cleaned thoroughly.

Whether the cleaning be done with forks or by screens, there arises the question of doing the work "out of face" or by piecemeal, while renewing ties. In renewing ties it is, of course, necessary to handle over the filling material which lies adjacent to such ties as have to be removed, and while thus in process of handling some labor is perhaps saved by doing the cleaning at the same time. While by this plan all of the ballast is not kept in uniform condition regarding cleanliness, it does, perhaps, get worked over frequently enough to be kept in passable condition. This phase of the subject is treated in Mr. Trench's paper. Organization for conducting the work is discussed minutely, and an accurate account seems to have been kept of the expense of the work in accordance with various specifications as to the extent of the material that is handled over, inside or outside the track or between tracks. A set of general instructions has been evolved from studies of the work under various conditions. It would seem that those who have the problem of dirty ballast to contend with might find it worth while to investigate the work of screening which is so well described in Mr. Trench's paper.

The Trend of Maintenance of Equipment Expense.

The testimony of J. T. Wallis, general superintendent of motive power of the Pennsylvania Railroad, as to the increased cost of maintenance of equipment, given in these columns last week, is based on the power and capacity of the equipment furnished by the mechanical department, rather than on the ultimate financial results of its use. This places the responsibility for the increased ton-mile cost upon the operating department. The basis used for locomotives is the "tractive power miles," rather than the ton miles. While the tractive power miles increased from 1903 to 1913, 62.5 per cent, the cost of repairs per million tractive power miles only increased 51.9 per cent. When the various elements which have tended to increase the costs, enumerated by Mr. Wallis, such as increased wages, federal boiler inspection law and standardization of equipment, are considered the record appears creditable. But for the actual cost of transportation, in which the stockholders and the public are interested, the ton-mile cost is the ultimate criterion. As a rule locomotives cannot be worked regularly up to their full tractive power. If heavier average revenue loads were secured it is evident that the cost of repairs per tractive power mile would have increased. The load has as direct effect upon the cost of repairs as the mileage. Moreover as it is the "last straw which breaks the camel's back,"

the limit of economical operation as far as repairs are concerned, is well within the theoretic power of the engine. In other words if the operating department had been able to greatly increase its train loads, beyond what it did effect, the cost of repairs per tractive power mile, would have been perceptibly increased. In 1913 the average tractive power per locomotive of the Pennsylvania Railroad was only 3.6 per cent greater than in 1912; while the cost of maintenance of locomotives per ton mile was 8.2 per cent greater. In 1912, on an average, each ton of tractive power drew 40.9 tons of revenue freight; and in 1913 each ton of tractive power drew 41.4 tons of revenue freight; but at increased cost for maintenance per ton mile of 8.2 per cent. There was not much, if any, difference in labor costs during these two years. Does this indicate that further approximation of load to tractive power, will be at increased maintenance cost per unit of load?

In like manner, Mr. Wallis makes a far better showing in cost of maintenance of freight cars, based on the "capacity ton miles" than is done on the ton mile basis; and he says that "it is quite plain that the cost of car repairs per unit of capacity available for loading is decreasing." But as the load has a direct effect on maintenance costs, the figures would evidently be increased by full loading. Unquestionably the real criterion of the success of any reform like the use of locomotives and cars of greater capacity, is to be found in ton-mile costs. The transportation costs are absolutely reduced; but this is apparently effected at increased cost of maintenance per unit of effective work done. On the Pennsylvania, the average number of tons of revenue freight per loaded car mile increased from 1902 to 1913 by 27.63 per cent; while cost of car maintenance per ton mile increased only 25.54 per cent. The cost of maintenance does not quite keep up in proportion to the loading. There is economy, from a maintenance standpoint, in loading cars to their capacity; but not in loading locomotives too close to their power. Of course, from the standpoint of ultimate financial results, the large equipment pays; but decreased transportation costs are to be discounted by increased maintenance cost of equipment and track. The amount of this offset depends upon the utilization of the tractive power and car capacity provided; and at the same time is affected by the quality of the equipment furnished. The problem is up to the operating department on the former; and there is every incentive still left for the mechanical department to provide better equipment. The placing of the responsibility where it belongs does not excuse any department from its obligation to do constantly better work.

As a general economic proposition, the country over, under existing conditions, it can hardly be claimed that the prevailing capacity of freight cars is

a real success. The average car load is about one-half the capacity of the car. We then have higher first cost, higher maintenance cost and higher expense of hauling dead weight. Owing to interchange of cars, the forty and fifty ton capacity was forced where it could not be economically utilized. Certain roads, which have comparatively little mineral traffic (in which full car loads can most readily be obtained), are victimized by a reform which only increases their operating ratio. Of course this has greatly increased the incentive for getting better car loads; but this is proved not to be wholly within the control of the railway. Of the 29 roads whose figures were given in our issue of January 3rd, all but one has made an increase in car loads in the eleven years covered; and in the case of that one, the record is wrong because in the former years company freight was included in revenue freight. Where coal or other mineral traffic is very small, there has been no increase in the car load which would not have just as easily been brought about with 30 ton cars. One great system increased its average car capacity 35 per cent in eleven years and its average car load only 18 per cent. One system has an average capacity of 36.16 tons and average load of only 14.86 tons.

The best results could, of course, be obtained by the use of cars suited to each kind of traffic, if traffic could be segregated and classified in operation. But, as it is, a large portion of the entire traffic is carried at an expense greater than that which properly belongs to it. In locomotive practice, the increased tractive power was not forced by interchange conditions and yet the process of increasing capacity has gone on just the same. One system which increased its average tractive power 46 per cent in eleven years, has only increased its revenue train load 30 per cent. On some, the record is not so good as that; and on all there is a vast excess of power over actual load.

Affairs of the New York, New Haven & Hartford R. R.

In proceeding with the investigation of the Interstate Commerce Commission into the affairs of the New York, New Haven & Hartford R. R., Joseph W. Folk, chief counsel for the commission, encountered, on April 10, the point blank refusal of witnesses to offer testimony. The incident occurred in the course of the public hearings, at Washington, D. C. Mr. Folk was endeavoring to obtain details of financial transactions between the New York, New Haven & Hartford and its subsidiary, the New England Navigation Co., and the so-called Billard Company, through which millions of dollars are alleged to have been improperly diverted from the New Haven. Witness after witness declined "by advice of counsel" to answer any question concerning the affairs of the Billard Company. It was maintained by their counsel that neither the commission nor congress had the power to require them to give the information sought. After a day of virtually fruitless questioning, Mr. Folk announced that he would institute in the Supreme court of the District of Columbia, Monday, April 20, proceedings in mandamus to compel the recalcitrant witnesses to reply to questions put

to them and to produce the books, records and contracts called for by the subpoenas of the commission. Further proceedings were postponed until April 29, by which time it was hoped that the courts might pass upon the mandamus proceeding. Subsequently, on April 15, Mr. Folk announced that proceedings under the criminal statutes would be instituted forthwith by the government to compel the testimony, unless the witnesses receded from their position. The following day indictments were voted by the federal grand jury, at Washington, against the four recalcitrant witnesses, as follows: Harry V. Whipple, president of the Merchants' National Bank of New Haven; Samuel Hemingway, president of the Second National Bank of New Haven, and Edward I. Field and Samuel Morehouse of New Haven. On the same day Henry Stoddard, counsel for Messrs. Whipple and Field, notified Mr. Folk, that his clients, under protest, would testify rather than undergo the stigma of an indictment and criminal prosecution.

Just what the Billard Company is was not disclosed at the hearing. Attorneys for the commission declared that they expected to show from the books and from certain witnesses details of the Billard Company's organization, its financial relations with the New Haven and its subsidiaries; that immense profits had been made by certain individuals officially identified with the New Haven and with the Billard Company through unique transactions in finance between the two companies, and that much of this money was recoverable to the New Haven. No witness, except Samuel Morehouse of New Haven would admit that he had any connection with the company, either as a stockholder or as an officer, although the presumed president, treasurer and some stockholders were on the witness stand. Mr. Morehouse, who said he was the attorney for the Billard Company admitted that "in looking after the company's business" he had taken from the vaults of the New Haven \$10,400,000 of securities which had been kept there by the Billard Company; in fact, that he had cleaned the vault out, but said he knew of no contracts between the New Haven and the Billard Company, and declined positively to tell anything else concerning the company.

Chairman Howard Elliott of the New York, New Haven & Hartford defined the position of the railroad's present officials in reference to the foregoing events, in the following statement: "The Billard Company matters, which are now under investigation by the commerce commission, relate to happenings several years ago, before I was connected with the New Haven company. Every facility has been given by the New Haven company to the investigators of the Interstate Commerce Commission for the examination of the books and records of the New Haven company for the purpose of obtaining information about any transactions with the Billard Company. The New Haven company does not in any way control the Billard Company, nor has it control of the books and papers of that company."

United States Attorney General McReynolds named, on April 14, two sets of trustees to take over subsidiaries of the New York, New Haven & Hartford R. R., in Rhode Island and Connecticut. The action is in conformity with the tentative agreement between the government and President Howard Elliott for the dissolution of the New Haven system, and the selection of the trustees is the result of conferences between President Elliott and the Department of Justice, covering several weeks. It is presumed to indicate a partial agreement between the federal government and the road's executive officers, although the matter has not yet been presented to the stockholders of the system. Judge Walter C. Noyes of New London, William H. Hyde of Hartford, Lyman B. Brainerd of New London, George E. Hill of Bridgeport and Charles Cheney of South Manchester, Conn., were named as trustees to take over the Connecticut electric street and interurban lines owned by the New Haven. Rathbone Gardner, Theodore F. Green, John O. Ames, John P. Farns-

worth and Charles O. Mumford, all of Providence, R. I., were chosen to take over the Rhode Island trolley lines.

Track Superstructure with Cast-Iron Chairs.

By R. TRIMBLE, CHIEF ENGINEER MAINTENANCE OF WAY,
PENNSYLVANIA LINES WEST.

Paper presented before the American Railway Engineering Association and published in Bulletin 165, March, 1914. Experiments on the Pennsylvania Lines. Experience similar to that on the Central Dutch Ry.

In view of the increasing cost of tie renewals due to the advance in price of timber and the decreasing life of ties, studies were made in the office of the chief engineer maintenance of way, Northwest System of the Pennsylvania Lines West of Pittsburg, prior to and during 1907. The studies involved an investigation of the methods used on the principal European railroads, and as a result a number of types of rail fastenings were evolved, embracing the same general principle, viz: a chair fastened to the tie with screw spikes, and with rail secured to the chair by bolts and clips, but not fastened directly to the tie.

Following this, in June, 1908, a joint committee of the Pennsylvania Lines East and West was appointed to test out these fastenings, and such other designs as might be adopted by the committee. Two stretches of track were built in 1909 and 1910, one at Birmingham, Pa., on the Pennsylvania R. R., and one on the P. F. W. & C. Ry. at Wooster, Ohio. Four different designs of tie plates were used, one of which is very similar to a rail chair tested by the Central Dutch Ry.

The following translations of an article in the *Organ für die Fortschritte des Eisenbahnwesens*, (Dec. 1, 1912) by E. C. Van Dyke, chief engineer of the Central Dutch Ry., entitled "Superstructure With Cast-Iron Chairs," is interesting in connection with the experiments being made on the Pennsylvania Lines. It may be of interest also, that after 3½ years' service under the heaviest traffic on the Pennsylvania Lines, this rail chair was one of the two which showed superiority over the present standard track.

The principal objection to this chair that has been raised is due to the expense. It has also been found that on account of the height of the chair and the fact that the resultant of the forces acting on the rail does not act vertically, the outer edge of the chair has cut into the tie considerably. It has been found desirable on our lines to make all tie plates and rail chairs with a greater distance from the center of the rail to the outer edge than to the inside edge of the plate or chair.

The following are extracts from the said article by E. C. W. Van Dyke:

"In 1912 the Central Dutch Ry. introduced a track superstructure, between Utrecht and Amersfoort, in which the rails were fastened to the wooden cross-ties by means of cast-iron chairs. The chair weighed about 28.1 lbs. (13 kg.) and has a base measuring 14⅞ by 6⅞ in. (360 by 175 mm.).

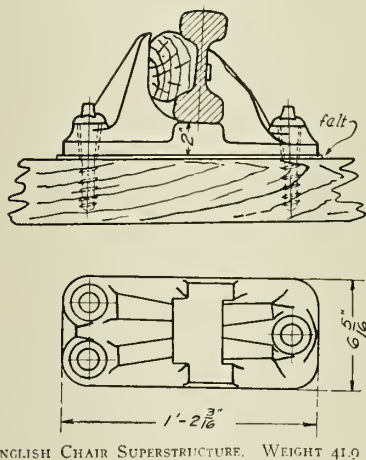
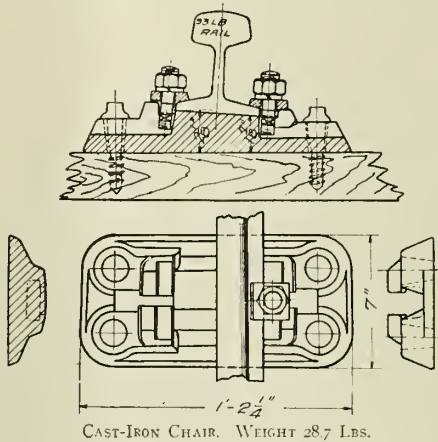
"The chair is fastened to the tie with four screw spikes, ⅞ in. in diameter by 8¼ in. long (23 by 210 mm.). The holes for the screw spikes in the chair are lined with wooden filler rings, driven in with wooden mallets just before the screw spikes are placed, this being done to prevent any play in the holes.

"The support for the rail in the chair is 3⅞ by 4⅞ in. (80 by 120 mm.), of which surface but 1⅞ in. is level, while the rest (1 in. on each side) is beveled, for the purpose of eliminating the tilting of the ties. The rails are fastened to the chair by means of clips and bolts with nutlocks. These bolts are put in from the side, instead of from the bottom, as is usually done. The rails weigh about 93 lbs. per yard, and are 59 ft. long, and are of the following dimensions:

Base of rail.....	4¾ in.
Height	5⅝ in.

Width of top of head.....2½ in.
Width of bottom of head..... 3 in.
Fishing angle1 in 4
Fishing contact¾ in.

"The angle bars are 31½ in. long, with four holes, and use 1-in. bolts. Twenty-four wooden ties per 59-ft. rail are used. These cross-ties are 6½ by 10¼ in. by 8 ft. 9 in. long, and are



impregnated with 22 lbs. of tar oil (System, Rueping). The joint ties are spaced 17¾ in. center to center. All ties are adzed to give level bearing surface for the chairs.

"The advantages of the chairs are as follows:

"(1) Better distribution of the rail pressure on the ties, as compared with rails resting on thin rolled tie plates.

"(2) The chairs can be fastened to the ties before placing the ties in the track.

"(3) Damaged bolts can be easily renewed without disturbing the chairs.

"(4) The height of the chairs permits the covering of the ties with ballast.

"(5) Experiments and tests have shown that the chairs do not break under a load of 40 tons (under this load, however, the chair cuts into the tie from ⅜ to 1½-in.).

"This chair superstructure is cheaper than the English rail chair construction with bullhead rails and is slightly more costly than the standard superstructure with ordinary tie-plates, as shown below.

"Cost of superstructure (inclusive rails and ties) per yard.

"Standard with the ordinary tie plates, \$4.83.

"English chairs with bullhead rails, \$5.49.

"New chair type, \$5.16.

"The Central Dutch Ry. maintains a shop where the chairs are fastened to the ties. In connection with this work it is of interest to note that the holes for the screw spikes are not bored

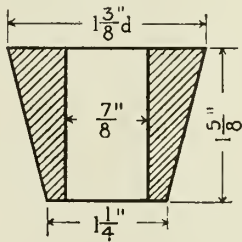
clear through the tie, but only to within about ¼-in. of the under side.

"The writer is of the opinion that the present standard superstructure, with ordinary tie plates, is inefficient for the present-day requirements. The destruction of ties increases very rapidly and has to be checked with new appliances. It is important that the fastening of the chair to the tie be distinctly separate from the fastening of the rail to the chair. The chair should also be of such dimensions that the material will not be subjected to pressure beyond the elastic limit.

"Upon recommendation of the writer, the Central Dutch Ry. built, in 1909, for experimental purposes, a track of the English type, i. e., bullhead rails fastened with wooden wedges in cast-iron chairs, these latter being held to the wooden ties by means of screw spikes. The results of this experiment were satisfactory. In three years' time no measurable cutting of the ties by the chairs could be found. No tightening of the screw spikes was found necessary.

"It has been established that planing of the ties at the chair seat sufficed, even on softwood ties and that shims of fiber or wood were unnecessary. The protection of the wood is so good that we find the life of ties in the main tracks on English railroads to be about 21 years, and that these ties fail by decay and not wear, while on Dutch railroads of standard construction (ordinary tie plates) the life of ties is only about 14 years.

"The rail joints are in fair condition, although the tie spacing is quite wide. The bolts are tight. The joints are, however, a



little weak. Measurements taken every three months showed no changes in the gage. The wooden wedges proved unsatisfactory. In dry, and warm weather the wedges became loose, thus permitting the rails to creep, and anti-creepers had to be applied, which increased the cost. Imported English wedges were not seasoned and showed considerable shrinkage after one year's seasoning. Perfectly seasoned wedges gave better results, but their sensitiveness to moisture is a serious matter.

"The experience with the English chairs induced the writer to design a chair suitable for Vignol rails. The rail base is approximately the same as the English. The fastening of the rail was accomplished by clips and bolts, to be put into place from the top and then turned 90 degrees. This track was laid in 1910.

"Although the chairs (22 lbs.) were put upon unplanned ties with 'knotty' structure, laid in a very bad ballast, with a tie spacing of 39 in., the superstructure gave good service. Not one chair was broken and the clip bolts were all tight after 20 months' service, although no nutlocks were used. The placing of the clip bolt for above may become difficult, if the holes become clogged, and replacing a broken bolt is not always easy. We found that the rails on these chairs do not creep.

"On this particular track we used 10-year-old rails, with badly-worn joints. The chairs at the joints were, therefore, under very severe conditions."

Southern Pacific's Student Courses.

The student courses of the Southern Pacific Co. have been described and commented upon from time to time in these columns. Facts concerning the origin and inception of the system were emphasized, however, by Norman Collyer, chief clerk to the president of the company, in a

paper read before the safety first conference, University of Nevada, recently. Mr. Collyer, explaining that the idea was conceived and put into effect by Julius Kruttschnitt, while vice-president and manager of the company; that it was first crystallized into syllabus form under the administration of Vice-President E. E. Calvin and that later it was extended, by direction of President Sproul, to embrace the traffic and accounting as well as operating departments, said, in part:

"To my knowledge, the Southern Pacific Co. was the first railroad in the United States to adopt an orderly, systematic scheme for the development of executive talent through the medium of apprenticeship. There is nothing spectacular about the course. We do not claim to make superintendents and general managers over night. We are just trying to make all 'round railroad men in a new way.

"The aim of our student course is to give to young men in the employ of the company an opportunity to pass through different departments for the purpose of gaining such co-ordinated knowledge of the entire railroad as will fit them better to assume positions of responsibility. It is, in fact, a laboratory course wherein the student performs the actual work of the department to which he may be assigned, supplemented by a parallel course of reading in text books and periodicals.

"Briefly, the procedure is as follows: Upon appointment the student is first placed at a station of medium size for a period of six months. This is because the station agent handles both the beginning and the end of transportation. The student is expected to perform such duties as are

assigned to him by the agent, and the agent is expected to afford him such diversified experience as will give him an all-around knowledge of station work, including ticket office, warehouse, baggage room, yard and the solicitation of business. Being an extra man, the student is not bound down to routine, but is permitted to distribute his time in such a way as to treat each feature with equal thoroughness.

"Next the student is assigned consecutively to maintenance of way, the office of the superintendent of transportation, motive power, train service, accounting department and tariff, bureau, spending three months in each. This completes his second year as a student and he should now have a working knowledge of the several departments of the railroad and their mutual interdependence. At the student's option (subject to the approval of the management) he next elects to specialize in either operation and maintenance, passenger and freight traffic, or accounting. Completing his work in either of these, he is given, after his graduation, such special experience as is needed to fit him for a regular position; thereafter everything depends on himself.

"To the thoughtful young man contemplating railroading as a life work, the student course offers an opportunity not to be overlooked. The opportunities in the railroad business are limitless; and while advancement can not come to all, it means a good deal to a young man to be in line. It is our belief that the graduate of ten years will be better, broader and more competent for having been a student, if he has the right stuff in him; and if he has not the right stuff, he will not last that long."

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Brandeis' Methods.

The Boston News Bureau says: "Lawyers and representatives of business recently in Washington before the Interstate Commerce Commission were astonished to find typewritten statements, purporting to give abstracts of evidence submitted, circulated for the press and public during the progress of the hearing by representatives of the commission. Investigation showed these reports were abstracts from reports of the commission's examiners, issued by L. D. Brandeis. The legal representatives of the business interests arose and protested against the circulation of such apparently authorized reports during what was understood to be a judicial hearing. * * *

"Mr. Brandeis has no responsibility. But the Interstate Commerce Commission appears now as responsible for him. How, then, can business interests expect a fair deal under such tactics? Think of the Supreme court hiring a Brandeis to 'abstract' the evidence and inform the public during the taking of the evidence."

Samuel Untermyer Defends Railways and Scores Farmers' Combination.

At a banquet of the Second National Conference on the Marketing and Farm Credits, at Chicago, Wednesday evening, Samuel Untermyer the corporation attorney, of New York, who has had considerable prominence as a trust fighter, spoke a good word for the railways. He said:

"Prompt relief must be given to the railroads. They are facing a far graver crisis than we realize. There is no exaggeration in the statements of their officers to the Interstate Commerce Commission, nor is there any foundation for the suspicion that the wholesale discharge of men is part of a spectacular play for public sympathy.

"Concede, if you please, that some of the railroads have been brought to their present plight by mismanagement, dishonesty, or exploitation. By all means punish the guilty—if you can reach them—but do not paralyze the industries of the country by denying the roads the opportunity to live. This is no time for reprisals."

Of the proposed farmers' co-operative sales and purchasing associations, he said:

"The injustice and inconsistency of the farmers' attitude, consist in his insistence on denying to every other industry the right of co-operation to restrict competition whilst he insists on exemption for his own occupation and is seeking to punish as crimes when committed by others acts that are not when perpetrated by him considered inimical to the public welfare."

Why the Public Is With the Railroads.

"Senator Cummins is a poor reader of the signs of the times if he thinks that the public's lively interest in the present plight of the railroads is the result of artificial fomentation. He says that the railroads have won popular sympathy by conducting an 'extraordinary campaign' of publicity. But it is apparent to anybody who thinks the matter over without prejudice that the popular response to the plea of the railroads for fair treatment is not at all due to the activities of the professional accelerator. Accelerators can always be had, but they can accomplish little with the public unless they present a case which practically makes its own argument.

"Mr. Cummins took part in the passage of the act of 1910 amending the Hepburn act of 1906, and he no doubt, remembers the long contest of 1906, in which the two Iowa senators of that day, Messrs. Allison and Dolliver, played so con-

spicuous parts. The railroads were then fighting desperately to prevent an extension of the powers of the Interstate Commerce Commission. They were bringing all the pressure at their command to bear on members of congress and on the public. They had accelerators and press agents at work and undoubtedly spent more money on that campaign than they have ever thought of spending since. But what did they accomplish? Practically nothing. Public opinion was set on putting full control of railroad operations into the hands of the Interstate Commerce Commission. The public heard what the railroads had to say, but was unconvinced by it.

"It has now heard what the railroads have had to say about the commission's policy of repression and starvation and is convinced by it. Its own observation sustains the complaint of the railroads. It has seen them burdened more and more as the result of state and federal legislation and wage arbitrations conducted under federal auspices. It knows that the commission has ignored for years the effect on railroad income of these enforced increases in expenditure and has refused to allow the roads any compensating increase in charges.

"The public likes fair play and is satisfied that the railroads are not getting it now. That is the real explanation of the outbursts of dissatisfaction at the obstinate attitude of the Interstate Commerce Commission. Were the commission right and the roads wrong the latter would have just as little success in working up popular support as they had when the Hepburn law and the act of 1910 amending it were under consideration."—New York Tribune.

What Can We See Ahead in Railroading?

BY IVY L. LEE, EXECUTIVE ASSISTANT, PENNSYLVANIA R. R.

A discussion of the two alternatives in the future development of the railroad system of the United States. From an address at a dinner given by the Knife and Fork Club, of South Bend, Ind.

There can be but two possible plans of developing the railroads of the United States: (1) Private ownership and management, under government control. (2) Government ownership.

Our transportation machine is undeveloped. There is but little double or four-track railroad west of the Allegheny mountains or south of the Ohio river. In Germany there is one mile of railroad to every 5.5 square miles of territory; in this country, but one mile of railroad line to every 13.6 square miles of area.

Sound American public opinion is opposed to government ownership. But are we not headed in that direction, not so much by deliberate choice as by drifting into a somewhat chaotic policy of which government ownership can be the only logical outcome? The sails of our ship are set in one direction, but there is an undercurrent carrying us inevitably toward certain shoals and rocks to which we are as a people but yet giving little thought.

What are some of these undercurrents flowing beneath the surface? First, A policy of organized labor slowly but surely moving in the direction of syndicalism. During the recent dispute between the eastern railroads and their trainmen and conductors, one of the leaders of the men remarked that the men cared nothing for the effect upon railroad finances of the payment of continually increasing wages. Their only concern was to bring all possible pressure to bear to obtain for the men at all times the maximum possible wages. The tendency of late has been to fix wages not so much with regard to the ability of the railroads to pay, not with primary regard to the needs of the men, not with any regard to the law of supply and demand, but mainly in response to tremendous organized pressure, backed up by the power of the ballot.

Second. The policy of states in passing restrictive and burdensome legislation without regard to the result of other states, without regard to the effect upon railroad finances as a whole. The state of New Jersey has passed a law imposing the entire cost of grade crossing removals in that state upon the railroads alone. If that law were to be literally and immediately enforced, the Pennsylvania Railroad would have little money left for the removal of grade crossings in other states. The state of Indiana recently ordered railroads to install automatic block signals. The effect has been that on the Panhandle road, for instance, we have no money left available with which to make the proper signal installations on our lines in Ohio, where traffic is much heavier than in Indiana.

There has been in recent years a perfect orgy of state legislation tending to burden railroad operations, tending to benumb the initiative and enterprise of railroad managers, tending to crush the enthusiasm and confidence of railroad investors. In 1913 there were 42 state legislatures in session; in them were introduced 1395 bills relating to railroad operation, and of that number 230 bills were passed. All safety appliances and mechanical improvements are desirable, but some much more so than others, and the vital mistake of a large proportion of this legislation directing the adoption of certain methods and standards of railroad operation is that it fails to discriminate between the relative importance of many desirable ends.

Third. A growing disposition to impose increased financial burdens upon the railroads for purposes only indirectly benefiting railroad users. Nowadays when a railroad seeks to make some improvement in a municipality, the railroad is called upon to expend additional and unnecessary capital for incidental improvements or ornament to the city.

There is a constantly increasing burden of taxation. The railroads pay in taxes 19 per cent of all the revenues of the state of Pennsylvania and 46 per cent of all revenues of the state of New Jersey. Taxes on the railroads east of the Mississippi and north of the Ohio river have increased 111 per cent in the past 10 years. The cost of public buildings, public schools, and the development of country roads, and every state enterprise thus becomes a very material burden upon the finances of railroad companies.

In this fact may be found such opposition as railroads may have to the development of artificial waterways. They cannot fear the competition of such waterways. But the history of artificial waterways fails to present a single case where, when full account is taken of interest on the original investment, the cost of maintenance and operation, the transportation by such waterway has been as economical as by rail. The burden eventually falls upon the taxpayer, and the railroad, as a large taxpayer, must shoulder an enormous share of the unnecessary impost.

The Railroad Difficulty.

The foregoing three tendencies reflect themselves in the added expenses of the railroad. But the railroads are not permitted to so adjust their charges that they may meet the expenditures thus peremptorily imposed. States may enforce increased expenditures, and yet the rates in the state may not be increased unless a corresponding increase is made in interstate rates, and such increase is subject to the approval of the Interstate Commerce Commission, over which the individual state has no control. It is the concurrence of these forces increasing expenses on the one hand, and on the other making it impossible to secure the revenue with which to meet these expenses, which constitutes the strongest undercurrent which is moving up toward government ownership.

It is as though we were seeking to move along by the trade-winds carrying us to initiative, enterprise, progress, and the development of commerce, yet found ourselves

caught in the gulf stream with a current forcing us toward the enervation, dampened enthusiasm, the political chaos and the bureaucracy of government ownership.

The present result of these forces cannot be better summarized than by a statement of the main fact upon which the railroads base their claim to the Interstate Commerce Commission for an increase of 5 per cent in freight rates. During the past three years the railroads in this territory have expended \$660,000,000 in improvements for use in the public service. During that time the revenues of these companies have increased \$186,000,000. In the same period the expenses of the companies increased \$203,000,000. The result is that at the end of the three years, after having provided this increased plant and performed this greatly increased service, the railroads are worse off in net earnings by \$17,000,000 than they were at the end of the fiscal year 1910 before this additional money had been spent. Here is the reason why more than one-half of the railroad mileage of the central West is in a state of virtual bankruptcy; and the reason why in even the strongest of railroad companies prudence compels the utmost conservatism in making further improvements.

The Danger of Government Ownership.

This country must have railroads—more railroads and better railroads—but as Mr. Prouty, of the Interstate Commerce Commission, said: "The question is, How can you obtain the necessary capital with which to develop our old railroad systems and build new railroad systems?" However undesirable government ownership may be, it is certain to come quickly if there is a continuation of the same kind of state and federal legislation which has attended in recent years the exercise of control over railroads in every respect save assuming responsibility for the financial result. Unless private capital can be more favorably treated, it cannot be much longer induced to provide the increased tracks, terminals and equipment demanded by the business of the country. Railroads will then be compelled to restrict their progress of improvements, and the inevitable result will be a demand for nationalization of the railroads,

the government stepping in to do what private capital can no longer be induced to do.

Even if we are to have government ownership, the American people will sooner or later realize that they cannot improve railroads without money. The bill must be paid, whether it is done through private ownership under government regulation, or whether it is done by public ownership attended by the inevitable political evils.

Conceding, therefore, that the bill must be paid, the experience of other nations, the experience of our own people, justifies the statement that the ultimate price will be less and the result will be more satisfactory if proper inducement is given to private enterprise and individual effort.

The people of this country have determined—and determined rightly—that the railroads shall be operated fairly, with due regard to the interests of the people as a whole. That means that we should have regulation and that there should be some power intrusted with the duty of insuring that in the operation of railroads the interests of the public should not be disregarded. But it is an entirely different thing to make railroad treasuries the prey of political demagogues, to hamper railroad operations with unwise and unnecessary restrictions, and to prevent railroad properties from properly adapting themselves to the commercial requirements of the country.

The suggestions for a sounder policy therefore, are these:

First. Let us pin our faith to the enterprise of the individual.

Second. Let us abandon belief in the value of legislation in detail concerning the operations of a complex industry requiring the highest ability of trained experts; and

Third. Let us see to it that as regulators we have men striving to serve the public and not to promote private political ambitions; let all railroad commissioners work with the railroads and not against them.

But under and above these policies, let us restore our belief in the sincerity of earnest men; abandon the thought that material success should be an object of suspicion; and face the inexorable law that we can reap only as we sow, and that in the long run we must pay for what we get.

Committee Work of the Railway Engineering Association

The board of direction of the American Railway Engineering Association has announced the outline of work assigned to the various standing and special committees for the year 1914-15, and the members appointed to these committees. The list of subjects and the chairmen and vice-chairmen of the committees are given below. All of the committees except No. 19 and that on stress in track are instructed to "make critical examination of the subject matter in the Manual and submit definite recommendations for changes:"

COMMITTEE I—ROADWAY.

1. Continue the study of unit pressures allowable on roadbed of different materials, conferring with committee on ballast and with special committee on stresses in track.

2. Submit specifications for protection of slopes by sodding or otherwise.

3. Recommend means for prevention or cure, as case may be, of water pockets in roadbed.

Committee, W. M. Dawley (Chairman), Assistant Engineer, Erie R. R., New York; J. A. Spielmann (Vice-Chairman), District Engineer, Baltimore & Ohio R. R., Pittsburgh, Pa.

COMMITTEE II—BALLAST.

1. Continue investigation of proper depth of ballast of various kinds to insure uniform distribution of loads on roadway, conferring with other committees.

2. Continue study of subject of ballast sections, with particular reference to the use of a sub and top ballast.

Committee, H. E. Hale (Chairman), Engineer, President's Committee on Valuation, New York; J. M. Meade (Vice-Chairman), Engineer, Eastern Lines, Atchison, Topeka & Santa Fe Railway, Topeka, Kan.

COMMITTEE III—TIES.

1. Continue study of the effect of design of tie-plates and track spikes on the durability of cross-ties.

2. Continue study on economy in track labor and material effected through the use of treated compared with untreated cross-ties.

3. Continue study of metal, composite and concrete cross-ties, building up a history of same.

4. Investigate and report on the future timber supply for ties.

5. Report on the distribution and care of cross-ties.

Committee, L. A. Downs (Chairman), Superintendent, Illinois Central Railroad, Dubuque, Iowa; G. W. Merrell (Vice-Chairman), Assistant to General Manager, Norfolk & Western Railway, Roanoke, Va.

COMMITTEE IV—RAIL.

1. Recommend standard rail sections.

2. Continue investigations of rail failures and deduce conclusions therefrom.

3. Continue special investigations of rails.
4. Present specifications for material in rail joints.

Committee, J. A. Atwood (Chairman), Chief Engineer, Pittsburgh & Lake Erie Railroad, Pittsburgh, Pa.; W. C. Cushing (Vice-Chairman), Chief Engineer Maintenance of Way, Pennsylvania Lines, Pittsburgh, Pa.

COMMITTEE V—TRACK.

1. Typical plans for double slip crossings, double crossovers and guard rails.
2. Study the relation between worn flanges and worn switch points, with a view to correcting the causes and decreasing the number of derailments due to a combination of worn switch points and worn flanges on wheels.
3. Continue the study of economics of track labor.

4. Report on the design of manganese frogs and crossings.

Committee, J. B. Jenkins (Chairman), Valuation Engineer, Baltimore & Ohio Railroad, Baltimore, Md.; G. J. Ray (Vice-Chairman), Chief Engineer, Delaware, Lackawanna & Western Railroad, Hoboken, N. J.

COMMITTEE VI—BUILDINGS.

1. Report on methods of heating, lighting and sanitary provisions for medium-sized stations.
2. Continue the study of the advantages and disadvantages of the various designs of freight houses and shop floors.
3. Present data on rest houses for employees.

Committee, M. A. Long (Chairman), Assistant to Chief Engineer, Baltimore & Ohio Railroad, Baltimore, Md.; G. H. Gilbert (Vice-Chairman), Engineer Bridges and Buildings, Queen & Crescent Route, Cincinnati, Ohio.

COMMITTEE VII—WOODEN BRIDGES AND TRESTLES.

1. Continue study of relative economy of repairs and renewals of wooden bridges and trestles.
2. Report on design of docks and wharves.
3. Report on developments in practice of ballast deck trestles since previous report.
4. Report on use of lag-screws for fastening guard timbers.

Committee, E. A. Frink (Chairman), Bridge Engineer, Seaboard Air Line Railway, Portsmouth, Va.; W. H. Hoyt (Vice-Chairman), Assistant Chief Engineer, Duluth, Missabe & Northern Railroad, Duluth, Minn.

COMMITTEE VIII—MASONRY.

1. Complete report on principles of design of plain and reinforced retaining walls and abutments.
2. Collect data concerning cost and method of constructing concrete piles, and make recommendations as to their use.
3. Report upon the cost, appearance and wearing qualities of various methods of surface finish for concrete.

Committee, F. E. Schall (Chairman), Bridge Engineer, Lehigh Valley Railroad, S. Bethlehem, Pa.; F. L. Thompson (Vice-Chairman), Assistant Chief Engineer, Illinois Central Railroad, Chicago, Ill.

COMMITTEE IX—SIGNS, FENCES AND CROSSINGS.

1. Report on the economy of concrete and metal signs and signals as compared with wood.
2. Report on the economy of concrete and metal as compared with wood for fence posts.
3. Investigate methods used and comparative cost of repainting crossing and other signs; also present specifications for whitewashing cattle-guard wing fences.

Committee, W. F. Strouse (Chairman), Assistant Engineer, Baltimore & Ohio Railroad, Baltimore, Md.; G. E. Boyd (Vice-Chairman), Division Engineer, Delaware, Lackawanna & Western Railroad, Buffalo, N. Y.

COMMITTEE X—SIGNALS AND INTERLOCKING.

1. Continue study of economics of labor in signal maintenance.
2. Formulate and present requisites for switch indicators, in-

cluding conveying information on condition of the block to conductor and engineer.

3. Present, for approval, specifications adopted by the Railway Signal Association, which in the judgment of the committee, warrants consideration.

4. Study the problem of signaling single-track roads with reference to the effect of signaling and proper location of passing sidings on the capacity of the line.

Committee, Thos. S. Stevens (Chairman), Signal Engineer, Atchison, Topeka & Santa Fe Railway System, Topeka, Kan.; C. C. Anthony (Vice-Chairman), Assistant Signal Engineer, Pennsylvania Railroad, Philadelphia, Pa.

COMMITTEE XI—RECORDS AND ACCOUNTS.

1. Make a comprehensive study of the forms in the Manual, adopted a number of years ago, and bring forms up to date.

2. Continue the study of reports required by federal and state railway commissions.

3. Continue the study of a feasible and useful sub-division of I. C. C. Classification Account No. 6, with a view to securing uniformity of labor costs.

Committee, W. A. Christian (Chairman), First Assistant Engineer, Chicago Great Western Railroad, Chicago, Ill.; M. C. Byers (Vice-Chairman), Assistant to President, Great Northern Railway, St. Paul, Minn.

COMMITTEE XII—RULES AND ORGANIZATION.

1. Review rules and instructions heretofore adopted by the association and recommend such changes and additions thereto as may seem desirable.

2. Formulate rules for the guidance of the maintenance of way department pertaining to safety.

3. Continue the formation of rules for the guidance of field parties:

- (a) When making preliminary surveys.
- (b) When making location surveys.
- (c) When in charge of construction.

4. Continue the study of science of organization.

Committee, G. D. Brooke (Chairman), Superintendent, Baltimore & Ohio Railroad, Winchester, Va.; F. D. Anthony (Vice-Chairman), Construction Engineer, Delaware & Hudson Company, Albany, N. Y.

COMMITTEE XIII—WATER SERVICE.

1. Complete report on design and relative economy of track pans from an operating standpoint.

2. Report on deep well and deep well pumping and relative economy of this as compared with other sources of water supply.

3. Report on the use of compounds in locomotive boilers to counteract:

- (a) Foaming.
- (b) Scale formation.

4. Continue the study of recent developments in pumping machinery, and various kinds of fuels used.

Committee, A. F. Dorley (Chairman), Engineer Water Service, Missouri Pacific Railway, St. Louis, Mo.; J. L. Campbell (Vice-Chairman), Engineer Maintenance of Way, El Paso & Southwestern Railway System, El Paso, Texas.

COMMITTEE XIV—YARDS AND TERMINALS.

1. Report on typical situation plans of passenger stations, of both through and stub types, with critical analysis of working capacity, and include a review of the different methods of estimating their capacity.

2. Report on developments in the handling of freight by mechanical means.

3. Report on developments in the design and operation of hump yards.

4. Continue study of track scales.

Committee, E. B. Temple, (Chairman), Assistant Chief Engineer, Pennsylvania Railroad, Philadelphia, Pa.; B. H. Mann

(Vice-Chairman), Signal Engineer, Missouri Pacific Railway, St. Louis, Mo.

COMMITTEE XV—IRON AND STEEL STRUCTURES.

1. Report on the methods of protection of iron and steel structures against corrosion.
2. Study designs and reports on build-up columns, co-operating with other investigators and committees of other associations.
3. Report on design, length and operation of turntables.
4. Report on relative economy of various types of movable bridges.

Committee, A. J. Himes (Chairman), Engineer Grade Elimination, New York, Chicago & St. Louis Railroad, Cleveland, Ohio; O. E. Selby (Vice-Chairman), Bridge Engineer, Cleveland, Cincinnati, Chicago & St. Louis Railway, Cincinnati, Ohio.

COMMITTEE XVI—ECONOMICS OF RAILWAY LOCATION.

1. Study the question of grade, curvature, rise and fall, and distance, and, if possible, present conclusions as to reasonable values of the same in a usable form, in order that they may be of use for the information and guidance of locating engineers.

2. Continue the important study of economics of railway operation heretofore carried on by committee, in order that the information may lead to more economical methods in railway operation and that information may be obtained for correcting values given to the physical features in the locating of railways.

3. Make special efforts to collect information in regard to effects of passengers and freight traffic on the cost of maintenance.

Committee, John G. Sullivan (Chairman), Chief Engineer, Western Lines, Canadian Pacific Railway, Winnipeg, Man.; C. P. Howard (Vice-Chairman), Consulting Engineer, Chicago, Ill.

COMMITTEE XVII—WOOD PRESERVATION.

1. Continue the study of the use of coal tar in creosote oil.
2. Continue the compilation of available information from service tests, supplementing this with reports of inspections to be made by members of the committee, of those sections of test track that have been in service long enough to give results.

3. Present specifications for timber to be treated.

4. Report on methods of accurately determining the absorption of creosote oil.

5. Study the subject of water in creosote.

Committee, Earl Stimson (Chairman), Engineer Maintenance of Way, Baltimore & Ohio Railroad, Baltimore, Md.; E. H. Bowser (Vice-Chairman), Superintendent Timber Department, Illinois Central Railroad, Memphis, Tenn.

COMMITTEE XVIII—ELECTRICITY.

1. Continue study of the subject of clearances.
2. Report on the effect of electrolytic action on metallic structures and best means of preventing it.

3. Continue the preparation of a standard specification for overhead transmission line crossings.

4. Continue the study of electrolysis and insulation and its effect upon reinforced concrete structures.

5. Report on maintenance organization with relation to track structures.

Committee, George K. Kittredge (Chairman), Chief Engineer, New York Central & Hudson River Railroad, New York; J. B. Austin, Jr., (Vice-Chairman), Superintendent, Long Island Railroad, Jamaica, N. Y.

COMMITTEE XIX—CONSERVATION OF NATURAL RESOURCES.

1. Continue the study of tree planting and general reforestation.

2. Continue the study of coal, fuel, oil and timber resources.

3. Continue the study of iron and steel resources.

Committee, C. H. Fisk (Chairman), Consulting Engineer, St.

Louis, Mo.; A. W. Carpenter (Vice-Chairman), Valuation Engineer, New York Central & Hudson River Railroad, New York, N. Y.

UNIFORM GENERAL CONTRACT FORMS.

1. Continue the study of general contract forms, including forms for bond.

Committee, E. H. Lee (Chairman), Vice-President and Chief Engineer, Chicago & Western Indiana Railway, Chicago; C. A. Wilson (Vice-Chairman), Consulting Engineer, Cincinnati, O.

GRADING OF LUMBER.

1. Continue the collection of current specifications, grading and inspection rules for maintenance of way timber and lumber not heretofore reported on, and present the same for all classes of maintenance of way timber and lumber, which will conserve the interests of railways and be acceptable to manufacturers' associations; conferring with committees of this association and with other organizations whose work is affected.

Committee, Dr. H. Von Schrenk (Chairman), Consulting Timber Engineer, Rock Island, Frisco and Chicago & Eastern Illinois Railways, St. Louis, Mo.; B. A. Wood (Vice-Chairman), Chief Engineer, Mobile & Ohio Railroad, Mobile, Ala.

STRESSES IN TRACK.

Committee, A. N. Talbot (Chairman), Professor of Municipal and Sanitary Engineering, University of Illinois, Urbana, Ill.; W. M. Dawley (Vice-Chairman), Assistant Engineer, Erie Railroad, New York, N. Y.

Uses of Carbolineum.

The use of Carbolineum Avenarius by the Great Northern Ry., to protect from decay its log houses in the Glacier National Park, calls attention to the many situations in which that material may be used for preservative purposes, for it has been used extensively on various railroads for treating ties, posts and poles.

Carbolineum Avenarius is a compound, having anthracene oil as a base, derived from coal tar distillation above 270 deg. C., and known for germicidal and fungicidal qualities and stability. It is imported from Germany and made by R. Avenarius, its inventor and originator of the designation "Carbolineum," registered in the U. S. patent office as a trademark name in 1887 and introduced in this country some 27 years ago. It is applied by either of two methods, one being to spread it on with a brush, and the other to dip the timber or lumber into an open tank, preferably with the material heated to about 200 deg. F.

The following comprise some of the principal places where this material has been used: On sills, joists, floors and foundation timber; on trestles, bridges and timber platforms; on piling, docks, scows, boats and hulls; on ties, poles, cross arms, car timber and fence posts; on shingle roofs, barns, fences and outbuildings; on nets, ropes, canvas and tarpaulins; on all wood structures exposed to the ravages of the teredo navalis, white ants, etc.; as a disinfectant, fungicide and vermicide; and on brick and concrete work, to waterproof the same and to prevent crumbling. When used instead of paint it applies a tint-brown stain and accomplishes the double purpose of preserving and waterproofing.

It is particularly applicable to joinery that is in damp places, like the joists and sills of floors, as, other conditions being equal, decay of timbers always starts first in joints or other places where moisture or dirt may collect. When so applied the timbers are first trimmed or cut for framing and are then given a brush coat of the carbolineum. This preservative oil is heated in a suitable iron container to a temperature of 150 deg. F. The cracks, knotty spots, mortises, tenons and cut ends are then run full of the oil. Before erection and after allowing as much

time as possible for the preservative to penetrate into the wood a second heavy coating is applied to all cut ends or bearing surfaces at a temperature of 180 deg. F. All dowles, bolts, spikes or nails before driven are also dipped in this preservative. The cost, including labor and material, is about \$4.50 per 1000 ft. b. m.

By the open tank method the timber, after framing, is immersed in a bath of carbolineum heated to 200 deg. F., and the timber kept submerged below the surface of the oil for a time varying with the thickness of the timber, the minimum period being not less than 10 minutes. Five minutes in the duration of the treating bath is added for every inch in the thickness of the timber above 2-in. plank-ing. The average cost of this treatment is about \$10 per 1000 ft. b. m., varying between \$8 and \$12, according to surface exposed. This includes material, labor and the treating outfit.

The quantity required for brush application is one gallon for 350 square surface feet of dressed lumber, or for 250 ft. of rough lumber, or for 100 ft. of shingle roofs, for first application; and about one-third of this quantity for the second application. It is used hot or cold, according to the season of the year, the condition, grade and seasoning of the lumber. For dipping of timber, from 10 to 12 gals. per 1000 ft. b. m. are required for an immersion lasting about 10

of the material, applying two coats to the entire hull, inside and out.

At the Insular ice plant, in Manila, P. I., the old insulation was recently torn out preparatory to the substitution of solid cork board, when a considerable difference was found in the condition of timbers where carbolineum was used and where it was not, after having been in service about 15 years. The following extracts from a letter of Mr. Cliff C. Barton, chief of the division of cold storage, is explanatory of the condition of things as found:

"In almost every case the wood that was treated with Avenarius Carbolineum is sound and shows very little sign of decay, while the timber which was not so treated is decayed and in a bad condition. We find that, owing to the low temperature at which cold storage rooms are kept, there is usually very little trouble from the white ant, and we found very few of them in the insulation of our cold storage rooms. For your information I might state that we have been using carbolineum during the past six or seven years in and around floors and joists in this plant, and find that it acts as a preventative against encroachment of the white ant, and that they are not liable to attack timber treated with carbolineum."

President Harrison on Southern Agricultural Development.

Fairfax Harrison, president of the Southern Railway, addressed the chamber of commerce of Selma, Ala., March 3, on the subject of "Railroad Co-Operation in Southern Agricultural Development." After pointing out that, as a business enterprise seeking increased prosperity through an enlargement of its volume of traffic, a railroad may properly co-operate with the people whom it serves, for community development, Mr. Harrison told of the organization of the Southern Railway land and industrial department by President Spencer, of the great enlargement of co-operative work, especially for agricultural development, under President Finley, and declared his purpose to continue the work inaugurated by his predecessors and to give it close personal attention. He spoke of the special value of this work in the pending revolution of agriculture in the South, brought about by the invasion of the Mexican cotton boll weevil, which, by enforcing the arguments of experts for diversified agriculture, may yet prove a real educational force in the South.

Speaking of the co-operation of the Southern Railway with communities to secure the location of desirable immigrants, Mr. Harrison cited the reports of the United States census of 1910, showing that at that time 2,571,734 natives of the nine southeastern states traversed by the Southern Railway lines were living in other states, while only 472,412 natives of other states were living in these nine states, making the net loss of population to the section through the movement to other states 2,199,322, or approximately 61,000 more than the total population of the state of Alabama in 1910. He said:

"In this connection, I would like to impress upon the Southern people my conviction that keeping our own people at home is even more important to our progress than attracting settlers from other localities. I am sure that I speak for you when I say that we will welcome the desirable immigrant from any other part of our own country or from Europe; that we will make him one of us; that we will undertake to teach him our language and imbue him with our aspirations; but it is fair to add that we can best insure the preservation of the ideals and traditions of the South and the advancement of our prosperity if, in addition to welcoming the stranger, we keep our own people at home. This is a matter that is having the attention of the Southern Railway Co. Through our land and industrial department and all of our agencies working for Southern development we are seeking to impress upon the people along our lines the superiority of our own sec-



Type of Cottage in Glacier National Park Built by Great Northern Ry., of Treated Timber (Copyright, 1912, by Kiser Photo. Co.)

minutes, according to size of the timber. The material is handled and sold by the Carbolineum Wood Preserving Co., 518 Prairie St., Milwaukee, Wis.

The following uses of carbolineum have lately been made by the United States government:

By the Panama Canal Commission for the treatment of lock fenders, and, only lately, for use on the pontoon bridge crossing the canal at Paraiso.

By the Department of the Interior, Reclamation Service, orders for the Interstate project, Nebraska.

By the Department of Commerce and Labor, orders for the Lighthouse Service.

By the Navy Department, orders for Bremerton navy yard.

By the U. S. Engineer Office, orders for Louisville and Portland canal.

By the War Department, order for Manila, Philippine Islands, for use in the U. S. refrigeration and ice plant.

By the Bureau of Yards and Docks, for a coaling plant at Sitka, Alaska.

By the Reclamation Service, order for Avenarius Carbolineum for the Umcompahgre Valley project, Colorado.

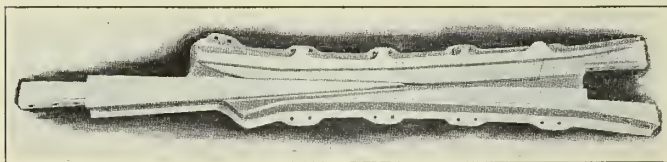
On government dredges considerable use has been made

tion and, so far as we are able to do so, we endeavor to persuade individuals contemplating removing to other parts of the country to remain in the South. This is a matter in which every Southern man can help. It requires no organization, but each one who knows of a neighbor who is thinking of leaving, can endeavor to persuade him to remain, and, if our land and industrial department is advised of cases of this kind, we will endeavor, through correspondence or a personal interview, to convince the man who is thinking of leaving that it is to his advantage to remain in the South.

"Great as has been the progress of the South, we have only fairly begun to realize our opportunities for agricultural and industrial development. The rapid progress being made by Southern farmers in the adoption of improved farming methods will greatly increase our steadily growing agricultural output. The economic law tending to the location of manufacturing enterprises in proximity to supplies of raw material and to power resources and the advantages of home markets based on a prosperous and increasing agricultural population will stimulate the development of diversified manufacturing in all of the Southern states.

The Conley Terminal Spring Frog.

A new spring frog of solid manganese, for use in terminals, has been designed by the Conley Frog & Switch Company, of Memphis, Tenn., which is being manufactured under the name of the Conley "Big Terminal" spring frog. This design is along the same lines as that of the Conley Class "C" manganese frog, with the exception that the main line is given a solid bearing through the frog. The separate guard rails are entirely eliminated. The easers at the toe

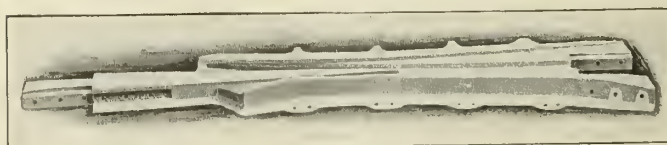


Conley Terminal Spring Frog—Fig. 1.

and the heel riser at the heel of the frog lap over the joints about 18 ins., thus doing away with all pounding at the joints.

This frog is so designed that snow and ice do not interfere with traffic in any way. Even the spring is encased under the frog, so that it cannot be interfered with by dragging rods, or brake beams. Wheels are guided through the frog by the tread rim engaging the elevated guide rails that are a part of the frog itself. The guide rail on the spring wing side is so designed that it holds the spring rail in place in such a manner that double-flange wheels cannot throw the spring rail out of place; and, in the event spring rail breaks, the frog would be perfectly safe, as it would then act as a rigid frog.

Spike flanges are cast onto the base of the rail, so that the inside spikes give the same amount of holding power as the outside ones. This anchors the frog to the ties, to prevent creeping toward the head block, which is sometimes the cause of derailments where traffic is all in the same direction. This creeping always tightens the gage, and the result is that separate guard rails become inoperative. Creeping of the



Conley Terminal Spring Frog, Fig. 2—Spring Rail Depressed.



Conley Terminal Spring Frog, Fig. 3—Rear View, Showing Spring Wing Side.

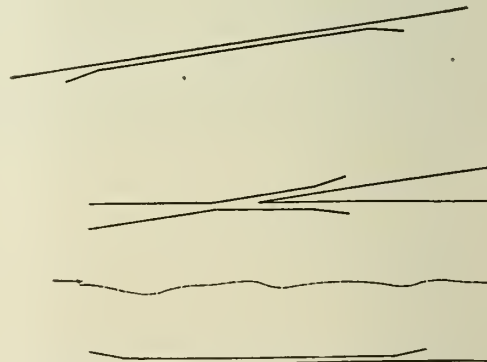
spring wing is also prevented, as it is held in place by a large steel pin at the hinge end.

The spring wing is solid manganese 2 inches deep by 5 inches wide, giving ten square inches of section, or slightly more than the cross section of a 100-lb. rail. The spring wing rests on a solid base, and when traffic is practically all on one track it is impossible for the spring rail side of the frog to become lower than the rigid side, as is often the case with the rail type of spring frog where the ties are not kept in first-class condition, nor the roadbed kept up to standard.

The "Big Terminal" spring frog requires no loose foot guards, and its construction is such that switchmen or trainmen will not be hindered in their work, nor can they get feet caught or in any way become injured while working over this frog.

The simplicity of this frog is remarkable—no body bolts, no separate castings and no loose plates. The guide rails on the frog have an easy spiral at each end, so that no shock occurs to wheels either in an approaching or trailing direction, and they eliminate the vibrating action to wheels or trucks when passing through the frogs, wheels in first-class shape pass through frog with lateral motion, while worn wheels are affected by a slight lateral movement equal to the amount or thickness worn off of the wheel flanges, which is very slight and seldom reaches $\frac{1}{4}$ inch; and this worn wheel movement is found only where the wheel is binding the frog side of the track.

It has been noted on dynamometer car records that the



Conley Terminal Spring Frog, Fig. 4—Irregular Path of Wheels Constrained by Separate Guard Rails.

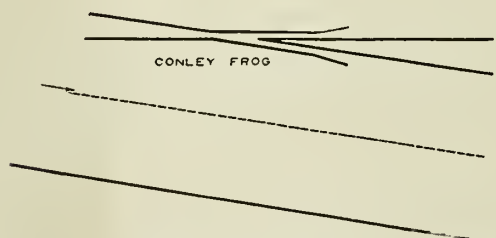
irregular course of wheels passing through the ordinary frog with separate guard rails is as seen in Fig. 4, which shows the truck on entering the side track is pulled toward the inside of the curve when the truck strikes the bend in the guard rail; then the truck is pulled part way back as the wheels strike the throat of the frog, and continues until the wheel passes to the bend of the wing rail, when the truck moves back to the guard rail until it passes to the last bend, when the truck again crowds to the outside rail.

The wobbling course does not take place with the Conley frogs, as there is no guard rail on the inside of the curve to pull wheels, and the wheels pass through on straight or curved lines, as shown in Fig. 5. The wearing and looseness of bolts on the ordinary frog is caused more from the lateral

motion of wheels passing through them than from the weight of traffic passing over them.

Another feature of the "Big Terminal" spring frog is that no derailments can occur on them due to loose wheels or bent axles, which is often the result when such wheels strike the points of ordinary frogs.

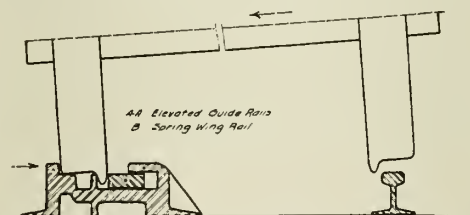
Another place where Conley frogs prove very efficient is in coach yards where long Pullman cars are handled with the



Conley Terminal Spring Frog, Fig. 5—Path of Wheels Without Separate Guard Rails.

separate guard rail system. The force pushing cars into a siding acts at a large angle with the center line of the cars, and this force has a tendency to transfer the weight of the cars to the wheels on the frog side, and at the same time causes the wheels on the guard rail side to rise off of rail slightly. It can readily be seen how such a condition causes the wheel to mount the guard rail and allow the opposite wheel to take the wrong side of the frog point. This difficulty is hard to overcome with the separate guard rail system and is a source of trouble and often of derailment.

Coach wheels passing through Conley frogs are safely and positively guided, as they do not depend on their mates to



Conley Terminal Spring Frog, Fig. 6—Result of Forces in Pushing Long Trains Through Turnouts.

pull them past the proper side of the frog point, and should this wheel on the inside of the curve rise above the rail, it would have no ill effect in passing over this frog. Figure 6 shows how these forces act on the long coach trucks and how the Conley guide rails make the passage of wheels safe.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The spring meeting of the Railway Signal Association will be held in New York, at Hotel Astor, on May 27 and 28. It has now been definitely settled that the annual convention will be held at Bluff Point, N. Y., September 22-24.

The Second National Conference on Marketing and Farm Credits has been in session at Hotel Sherman, Chicago, this week, April 14 to 17, inclusive. A number of able papers were presented upon co-operative marketing, farmers' credits

and other phases of agricultural economics; and the discussions were generally of a very practical and timely nature.

A conference on municipal snow removal was held in the mayor's reception room of the City Hall, Philadelphia, Pa., April 17. On Thursday evening, April 16, Mayor Blankenburg tendered a dinner, at the Union League, to the visiting delegates. At the first session, Friday morning, the program included four 15-minute papers on present practice, read by delegates from New York, Scranton, Boston and Philadelphia. A round table luncheon at the City club was to be held Friday noon, and in the afternoon five 15-minute papers were scheduled as follows: "The Citizen's Part in Snow Removal," by Dr. Marie D. Equi, member of Civic League, Portland, Ore.; "Snow Removal from a Contractor's Standpoint," by John W. Doherty, Belmont Construction Co., Philadelphia; "The Police and Snow Removal," by James Robinson, superintendent of police, department of public safety, Philadelphia; "Snow Removal by the Street Car Company," by Martin Schreiber, engineer maintenance of ways, Public Service Railway Co., of New Jersey; "Snow Removal as a Field for Engineering Study," by Morris R. Sherrerd, chief engineer, board of street and water commissions, Newark, N. J.

The new mining laboratory of the University of Illinois, and its work, will be described by Prof. H. H. Stoeck, at an extra meeting of the Western Society of Engineers in the society rooms, 1735 Monadnock block, Chicago, Monday, April 20. The paper will also include some account of mining conditions in Illinois and investigations made by the department of mining and engineering at the University of Illinois. The program for the regular meeting of the Western Society of Engineers, Monday evening, April 13, included a paper on the construction of the Third avenue reinforced concrete bridge at Cedar Rapids, Iowa, by Barton J. Sweatt.

A Forest Products Exposition will occupy the Coliseum, Chicago, with a great exhibition of American wood industries, April 30 to May 9, inclusive. It will be conducted under the auspices of the National Lumber Manufacturers' Association, of which George S. Wood is manager, Otis building, Chicago. The same exposition will be held in the Grand Central Palace, New York city, May 21 to 30.

The program for the monthly meeting of the Canadian Society of Civil Engineers, Montreal, Que., April 9, included papers on "Concrete Highway Construction" and on "Road Improvement in the Province of Quebec" read by L. S. Bruner and G. Henry, respectively.

At the meeting of the Canadian Railway Club, at Montreal, Que., April 14, J. E. Duval, general superintendent of car service of the Grand Trunk system and formerly manager of the Canadian Car Service Bureau delivered an address upon the misuse of cars and the causes of car shortage.

Railway and Engineering Literature.

THE VALIDITY OF RATE REGULATIONS, STATE AND FEDERAL.—By Robert P. Reeder, of the Philadelphia bar. Published by T. & J. W. Johnson Co., 535 Chestnut street, Philadelphia, Pa.; 440 pages, 6x9¼ ins. Price, bound in buckram, \$5.00, delivered.

This book is a treatise for the legal profession, which deals with the principles of constitutional law which are involved in rate regulation. It states the decisions in the rate cases themselves, and it also goes into a broader discussion of the purposes of those who placed in the federal constitution the provisions which bear upon rate regulation. While the book sets forth clearly the established principles, many unsettled problems are also discussed at length. The treatment covers the

contrast between state and federal power, the methods of making and of enforcing regulations, the principles governing the valuation of property, the constitutional rate of return, discrimination in regulations, differentials, and the impairment of contracts. The book contains an especially valuable discussion on the relation of the due process provision to substantive law. It includes 4000 citations, and is arranged with parallel references to official reports, National Reporter system, L. R. A. and L. ed.

* * *

ENGINEERING VALUATION OF PUBLIC UTILITIES AND FACTORIES.—By Horatio A. Foster. Published by D. Van Nostrand Co., New York city. Cloth, 6x9 ins., 345 pages; price \$3.00, net.

This work, which first appeared more than a year ago, is in line with the recognized large demand for information regarding the valuation of property of public utility corporations. The author takes, as his criterion of instructions for valuation, the opinion of Judge Savage, of Maine, and this he gives in full. Following this there is a large number of forms developed for the purpose of making more perfect inventories and for classifying data in proper order. Many of these are taken from copies of those developed by the joint engineering staff of the Wisconsin Railroad Commission and the Wisconsin Tax Commission, under Prof. W. D. Pence, now of the engineering board of valuation of the Interstate Commerce Commission. A great deal of space is devoted to the subject of depreciation, this being the point in railway valuation work over which more contention seems to be arising just now than on any other one question.

* * *

RAILWAY SIGNAL ENGINEERING (MECHANICAL).—By Leonard P. Lewis, of the Caledonian Ry.; Lecturer on Railway Signaling at the Glasgow and West of Scotland Technical College. Published by D. Van Nostrand Co., 23 Murray St., New York city. Cloth, 5½x8½ ins., 358 pages; price \$3.50, net.

This is a concise treatise covering the general principles of mechanical signaling on British railways. The various chapters relate to Board of Trade rules; classes and uses of signals; construction details; point (switch) connections; interlocking apparatus; signal box (tower) arrangements; miscellaneous apparatus; signaling schemes; interlocking tables, diagrams, etc.; and methods of operating trains.

* * *

STEEL BRIDGE DESIGNING.—By Melville B. Wells, C. E., Assoc. Prof. of Bridge and Structural Engineering, Armour Institute of Technology. Published by the Myron C. Clark Publishing Co., Chicago. Cloth, 6x9 in., 260 pages, with numerous folding plates; price \$2.50.

This book was written as a text for classes in engineering colleges and as a reference book for drafting rooms and bridge offices. The first three chapters relate to the engineering work of bridge location and contracts, and bridge manufacture. These are followed by chapters on riveted joints and spacing of rivets, design of roof trusses, types and details of highway bridges, and design of a riveted truss highway bridge; types and details of railway bridges; designs of plate girder and riveted truss railway bridges, as well as pin-connected bridges. There is also a chapter on shop drawings and another on strength of materials. The arrangement of the matter and the general treatment of the subject are such that students who may have it in contemplation to visit bridge works will be given some idea of what they may expect to see when they get there.

* * *

PROCEEDINGS OF THE AMERICAN ELECTRIC RAILWAY ENGINEERING ASSOCIATION, 1913.—The American Electric Railway Engineering Association has issued in a bound volume the proceedings, covering a complete report of the eleventh annual convention, held at Atlantic City, N. J., October 13 to 17, inclusive, 1913. It is published from the office of the secretary of the association, 29 West 39th street, New York city.

* * *

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS.—The proceedings of the 25th annual convention of the National Association of Railway Commissioners, held at Washington, D. C., Oct. 28-31, 1913, have been published by the Law Reporting Co., official reporters, 115 Broadway, New York city. The work makes a book of 612 pages, 6x9¼ ins., bound in black cloth; price \$1.00. It includes all committee reports, and the discussion thereon, and should be extremely valuable to all interested in railroad matters. The publication of these proceedings and the sale at the price stated was undertaken by the company mentioned above at the request of the executive committee of the association, after congress had refused to make an appropriation for the Interstate Commerce Commission to cover the reporting and printing at government expense, as had been done in previous years. The expense for the first year was

about \$2,000 and the publisher states that the number of copies sold is far from sufficient to cover the cost, and must be increased largely if the work is to be continued. The company further states: "We do not hope to ever make anything out of it, but these proceedings are so important that it seems as if they ought to be reported and printed and thus made available for general use, until congress can be induced to return to the old plan of issuing the report as a public document."

* * *

New publications of the General Railway Signal Co. include a pamphlet on the "G. R. S. Lightning Arrester, Model 1B." This device is composed of a porcelain case 4¾ in. long, 1½ in. wide and 2½ in. high, a choke coil, three R. S. A. binding posts, a brass connector, a centering nut for the ground connection binding post, a round brass ground plate or disk, the circumference of which is serrated, and two non-fusible line plates. Other devices covered by new literature are the "G. R. S.—EZ Motion Plate Rail Clips and R. S. A. Detector Bars; and the G. R. S. Model 2A Signal." The last named device was designed some six years ago, and previous to Jan. 1, 1914, had been ordered for installation on 98 railroads, the aggregate number of signals of this type, all told, then being 13,159.

* * *

International Railphones, Ltd., Prudential Bldg., Corporation Street, Birmingham, England, is promoting and installing the von Kramer wireless inductive "Railophone" system for the establishment of intercommunication between a moving train and a station by means of telephony and telegraphy, or the transmission of signals between a signal cabin and the engine of an express or freight train; or the automatic indication on the engine of the approach to important railway signals. The Midland Ry., of England, is laying down a trial plant on the main line near Derby, and the Prussian State Railways have put in an experimental installation, which, after inspection and test by their minister for railways, has been extended to ten times its original length.

* * *

The Union Switch & Signal Co. has issued Bulletin No. 69, entitled the "T. D. B. System." This is an absolute automatic block signal arrangement for interurban electric railways, and is known as the "Traffic Direction Black" system. Two cars are permitted between sidings, each in a separate block and protected head-on and rear, by "absolute" signals, with a minimum of apparatus, there being but one track circuit and four signals to each opposing block unit. The blocks for opposing cars do not coincide with the blocks for following cars. There are but two signal indications, namely, stop and proceed, and there are no preliminaries, the preliminary section being always near a siding, with the result that a car standing within the limits of the preliminary may prevent an opposing car from entering the adjoining block, even though this block is clear and the car should be allowed to proceed.

* * *

The Chicago Bridge & Iron Works has issued several pamphlets on water towers and steel railroad tanks. These books are well illustrated, showing numerous installations of elliptical-bottom tanks. The illustrations cover steel water towers for municipal and private water works, as well as standpipes and water towers for sprinkler systems, railroad locomotive service, water power developments, power plants and mill service. The pamphlets contain several tables and an outline of the proper method for finding stresses in various parts of the structure. Another style of construction is the conical-bottom tank, which differs from the "elliptical" bottom only in that no part of the bottom makes an angle of over 45 deg. with the vertical. As it facilitates precipitation, this design of tank is recommended for use where the water contains considerable mud or sediment.

* * *

Hayes Track Appliance Co., Richmond, Ind., has issued a new edition of Book 68, on "How to Install Hayes Derails." It is a volume of 48 pages, 3¼x6 ins. in size, and may be had for the asking.

Iron and Steel Industry.

With practically one-third of the iron and steel capacity of the country idle, and no safe assurance as to a higher income from freights in a large section of the country, and the holding up of very much construction enterprise, it is somewhat surprising that so little weakness is manifest in

iron and steel prices. Manufacturers are not pushing for business, and buyers are willing to delay. The past week's

developments show a sluggish demand comparatively. The industry at large is optimistic and sound.

The Railway Supply Man's Point of View

Building a Business.

NO. 2—PERSONALITY.

Under the general heading of "Building a Business," there will be discussed in these columns from time to time subjects which pertain very largely to the foundations upon which a business is built, different phases of the general subject being discussed in forthcoming issues.

It hardly seems necessary to touch upon such a widely recognized fact as personality. Its supreme importance is universally conceded, in that whatever one's belief may be concerning a future life, no one expects anything more than the persisting of personality in the future existence. Other things may be—accepted as purely temporal. The great majority of people believe in the persistence of personality,—the one thing that has possibilities of persistence. Its supreme importance is self-evident.

With personality conceded by most intelligent human beings as being a spark of the infinite, and being the only thing infinite in things finite, we are forced to admit the supreme power of personality in human affairs.

Great natural laws are as much at work in the commercial world as they are in the world of chemistry, mathematics, theology, or astronomy, and in the analyzing of "Building a Business," these laws have been taken into consideration, and they must be recognized. Many things enter into the successful conduct of any business, but beyond them all, and standing alone, is personality.

Naturally, in the building of a business, several personalities,—many personalities, have their influence, and the building of a business is shaped by the character of the personalities most in control. One personality, however, must be dominant, and it is the dominant personality that determines a business. We referred last week, under the title "What's in a Name," to the growing tendency toward impersonality in businesses. While business concerns are apparently becoming more impersonal in that the general public or consumers are unaware of the personality or personalities behind a business, they are there just the same, and the growth or success of a business, or its failure or decline, are determined by some one dominant personality.

However dominant a personality may be, it is always affected by other personalities, and the dominant personality of today is likely to be superseded by another dominant personality tomorrow, so that the personality or the personnel of a business largely determines what that business shall be, and measures its building.

There is a growing tendency among large and successful enterprises, in their relationship to their employees, to go beyond the working powers simply, and instead of demanding certain things of them for eight or ten hours a day, they go further and make demands upon them covering the entire twenty-four hours, seven days in the week, and the twelve months of the year. Is there in this a tendency to interfere with individual rights? It is barely possible that there is some such suggestion, but the success of any army depends upon its discipline. Its supreme authority is in the general dominant personality. The same law applies in the building of a business, and whether or not it is conscientiously recognized among business men, it is becoming more true every day.

A modern railroad corporation some time ago said to its employees that they should not use intoxicating liquors while on duty. They are now going further, and saying that they shall

not use them at all. They are interfering with a man's individual prerogatives, and yet no thinker watching the trend of human affairs can say that the railroad corporation is in the wrong. The personality of the man at the top, and the man at the bottom, and of the man in between, must be such as shall make for the most efficient operation of a business.

Large corporations which are continually more successful are recognizing that they must not only prohibit certain things which are injurious to the employees, and therefore to business, but that they must so conduct their business in its relation to the employee that in addition to prohibiting that which interferes with success, they must install methods, etc., that will add to success. Far from interfering with the individual rights of employees, large businesses are recognizing in a much broader way than ever before in the history of the world the rights of employees, and further, are recognizing that fair treatment of an employee brings added returns to the business. A personality should not only be prevented from retrograding, and allowed to grow, but it should be aided in its growth; and big businesses which are to be built, and built to endure, must recognize the value of elevating character, which is an attribute of personality.

This seems like a sermon, and the subject seems like a text, but perhaps preaching is nothing but discussing facts, and personality is the most tremendous fact of the ages.

Rightly or wrongly, the almost universal feeling among bankers, merchants and manufacturers is that the business of the country is held up, by the delay in deciding the application of the eastern roads for a five per cent increase in rates. That business is within very narrow and constrained lines is very evident. Railway business, some insist, is poor because general business is dull. It seems more fair to say that general business dullness is a reflex of the railway situation. A year ago when everything was booming, railway net earnings were not in line with the general prosperity. It is the net which controls. When and as it became apparent that any improvement would be stubbornly fought, and obtained, if at all, only after a long and wearisome struggle, business took alarm and went into a decline. What tonic there will be in a rate increase granted more than a year after it was applied for, is a matter of conjecture. But that there will be a continued depression and general lack of confidence, if better rates are denied, hardly admits of doubt.

The New York Tribune has an excellent cartoon entitled "Watchful Waiting." It represents business as a patient in Dr. Wilson's private office. The office boy comes out of the private office and says "The doctor says he will see you next fall."

The program last announced by the Interstate Commerce Commission is beautifully indefinite. It says that the hearing of evidence on the question of whether the railways need more revenue is closed and argument will begin April 27th. After that, the second question as to how they may proceed to get that revenue, will be taken up with all the collateral issues of free service, spotting cars, lighterage, etc. Considerable evidence on these subjects has already been heard; but what there is yet ahead to consume time and delay action, does not yet appear.

The representatives of the Interstate Commerce Commission who have been examining the records of purchases

made during the past five years by the trunk lines, have undoubtedly acquired considerable information of a primary school nature. They have found variations in prices and they have probably found that prices depend on what it is that is purchased, and on a multitude of market and other conditions.

They thought that they smelled something which was not sanitary—what they have been able to locate remains to be seen. A large amount of money has been expended and expense incurred in a search which was foredoomed to failure as far as results of any practical value are concerned. The elder Weller's conjecture regarding matrimony "Vether it's vorth while to go through so much to learn so little," suggests itself. Meantime all business has been held up while the clothes of railway officials have been gone through, for evidence of graft or inefficiency. Manufacturers and shippers are next to be stood up in line with hands up, while a trade commission bares even the thought and intent of their hearts.

Some Natural Laws of Social Intercourse and Trade.

A reader who was considerably interested in the editorial on Procrustean methods, in the Review of April 11th, has taken the trouble to make up a list of some natural laws of social intercourse and trade, as suggested and set forth in that article. As this analysis may interest others we give it as follows:

- 1—Supply and demand must in time balance each other.
- 2—Quality of work and material influences prices.
- 3—Price will vary with quantity.
- 4—Prices are regulated by the shifting prices of the world.
- 5—The best for the purpose, is the most economical.
- 6—Service is a criterion of value.
- 7—Rates for service and prices for materials and appliances cannot be the same at all times and in all places.
- 8—A going business can exist only on a basis of fair profit to producer and seller, and reasonable cost to consumer.
- 9—Business cannot continue when conducted on fixed principles which exclude individual initiative and reward.
- 10—Standards which are unchangeable, defeat progress and eventually reverse its wheels.
- 11—Industries which are mutually dependent cannot be segregated and operated independently without disaster.
- 12—The course of trade and industry untrammelled, except by moral law, has always contributed to the betterment of the race.
- 13—Action must conform to the general condition of the world's activities.
- 14—Regulation of trade and industry must provide flexibility to secure efficiency.
- 15—Every legitimate business transaction will inure to the benefit of all concerned in it.
- 16—Men cannot be held to responsibility without commensurate authority.
- 17—Development depends on freedom of thought and action.
- 18—Liberty is an inherent right of all men, and its only limit is at the point where it interferes with the rights of others.
- 19—Individualism cannot be wholly crushed out and be replaced by a dead level of socialism.
- 20—The race goes backward when the individual is deprived of the motives for industry, ingenuity and initiative.
- 21—Extremists are men who are blinded by a single idea or a group of ideas, and fail to reckon with the real facts of human nature, and the countless variations developed under laws which are immutable.

22—Natural ability is a valuable asset when coupled with experience and trained judgment. When unregulated, it is a menace to the social order.

SUPPLY TRADE NOTES.

—The Dearborn Chemical Co. has transferred its south-eastern branch office from Birmingham, Ala., to Atlanta, Ga., 1407 Candler building, where C. H. Everett, and J. F. Boutelle, representing the Dearborn company in that territory, will have their headquarters.

—Isham Randolph, consulting engineer, announces that he has moved his office to room 1827 Continental & Commercial National Bank building, Chicago, where he will continue his practice as consulting engineer.

—Elbert J. Fuller has been appointed representative of the Hunt-Spiller Manufacturing Corporation of Boston. Mr. Fuller, until his connection with the Hunt-Spiller Manufacturing Corporation was with the Chicago & North Western Ry. and he resigned his position on that road to accept this new position.

—A. Z. Polhamas was recently made chairman of the executive board of S. F. Bowser & Co. S. B. Bechtel has been advanced from assistant general manager to the position of general manager. W. G. Zahrt succeeds Mr. Bechtel as assistant general manager and E. H. Briggs has been made general sales manager.

RAILWAY NEWS.

Atchison, Topeka & Santa Fe.—See New Roads and Projects under Texas.

Canadian Northern.—The Canadian Northern Pacific Ry., it is said, will complete grading on its lines in British Columbia by the middle of August. Grading from the present end of the completed line north of Kamloops to Blue River, Mile 141, will be finished about the middle of July and from the latter point to Albreda Summit, Mile 182, some time in August. On the section between the Summit and Yellowhead Pass, the grading has all been done. The line has been prepared for steel from rail-head near Cisco, 140 miles from Port Mann, through to Kamloops. The bridge at Cisco, one of the most important crossings of the Fraser river, is expected to be ready by August 1. Two other bridges close to Lytton will probably be completed a few weeks sooner. Bridge construction is well advanced along the North Thompson route and it is expected that the different structures will be ready by the time the grading is finished. Steel has been laid on 269 miles of track, leaving 230 miles yet to be laid to complete the line through British Columbia.

Construction work, according to report, will be begun this year on the Canadian Northern Ry. from Oliver to St. Paul de Metis, Alta. The work of cutting the right of way is now practically completed and about 15 miles of grading has been done. The line will run northward close to Battenberg, Egremont, Radway Centre, south of Smoky Lake, and thence east to St. Paul de Metis.

Chicago, Burlington & Quincy.—A representative of the Chicago, Burlington & Quincy has been quoted as saying that track elevation desired by the citizens of Aurora, Ill., would involve an expenditure of \$3,000,000 but that the railroad was ready to make the improvement.

Chicago, Milwaukee & St. Paul.—The Northwestern Elevated R. R. has notified the track elevation department of the city of Chicago that work on the elevation of the company's tracks north of Wilson avenue will begin at once. The tracks are the property of the Chicago, Milwaukee & St. Paul Ry., and are used jointly by the steam and elevated railroads. The cost of the work will be about \$2,000,000.

Detroit, Toledo & Ironton.—The Detroit, Toledo & Ironton R. R. has applied to the Ohio utilities commission for permission to issue \$250,000 6 per cent equipment trust notes.

Great Northern.—Louis W. Hill, president of the Great Northern Ry., is quoted as saying that the road's proposed steamship wharves and terminals on the Pacific coast will

be located at Flavel, three miles west of Astoria, Ore. Yardage facilities, it is said, will accommodate 1000 cars. It is estimated that contracts for construction will be let at once and the work completed early next year.

Kansas City, Mexico & Orient.—Funds sufficient for taking the Kansas City, Mexico & Orient Ry. out of the hands of receivers and placing it on a paying basis have been obtained in New York, according to a telegram received in Kansas City April 14, by W. T. Kemper, president of the Commerce Trust Co., and a member of the Orient organization committee. The telegram was from J. Z. Miller, who is in New York representing Mr. Kemper in the negotiations. The Columbia-Knickerbocker Trust Co., of New York, according to the telegram, has underwritten \$5,500,000 in two-year notes for the reorganization committee. The proceeds will permit the paying off of the receivers' certificates and current debts and take the road out of the expensive receivership, according to Mr. Kemper.

Lehigh Valley.—The Lehigh Valley R. R., it is said, will soon begin work in four-tracking its line from Glen Onoko, Pa., to Penn Haven Junction, Pa., a distance of about five miles.

Maine Central.—The Maine Central R. R. has sold \$6,000,000 5 per cent notes, callable at any time at 102½. The indenture securing the issue provides that no mortgage be placed upon the property during the life of the notes.

Missouri Kansas & Texas.—In accordance with the agreement with Attorney General Lowney of Texas to separate the Texas holdings of the Missouri Kansas & Texas Ry. from the other property, the following directors of the Texas company have been elected: A. F. Platter, S. B. Perkins and William Bacon, Greenville, Tex.; Geo. B. Taliaferro, San Antonio, Tex.; and W. H. Dougherty, Gainesville, Tex., who succeeded J. C. Whaley, E. P. Wilmot, Paul Waples, J. N. Simpson and E. N. Reardon. Directors re-elected are: Frank Trumbull, chairman; C. E. Schaff, president; W. H. Wolfe, Dallas, and E. D. Stager, Bonham, Tex.

New Orleans, Texas & Mexico.—The protective committee for the first mortgage bond holders of New Orleans, Texas & Mexico R. R., it is said, will meet within a few days to vote upon authorization of \$1,200,000 equipment trust notes to purchase additional equipment for St. Louis, Brownsville & Mexico Ry. Receivers would buy 15 locomotives, 500 freight cars and a small number of baggage and passenger cars, as previously mentioned in these columns.

New York Central Lines.—The consolidation of the New York Central & Hudson River R. R. with the Lake Shore & Michigan Southern Ry. has been authorized by more than two-thirds of the stockholders in the two companies and the directors of the two companies will proceed immediately to the execution of the agreement. The accomplishment of the consolidation will then wait upon the approval of the agreement by the stockholders and the consent of railroad commissions through whose jurisdiction the two lines run.

J. P. Morgan & Co. have bought \$40,000,000 4½ per cent refunding and improvement 100-year bonds of the New York Central & Hudson River R. R. The firm also has a six months' option, it is said, on \$30,000,000 additional bonds of this issue, which will be sufficient to cover the company's requirements for the current year. Of the \$40,000,000 bonds just taken by the bankers, \$15,000,000 have been sold privately and the balance of \$25,000,000 are being offered for public subscription at 95¾.

New York Connecting Railroad.—The New York Connecting R. R. has received authority to issue \$5,000,000, forty-year 4½ per cent bonds to be used for further construction and expansion.

Northwestern Pacific.—The Northwestern Pacific R. R., now building between Willits and Shively, Cal., expects to have the road completed and open for service by autumn of this year. All but 32 miles of the track is now laid. Of this latter stretch, grading work is completed on 20 miles, and much work has been done on the remaining 12 miles. By the latter part of next month the tracks will be only 12 miles apart, with the Eel river between. No work will be done toward bridging the river until low water.

Pennsylvania Railroad.—Actual work on the electrification of the main line of the Pennsylvania Railroad from Paoli, Pa., to Broad Street station has been started. The engineering department has decided upon the catenary system of overhead construction. For several months the railroad engineers have been studying four systems of overhead construction, and in this connection an experimental stretch of one mile was constructed between Radnor and St. David's. The electrification of the Paoli line will cost \$4,000,000, while

the Chestnut Hill branch will cost \$1,250,000, a total cost of \$5,250,000. The work will be completed by next fall.

St. Louis, Brownsville & Mexico.—See New Orleans, Texas & Mexico R. R.

Seaboard Air Line.—See New Roads and Projects under Florida.

Southern Pacific.—Stockholders of the Southern Pacific Co. voted on April 8 an increase of \$20,000,000 in capital, sufficient to provide enough treasury stock to exchange for \$55,000,000 of new convertible bonds on demand. See Railway Review of February 14.

PERSONALS.

G. W. Hayden has been appointed assistant to chief purchasing officer N. M. Rice, of the St. Louis & San Francisco R. R., with headquarters at St. Louis, Mo., effective April 15. T. J. Powell having resigned, the office of purchasing agent is abolished. Mr. Powell, who has been connected with the railroad for the last four years has left the service to become manager of the railway sales department of the Pierce Oil Corporation.

J. N. Hicken has been appointed trainmaster of the Great Northern Ry., at Harve, Mont., succeeding W. A. Carswell, promoted. Thomas R. Patterson succeeds Mr. Hicken as chief dispatcher at Superior, Wis.

Thomas H. Pindell, formerly superintendent of the Chicago, Peoria & St. Louis R. R., at Springfield, Ill., has been appointed superintendent of the Alton & Southern R. R., with office at East St. Louis, Ill.

Alfred Mackrille, auditor of freight receipts of the New York, New Haven & Hartford R. R., New Haven, Conn., has been appointed assistant general auditor; T. M. Prentice,



J. H. P. Hughart, Recently Elected President of the Grand Rapids & Indiana Ry.

who was assistant to general auditor, has been appointed assistant auditor, and A. R. Down, who was traveling auditor, has been made auditor of freight receipts.

J. H. P. Hughart, whose election as president of the Grand Rapids & Indiana Ry., who was previously mentioned in these columns, was born in Pittsburgh, Pa., December 1, 1854. He attended Mr. J. R. Newall's private school in Pittsburgh until June, 1869, and at Massachusetts Institute of Technology from September, 1871, until the latter part of 1872. Mr. Hughart first entered railroad service with the Pittsburgh & Connellsville railroad, at Pittsburgh, September 1, 1896, as a clerk in the treasurer's office and he was subsequently in engineering service; also in the auditor's office of the Union Line at Pittsburgh. He entered the service of the Grand Rapids & Indiana R. R. Co. May 1, 1874, as president's clerk, serving in this capacity until December 1, 1874. From December 1, 1874, to February 28, 1877, he was president's clerk and purchasing agent; February 28,

1877, to March 31, 1887, secretary and paymaster; March 31, 1887, to April 22, 1892, secretary and assistant to president; April 22, 1892, to August 1, 1896, second vice-president and general manager; August 1, 1896, to March 31, 1906, general manager of Grand Rapids & Indiana Ry.; March 31, 1906, to April 1, 1914, vice-president and general manager. As previously reported Mr. Hughart was elected president of that company April 1, 1914.

T. B. Fogg, general manager of the Toledo Terminal R. R., with office at Toledo, Ohio, has resigned to accept service with another company, and the duties of that office have been assumed by A. B. Newell, president and general manager. J. E. Withrow has been appointed trainmaster, with office at Toledo, Ohio.

L. H. Tutwiler, traveling storekeeper of the Baltimore & Ohio R. R., with headquarters at Baltimore, Md., has been appointed district storekeeper, in charge of the territory east of Parkersburg and the Staten Island Rapid Transit Ry., with headquarters at Mount Clare shops, Baltimore. E. W. Thornley, storekeeper at Glenwood shops, has been appointed district storekeeper, in charge of the Pittsburgh district, or the lines from Cumberland to Chicago, and branch lines, with headquarters at Glenwood shops, Pittsburgh, Pa. F. A. Murphy, traveling storekeeper, has been appointed district storekeeper, in charge of the Wheeling district, or the lines from Grafton, W. Va., to Columbus, O., and the ports on the Great Lakes, with headquarters at Wheeling, W. Va. H. P. McQuilken, storekeeper at Washington, Ind., has been appointed district storekeeper, in charge of the Southwestern district, or the lines of the Baltimore & Ohio Southwestern from Parkersburg to Cincinnati, Louisville and St. Louis, and the Cincinnati, Hamilton & Dayton Ry. from Cincinnati to Indianapolis, Decatur, Springfield, Dayton and Toledo, with headquarters at Cincinnati. A new organization of the stores department has been made with a view to improving the supervision over the stock of railway material and supplies with respect to the quantities on hand, and in caring for such articles as are used by the various departments. The position of traveling storekeeper has been discontinued and the work of the stores department has been centralized under the supervision of district storekeepers. D. L. Donaldson has been appointed storekeeper at Parkersburg, W. Va., succeeding J. D. Burke, resigned.

H. E. Hutchens, general superintendent of Northern district of the Southern Railway, with headquarters at Greensboro, N. C., has been appointed superintendent of passenger transportation, with headquarters at Washington, D. C. W. M. Cowbig, superintendent of transportation, has been appointed superintendent of freight transportation, at Washington, and the office of superintendent of transportation is abolished. R. E. Simpson, superintendent of the Knoxville division, succeeds Mr. Hutchens at Greensboro, as general superintendent of the Northern district; O. B. Keister has been appointed superintendent of the Knoxville division, with headquarters at Knoxville, Tenn., succeeding Mr. Simpson; F. S. Collins, superintendent of the Mobile division, with headquarters at Selma, Ala., in place of Mr. Keister, and M. O. Dunbar succeeds Mr. Collins as trainmaster of the Charlotte division, with headquarters at Greenville, S. C.

TRAFFIC.

F. L. Word has been appointed live stock agent of the Georgia Southern & Florida and Hawkinsville & Florida Southern railways, with office at Atlanta, Ga.

J. A. Streyer, general freight and passenger agent of the Macon, Dublin & Savannah R. R., has been appointed traffic manager, with offices heretofore at Macon, Ga.

E. Gegenbach has been appointed general agent of the freight and passenger departments of the St. Louis & San Francisco R. R., at St. Louis, Mo.

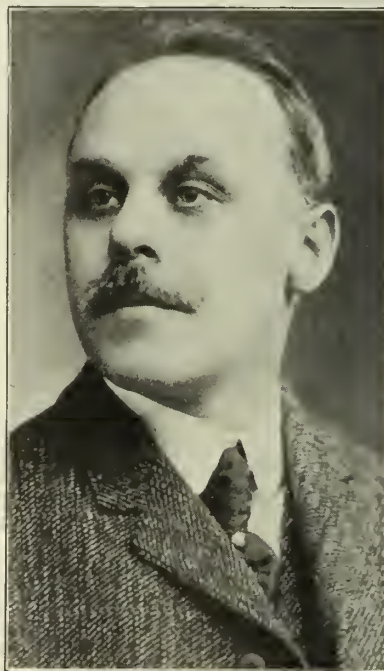
L. C. Morris has been appointed city passenger and ticket agent of the Lehigh Valley R. R., Rochester, N. Y. E. M. Horner, district passenger agent, Rochester, having resigned to become associated with the Rochester chamber of commerce, the office of district passenger agent is abolished.

J. L. West, whose appointment as traffic manager of the Missouri, Kansas & Texas Ry., of Texas, was announced in a previous issue, was born at Belleville, Ill., August 16, 1868. He received a public school education and entered railway service in 1889 as stenographer in the road department of the Missouri, Kansas & Texas Ry., at Parsons, Kan. Mr. West's entire railroad career has been with that company as stenographer, rate clerk in general freight office, chief clerk general freight office, assistant general freight agent and general freight agent. In these positions he has represented the Missouri, Kansas & Texas lines at Parsons, Kan.; Sedalia, Mo.; Denison, Tex.; Dallas, Tex.; Houston,

Tex.; Kansas City, Mo.; St. Louis, Mo., and again at Dallas, since 1910.

A. R. Malcolm, commercial freight agent of the Missouri Pacific, St. Louis, Iron Mountain & Southern, Denver & Rio Grande and Western Pacific railways at Milwaukee, Wis., has been appointed assistant general freight agent of those roads, with headquarters at Omaha, Neb.

John J. Koch, whose appointment as assistant freight traffic manager of the Pennsylvania Lines West of Pittsburgh, was recently noted in these columns, was born in Pittsburgh, Pa., February 10, 1861. He entered the service of Pennsylvania Company, office general freight agent, January 3, 1879, remaining in that capacity until October 31, 1881. He has been



John J. Koch, Assistant Freight Traffic Manager, Pennsylvania Lines West of Pittsburgh.

with the Pennsylvania system continuously. He was clerk in division freight agent's office, Pennsylvania Company, November 1, 1881, to February 28, 1884; chief clerk same office, March 1, 1884, to April 14, 1897; division freight agent of the Pennsylvania Company, April 15, 1897, to June 30, 1908 and general freight agent, July 1, 1908, to February 16, 1914. He was appointed assistant freight traffic manager of the Pennsylvania Lines West of Pittsburgh with office at Pittsburgh, February 16, 1914.

Alexander Tinling, assistant general freight agent of the Northern Pacific Ry., at Tacoma, Wash., has been appointed assistant general freight and passenger agent at Seattle, Wash.

ENGINEERING.

E. G. Lane has been appointed district engineer maintenance of way of the Baltimore & Ohio Southwestern R. R., with headquarters at Cincinnati, Ohio. Mr. Lane was formerly division engineer at New Castle, Pa.; engineer maintenance of way at Pittsburgh, Pa., for five years and since January 1, 1912, has been assistant engineer on the general operating staff of the Baltimore & Ohio, at Baltimore, Md. H. B. Dick, hitherto district engineer maintenance of way at Cincinnati, has been granted leave of absence on account of ill health.

George W. Boschke, chief engineer of the Oregon-Washington R. R. & Navigation Co., with headquarters at Portland, Ore., has resigned. Reports say that Mr. Boschke has formed business connections with a firm of contractors.

Felder Furlow, assistant engineer, Eastern and Northern districts of the Southern Railway, has been transferred to Birmingham, Ala., in charge of construction department work.

R. W. Williams, assistant engineer of the Southern Railway at Birmingham, Ala., has been appointed as assistant engineer of the Alabama Great Southern R. R. in charge of construction of additional main track.

A. F. Blaess, whose appointment as engineer maintenance of way of the Illinois Central R. R. and Yazoo & Mississippi

Valley R. R., was noted in a previous issue of the Railway Review, was graduated from the University of Michigan, civil engineering department, class of 1895. From 1895 to 1896 he was employed as chainman and rodman on preliminary and location surveys for the Detroit & Mackinaw Ry. Mr. Blaess entered the service of the Illinois Central as track apprentice in 1897, served in that capacity for about three months and was then transferred to the engineering department as rodman. He subsequently held various positions, ranking from rodman to assistant engineer, until 1902 when he was appointed road supervisor. He was appointed roadmaster in 1905 and was so employed until 1911 when he was made assistant engineer maintenance of way, Illinois Central and Yazoo & Mississippi Valley railroads. He was district engineer of the latter road from September 1, 1913, to November 1, 1913, and district engineer of the Illinois Central, Northern lines, since then until his recent promotion which has just been announced.

C. S. Kirkpatrick has been appointed division engineer of the St. Louis, Brownsville & Mexico Ry., with headquarters at Kingsville, Tex., succeeding E. S. Heyser, resigned to engage in other business.

MECHANICAL.

P. W. Helwig, general car foreman of the Minneapolis & St. Louis R. R., has been appointed master car builder of the Chicago & Alton R. R., succeeding T. M. Ramsdell, resigned to take service with another company.

OBITUARY.

Sir William Whyte, a director and formerly vice-president of the Canadian Pacific Ry., died at Coronado Beach, Cal., April 14. Sir William Whyte was born in Fifehire, Scotland, on Sept. 15, 1843. He was educated in Scotland, and in May, 1862, commenced railway work as a station agent on the West of Fife Railway. He came to Canada in June, 1863 and secured a position on the Grand Trunk Ry., for which company he worked for 20 years. He was freight agent at Toronto for a time and was for over one year division superintendent. From 1883 to 1884 he was general superintendent of the Credit Valley Ry., and also served in that position with the Ontario & Quebec Ry., which also included the Credit Valley and Toronto, Grey & Bruce railways. In 1884-1885 he became general superintendent of the Ontario division of the Canadian Pacific Ry., which embraced all the lines in Ontario west of Smith Falls Junction. The following year he was general superintendent of the eastern division as well as the Ontario division, and from 1886 to 1897 he served as general superintendent of the western division. It was in 1897 that he was appointed manager of the western lines, including all lines west of Lake Superior, and occupied this position until 1901, when he became assistant to the president. This position he filled for three years, and on Jan. 1, 1904, was elected second vice-president, with headquarters at Winnipeg, which position he filled up to a little over two years ago, when he retired from active service, although continuing as a director of the company.

Joseph J. Brooks, general counsel of the Pennsylvania Lines West of Pittsburgh, died April 10. Mr. Brooks was born in Salem, O., November 23, 1845. He was graduated from Yale University with the degree of bachelor of arts in 1867. For two years he pursued law studies in the Harvard Law school, winning the degree of LL. D. In 1870 he entered into general law practice in Pittsburgh and continued in private practice until 1881, when he became assistant counsel for the Pennsylvania Lines West of Pittsburgh. Since 1893 he had been general counsel for the Pennsylvania Lines.

John R. Skinner, superintendent of stores of the Delaware & Hudson Co., at Oneonta, N. Y., died suddenly on April 6 at his home in that city.

NEW ROADS AND PROJECTS.

Alabama.—The Vredenburgh Saw Mill Co., Vredenburgh, Ala., has extended its line 12 miles from Vredenburgh to Coy, Ala., and is now operating passenger trains from Corduroy to Coy, 20 miles.

Alberta.—See Railway News under Canadian Northern Ry.

Arizona.—See New Roads and Projects under Utah—San Pedro, Los Angeles & Salt Lake R. R.

Arkansas.—The J. H. Phipps Lumber Co., Fort Smith, Ark., is completing construction of an 18-mile line, the Black Mountain & Eastern Ry. The road connects with the St. Louis & San Francisco R. R. at Combs, Ark., and extends south toward Ozark, Ark., with terminus now in the timber.

Florida.—The Tampa & Gulf Coast Ry., now building from Tampa to St. Petersburg, Fla., has completed the line through Green Springs, while much of the right of way has been cleared to Clearwater, 33 miles from Tampa. Difficulties have been encountered in securing right of way into St. Petersburg and the company may go either to Gulfport or Big Bayou.

The Seaboard Air Line Ry. is reported to have completed its extension from Bartow to Pembroke, Fla., 8½ miles, and will award contract in a few days to build a line east from Bartow about 25 miles to a point 6 miles east of Lake Wailes.

The Atlantic Coast Line R. R., according to a Florida press report, is preparing to extend its line from Sebring, De Soto county, Fla., south to Immokalee, Lee county, a distance of 75 miles. It is stated that the right of way was secured some time ago from Sebring, and actual construction will commence within a very short time. The new line would skirt the western shore of Lake Istapoga and then run in a southwesterly direction across Fish-Eating creek to Labelle, crossing the Caloosahatchee river at that town and thence to Immokalee.

Georgia.—Hoyt Brannon, cashier of the Farmers & Citizens' Bank, Dawsonville, Ga., has written to the Railway Review advising that Lumpkin and Dawson counties Georgia, are in great need of railroad facilities, that there is business to support a road and local people would assist in financing.

Surveys are being made for the Cumming & Norcross R. R., which would run from Norcross, Ga., to Cumming, Ga., a distance of about 23 miles. The company has been organized by local people. See Railway Review of April 4.

Minnesota.—A press report states that the Minneapolis, St. Paul & Sault Ste. Marie Ry. is planning to build a branch line starting from the Wheat line at Warren, Minn., and running parallel with the Great Northern Ry. north into Kitson county and joining with the main line at Noyes, Minn.

Missouri.—The recently chartered Caldwell County & Southern R. R. has elected the following officers: David Miller, Kansas City, Mo., president; L. L. Frost, Mirabile, Mo., vice-president; H. C. Shively, Kingston, Mo., secretary, and F. L. Bowman, Kingston, treasurer. S. C. Rogers, of Kingston, has been appointed engineer and general manager. The company proposes to build 9½ miles of railroad from Kingston to a connection with the Chicago, Burlington & Quincy R. R. at Hamilton, Mo.

A charter has been issued to the Rolla, Ozark & Southern Ry. which has headquarters at Rolla, Phelps county, Mo. The railroad is to be constructed from that town to Anutt, Dent County, a distance of 18 miles. The capital stock is \$200,000 and the first board of directors are as follows: F. W. Webb, J. Ellis Walker and E. W. Walker, of Rolla; E. C. Comstock, of Lecom, and J. A. Frank, of Anutt. The road will open up an extensive belt of timber and mineral lands, now remote from railroad facilities.

North Carolina.—The Atlantic & Carolina R. R., capital \$50,000, has been chartered to build and operate a line from Warsaw to Kenansville, N. C., a distance of about ten miles. The line is completed from Warsaw, on the Atlantic Coast Line R. R., to a point within two miles of Kenansville, and the remainder will be finished within a few weeks. The railroad, which is standard gage, is being constructed and financed by A. R. Turnbull, president and general manager of the Rowland Lumber Co. of Bowden, N. C. The incorporators and directors of the new company besides Mr. Turnbull are: W. J. Jones of Norfolk, Va.; T. A. Hefty of Bowden, N. C.; L. A. Beasley and H. D. Williams of Kenansville, N. C., and R. D. Johnson of Warsaw, N. C.

The Greensboro, Northern & Atlantic Ry. has completed surveys for the proposed line from Greensboro, N. C., east to Durham and north from Burlington, N. C., to Danville and Lynchburg, Va. Financing has not been entirely arranged. Approximately \$500,000 has been subscribed by the several counties in North Carolina through which the railroad would run.

Oklahoma.—The Kansas & Oklahoma Southern Ry. proposes to offer a \$2,000,000 issue of bonds to raise \$900,000 required to complete 61 miles of railway from Caney, Kan., to Vinita, Okla. The company has already expended \$320,000, it is said, for grading, etc., between these points and 40 miles of line is ready for track laying. S. M. Porter, Caney, Kan., is president and B. J. Dalton, Lawrence, Kan., is chief engineer. See Railway Review of March 7.

South Dakota.—It is stated that the Fairmount & Veblen Ry. will begin grading immediately on proposed extension

from Veblen, S. D., to a connection with the Chicago, Milwaukee & St. Paul Ry. at some point in Day county, about 40 miles of standard gage railroad.

Tennessee.—A meeting was held this week in Nashville, Tenn., to take steps toward the organization of the Nashville & Cornith R. R. Allan W. Jones is interested, also George S. Bruce, civil engineer. The Nashville Industrial Bureau, A. P. Foster, secretary, Nashville, Tenn., may give information.

Texas.—A report says that surveys will soon be made for a branch of the San Antonio, Uvalde & Gulf Ry. to Aransas Pass, Tex., about 25 miles.

A press report states that the Atchison, Topeka & Santa Fe Ry. has arranged to issue bonds in the sum of about \$2,500,000, to be secured by a mortgage on the Pecos & Northern Texas Ry., including the lines from Clovis to Canadian, Tex., and from Canyon to Lubbock, Tex. It is also stated that the proceeds will be used to construct a line of railroad from Slaton, Tex., to Ft. Worth, Tex., passing through the counties of Crosby, Dickens, King, Knox, Baylor, Young and Jack, and using for a part of the way the Gulf, Texas & Western R. R.

Utah.—The press report that the San Pedro, Los Angeles & Salt Lake R. R. is contemplating construction of a line of railroad from Modena, Utah, south to the Grand Canyon, has been denied.

Virginia.—The Sulphur Springs Lumber Co. has purchased a large tract of lumber in Scott county, Virginia. Eight miles of railroad will be built.

Wisconsin.—The Baraboo, Devils Lake & Western R. R., which plans to build about 100 miles of railroad from either Cashton or La Crosse, Wis., via Baraboo to Portage, Wis., does not contemplate any construction work this year. Both steam and electricity will be used. T. E. Meade, Baraboo, Wis., is general manager. See Railway Review of March 7.

Electric Railways.

The Peninsula People's Right of Way Co., San Mateo, Cal., has been chartered and plans are being made for an electric railway south from San Francisco to San Mateo county. The capital stock is \$750,000 and a like amount of bonds will be issued.

John G. King, Lexington, Ky., has inaugurated a movement for the formation of a local company for the construction of an interurban line from Lexington to Richmond, 26 miles. He estimates the cost will be \$660,000.

The work of completing the double track on the Buffalo-Lockport division of the International Railway between Lockport and North Tonawanda, N. Y., has been begun, and it is expected that the two tracks will be in operation by June 1. The company proposes to expend in excess of \$2,000,000 in Buffalo during the summer months in improving its roadbed, replacing old rails, stringing new wires and for new pavements.

Stockholders of the San Francisco-Oakland Terminal Rys. have voted to increase the bonded indebtedness of the company from \$20,000,000 to \$35,000,000, subject to the approval of the California railroad commission. This is a step toward the complete refinancing of the company. Of the \$35,000,000, it is stated that \$20,000,000 will be set aside to provide for the old indebtedness either at time of maturity or whenever claimants choose to cancel the obligations. The fund will also provide for the bonds issued by other corporations whose properties were acquired by purchase or consolidation. The new bond issue will be known as "first and refunding thirty-year 5 per cent gold bonds," and will be secured in the regular manner. Part of the \$15,000,000 remaining will be used to acquire property within the purpose of the corporation and for the extension and improvement of its facilities and the improvement and maintenance of its service. This company is double-tracking its line to Point Richmond at a cost of \$325,000.

It is reported that a California syndicate is negotiating for the purchase of the Twin City & Lake Superior Ry., known as the "Arrow line." It is understood that construction on a line to Superior and Duluth, Minn., will be started immediately after control is secured to compete with the electric line between Superior and the steel plants. The Arrow line was incorporated in 1907 and has stock to the par value of \$1,600,000 outstanding, which was sold at from 15 to 50 per cent of the face value. About 50 miles of the right of way have been graded.

A proposition to build an electric railway from Fort Worth to Mineral Wells, Tex., about 60 miles, is again being considered, the contemplated route being via Azle, Springtown

and Poolville. R. O. McCormack, secretary of the Chamber of Commerce, Fort Worth, may give information.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Ferro Carril del Pacifico, Columbia, has ordered 2 Forney type (0-4-2-T) locomotives from the American Locomotive Co.

—The Pisco a Ica Ry. has ordered one four-coupled (2-4-0) locomotive from the American Locomotive Co.

—The Maryland & Pennsylvania R. R. is in the market for 2 Mikado (2-8-2) locomotives.

—See Railway News under New Orleans, Texas & Mexico R. R.

—The Jackson Iron & Steel Co. has not ordered one locomotive from the American Locomotive Co., as reported in our previous issue, but has asked for prices.

—The Chicago & North Western Ry., according to report, will purchase 35 locomotives.

Freight Cars.

—The San Antonio & Aransas Pass Ry. is contemplating the purchase of 50 freight cars.

—The Boston & Maine R. R. is reported as contracting with the Laconia Car Co. to apply 3500 steel underframes recently purchased from the Pressed Steel Car Co.

—See Railway News under New Orleans, Texas & Mexico R. R.

—The Solvay Process Co. is in the market for 50 steel hopper cars, 150,000 lbs. capacity.

—The Pennsylvania Railroad has entered an order for the immediate construction of 41 box cars at its Altoona shops. These are to be of the same type as described in the Railway Review of April 4.

—Phelps, Dodge & Co. have ordered 25 ore cars from the Pressed Steel Car Co.

Passenger Cars.

—The Chicago, Milwaukee & St. Paul Ry., reported in the Railway Review of April 11 as contemplating the purchase of additional passenger cars, is in the market for 10 coaches, 2 combination passenger and baggage, 2 combination mail and baggage, 11 sleeping, 3 observation and 1 dining car.

—See Railway News under New Orleans, Texas & Mexico R. R.

Machinery and Tools.

—The Pennsylvania Lines West of Pittsburgh are in the market for about 20 machine tools for its shops at Indiana Harbor, Ind.

Iron and Steel.

—The Chesapeake & Ohio R. R. has ordered 3000 kegs of spikes. The Illinois Steel Co., it is said, took part of this order.

Bridges.

—The Tug River & Kentucky R. R. (Norfolk & Western Ry.) seeks the War Department's approval of plans for a bridge across the Tug fork of the Big Sandy river, about 10 miles above Williamson, W. Va.

—The Virginian Railway has ordered 300 tons of bridge material from the Roanoke Bridge Co.

—Contract for the steel superstructure of a bridge to be erected over the Fraser river for the Kettle Valley Ry. has been awarded to the Canadian Bridge Co.; estimated cost, \$300,000.

—See Railway News under Chicago, Burlington & Quincy R. R.

Buildings, Terminals, Etc.

—The Illinois Central R. R. is building a new roundhouse at Jackson, Miss., and will make some additions to its yard facilities at that point.

—The Oklahoma corporation commission has prepared an order requiring the Rock Island Lines and the St. Louis & San Francisco R. R. to construct a union depot in Oklahoma City, Okla.

—The Cincinnati, New Orleans & Texas Pacific Ry. will begin construction of proposed new shop building at Chattanooga, Tenn., within 30 days. The structure will cost about \$40,000.

—The Lehigh Valley R. R., according to report, will let contract at once for a new station at Lackawanna, N. Y.

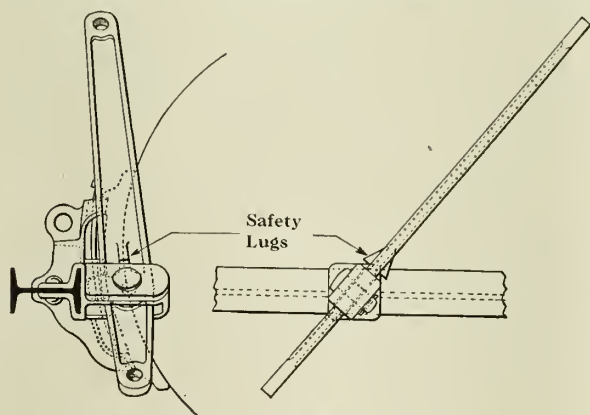
—The Algonquin, a large summer hotel at St. Andrews,

N. B., owned by the Canadian Pacific Ry., was destroyed by fire April 11, an estimated loss of \$500,000.

Plans prepared by the St. Louis Southwestern Ry. for improvements at Ft. Worth, Tex., call for a new freight depot to cost about \$60,000. Construction for the most part will be done by the company's force. The new structure will be 300 ft. long, with covered platform 380 ft. in length; second story 34x40 ft.; steel frame; brick walls; concrete foundation; reinforced concrete floors, platforms, etc.

Safety Brake Levers and Clevises, National Malleable Castings Co.

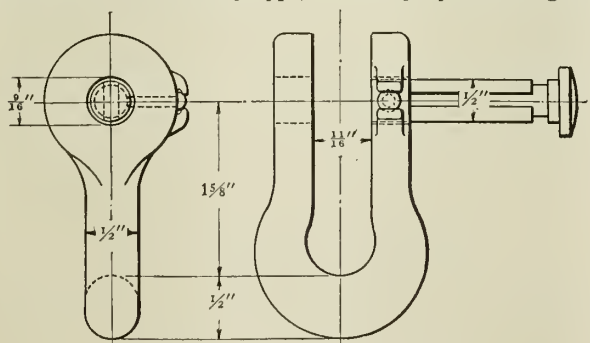
In order to prevent accidents resulting in the tearing off of brake beams, with consequent damage to cars, and even wrecks, which are frequently the result of the loss of the cotters in the brake lever pins, the National Malleable Castings Co., Cleveland, O., has devised a safety brake lever, having cast thereon two lugs, one on each side, just above the fulcrum pin hole. In case the fulcrum pin comes out, these lugs strike against the



National Safety Brake Lever.

edges of the fulcrum and so prevent the lever from slipping through it.

Another novel safety contrivance brought out by this company was devised in view of the fact that uncoupling rods very frequently become detached from the coupler locking mechanism because of the loss of the cotter in the clevis pin, which permits the pin to drop out and results in the loss of both the clevis and pin. This is a source of expense and, since the coupler is thereby rendered inoperative from the side of the car, also results in a violation of the requirements of the Interstate Commerce Commission. In order to remedy this defect in clevises of the ordinary type, the company has designed the



National Safety Clevis and Pin.

safety clevis and pin, shown on the illustration herewith, in which the pin is permanently fastened in one eye of the clevis and cannot be lost. The pin is also arranged so that when it is passed through both eyes of the clevis it can be locked in that position without depending upon a cotter to hold it. These clevises are furnished in four sizes, one of them having dimensions in accordance with the standards of the Master Car Builders' Association.

Literature descriptive of both of these devices is available on application to the address above referred to.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, APRIL 7, 1914.

- Electropneumatic brake apparatus, 1,092,141—Edward H. Dewson, New York, N. Y., and Walter V. Turner, Edgewood, Pa., assignors to The Westinghouse Air Brake Co., Pittsburgh, Pa.
- Railroad-tie, 1,092,198—Charles A. Allen, Galion, Ohio.
- Piston packing-ring, 1,092,201—Roy L. Burd, Chicago, Ill.
- Slack-adjuster, 1,092,215—Louis A. Hoerr, St. Louis, Mo.
- Foot-guard, 1,092,246—Herbert Frances Davis, Cumberland Center, Me.
- Electric signal mechanism, 1,092,266—Winthrop K. Howe, Rochester, N. Y., assignor to General Railway Signal Co., Gates, N. Y.
- Locomotive sand-box, 1,092,268—Harry Idoine, Altoona, Pa.
- Locking mechanism for train-pipe couplings, 1,092,296—Peter Schmidt, St. Louis, Mo., assignor to Durbin Automatic Train Pipe Connector Co., St. Louis, Mo.
- Journal-box, 1,092,306—Warren J. Sutliff, Schenectady, N. Y.
- Railway-tie and fastener, 1,092,335—John Byrne, East Liverpool, Ohio.
- Railroad-spike, 1,092,351—George Francis Garrity, Scranton, Pa.
- Pedestal car-truck, 1,092,357—John M. Hansen, Pittsburgh, Pa.
- Switch-throwing device, 1,092,372—Clarence E. Long, Fort Wayne, Ind.
- Safety and signaling device for railroads, 1,092,383—Dimond C. Newton, Owego, N. Y.
- Electric railway and signaling system therefor, 1,092,411—Louis H. Thullen, Edgewood, Pa., assignor to The Union Switch & Signal Co., Swissvale, Pa.
- Automatic switch-controlling mechanism, 1,092,423—Howard S. Blankenship, Norfolk, Va.
- Steel box-car, 1,092,456—Ralph V. Sage, Westmontborough, Pa.
- Railway signaling, 1,092,459 and 1,092,460—Jacob B. Struble, New York, N. Y., assignor to The Union Switch & Signal Co., Swissvale, Pa.
- Locomotive-fireman's coal-shoveling recorder, 1,092,466—George G. Weston, St. Louis, Mo.
- Railway-rail joint, 1,092,480—Henry C. Fox, Richmond, Ind.
- Metal car-roof, 1,092,484, 1,092,485 and 1,092,486—John J. Hoffman, New Kensington, Pa., assignor to P. H. Murphy Company, Parnassus, Pa.
- Cinder-deflector, 1,092,516—Ruby A. Beymer, Columbia, S. C.
- Railway-crossing signal, 1,092,521—Calogero Cannova, Sioux City, Iowa.
- Rail-holder, 1,092,525—Sanford Gasser, Sherman, Mich.
- Equalizer for car-trucks, 1,092,530—James H. Housman and Charles F. Jordan, Clifton Forge, Va.
- Grate-shaking guard, 1,092,546—Joseph L. Spani, Paragould, Ark.
- Optical system for headlights, 1,092,560—William Churchill, Corning, N. Y., assignor to Corning Glass Works, Corning, N. Y.
- Wheel-press tail-block, 1,092,597—George T. Reiss, Hamilton, Ohio, assignor to Niles-Bement-Pond Co., Jersey City, N. J.
- Rail-joint, 1,092,624—Oglesby Allen, Jr., Chicago, Ill.
- Rail-handling apparatus, 1,092,630—Benjamin F. Brown, Woodsville, N. H.
- Car-replacer, 1,092,635—Howard Denison and Sullivan Denison, Pittsburgh, Pa.
- Railway-rail, 1,092,646—George R. Hannon, Ivesdale, Ill.
- Car-door, 1,092,654—Eleseus J. Lee, Council Bluffs, Iowa.
- Dump-car, 1,092,659—John Daniel Mettler, Snyderstown, Pa.
- Tie and rail-fastener, 1,092,661—John R. Nagy, Martins Ferry, Ohio.
- Track-sander, 1,092,680—John H. Watters, Augusta, Ga.
- Spike, 1,092,683—Charles M. Wickham, Rockford, Ill.
- Packing-ring, 1,092,690—Clarence R. Bryant, Fort Worth, Tex.
- Car-ventilator, 1,092,705—William J. Fleming, Jr., Darien, Conn., assignor to Automatic Ventilator Co., New York, N. Y.
- Automatic railroad-gate, 1,092,712—Simen Hauer and Magnus B. Jacobson, La Crosse, Wis.
- Train-stopping apparatus, 1,092,718—Arnold O. Johnson, El-nora, Ind.
- Wheel-flange lubricator, 1,092,738—James H. Miner, Lumberton, Miss.
- Air-brake system, 1,092,812—Frank H. Dukesmith, Meadville, Pa., assignor to Thomas C. Van Horne, Pittsburgh, Pa.
- Compensating truck for railway cars, 1,092,814—Alfred J. Kellogg, Newberg, Oreg.



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OFFICIALS of the Union Pacific and Illinois Central railroads have recently arranged to extend the privileges of the Railway Educational Bureau, conducted on their lines for several years, so that officials and employees of other roads can participate in its benefits.

Twenty-five courses of instruction are available.

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APRIL 25, 1914.

Vol. 54

Railroads May Hold Water Lines Temporarily.

The Interstate Commerce Commission handed down a ruling, on April 18, which will allow such railroads as have applied to the commission for permission to retain an interest in affiliated water lines, to continue holding such interest at least until such time as the commission shall have passed upon the merits of their respective applications. The Panama law requires that the common carriers by rail which have direct or indirect interest in common carriers by water must divest themselves of that interest by July 1 if the two carriers may or do compete for traffic. The act confers upon the commission discretionary authority to determine whether the rail carrier shall divest itself of its water lines. It has been evident to the commission for weeks that it would be physically unable to pass upon all the applications by July 1. It probably will take several months to hear and determine the many proceedings which have been instituted. Meantime no change in the general situation will take place.

Car Surplus.

The American Railway Association's statement of car surpluses and shortages, issued April 15th, shows the largest surplus in five years—namely 213,324 cars. The increase in surplus box and coal cars is general all over the country. The coal shortage is practically wiped out, being only 455 cars. Two years ago the shortage was 51,554 cars and a year ago 13,217. Cars in shops number 193,812, or 7.99 per cent; a year ago they were 6.28 per cent of the whole.

Reluctant New Haven Witnesses Yield the Point.

All of the witnesses who last week refused to give testimony in the Interstate Commerce Commission's inquiry into the financial operations of the Billard Company with the New York, New Haven & Hartford R. R., have now agreed to testify fully concerning the facts in their possession and to produce the books and papers of the Billard Company. Confronted by indictment and criminal prosecution for their refusal to respond to "lawful questions" of the commission, the witnesses concluded not to press their contention that the questions asked constituted an invasion of their personal rights. It is expected that the next hearing will be on April 29.

Forty-five Months of Safety First on C. & N. W. Ry.

A statement has been issued by R. C. Richards, chairman of the central safety committee of the Chicago & Northwestern Ry., showing that a total of 292 fewer persons were killed and 9475 fewer persons injured on the Northwestern road during the 45 months ending March 31, 1914, than the number killed and injured in the 45 months' period which ended June 30, 1910. As the "safety first" movement was initiated 45 months ago, the Northwestern ascribes its decrease of 21.9 per cent in the number of persons killed and its decrease of 24.7 per cent in the number of persons injured directly to this movement. Since the inception of this movement four years ago there has been a decrease of 31.6 per cent in the number of employees killed, a decrease of 25.1 per cent in the number of employees injured, a decrease of 23.3

per cent in the number of passenger injured, of 19.2 per cent in the number of outsiders killed, and a decrease of 7.1 per cent in the number of outsiders injured.

Models Show Lumbering on National Forests.

The United States Government has prepared two models which show how the government sells its timber, for display at the Forest Products' Exposition, to be held in Chicago, April 30 to May 9, and in New York, May 20 to 30. These models represent an acre of western yellow pine land in a national forest of the Southwest before and after logging. In the model showing the stand before the lumberman goes into it the trees range from those only a few years old to large, overmature, stag-headed individuals more than ready for the ax. In the second model the mature trees and all others larger than a certain diameter have been cut down and made into logs and cord-wood. In this, as in all government sales, the stumps are cut low to avoid unnecessary waste, logs are taken to a small diameter well up into the tree, and such material as is not fit for lumber is converted into cordwood. Together, the models show the care which the government requires of lumbermen in felling old trees so that the young growth is not injured. The brush is piled in heaps for burning after the lumber has been removed, in order that the fire menace which usually follows lumbering may be done away with. The models are on a scale of about one inch to five feet, so that trees approximately 100 feet tall are about 20 inches high in the models. It is the intention of the forest service to have these models set forth certain points in regard to the timber sales conducted by the government. They will demonstrate, in the first place, that the timber on the national forests is for use; placards tell how it is sold to the highest bidder when it is wanted for commercial purposes, and how it may be given away to local settlers and prospectors for developing homesteads or mines.

Conductor Acquitted of Government's Charges.

A jury in the United States District Court, at Cincinnati, Ohio, returned a verdict of acquittal, April 18, in the case in which William A. Boyer, of Chicago, one of the two conductors of the Chesapeake & Ohio Ry. of Indiana was charged with violating the Interstate Commerce law in accepting less than the regular fare for the transportation of a passenger between Cincinnati and Chicago.

Project for Farm Study, National Civic Federation.

The executive committee of the National Civic Federation constituted a department to study agricultural conditions, on March 23, and President Seth Low has now named a committee on plan and scope for this department, and the personnel which is representative of all phases of the subject has been made public. At the meeting at which the original action was agreed upon addresses were made by representatives of the large farmers' organizations and by agricultural experts favoring the creation of such a department and letters were read from Secretary D. F. Houston of the department of agriculture and from Ambassador Myron T. Herrick, both of whom cordially indorsed the project. In outlining subjects for study Secretary Houston said: "The plans proposed for rural betterment are numerous. These are plans for rural organization, for co-operative enterprises specifically for the marketing of farm products, and for rural credits, for rural sanitation, for improvement of the social and intellectual side of country life, for good roads, etc. Unquestionably, there should be improvement in all these directions. The question is mainly one of agency and method."

Railroads Sued for Hauling Unemployed.

The Chicago, Rock Island & Pacific and the Denver & Rio Grande railroads are said to have hauled recently, into

Colorado Springs, Colo., about 165 men who had been marching as an "army of unemployed." For this action, suit to collect \$33,000 as penalty and \$5,000 damages has been filed in the United States District court at Colorado Springs, by the commissioners of El Paso county against the railroad companies. The action is based upon a statute which provides that any person who brings into and leaves in the county any pauper or paupers, knowing them to be paupers, shall pay a penalty of \$200 for each offense.

Santa Fe Conference on Freight Damage Claims.

Officials of the A. T. & S. F. Ry., to the number of more than 100, recently held their semi-annual conference at San Diego Cal., at which, among other things, plans were discussed for reducing as far as possible claims for damages presented by freight shippers. F. A. Lehman, assistant to the vice-president, in charge of operation, issued a statement describing the aim and purpose of the meeting in the following language: "We have been hammering on the loss and damage item through organized effort for five years with encouraging results, but there is still room for improvement. That is why we meet twice a year—to improve our methods of handling freight. Efficiency is our slogan, and when everybody adopts it in spirit and in truth, we shall have the loss and damage item cut to the bone. A loss or damage claim, as a rule, means that somebody has been careless, and our activity is in the direction of inducing every one having to do with the transportation of freight to exercise greater care in his work. By the employment of modern efficiency methods we expect to overcome this difficulty." F. C. Maegly, assistant general freight agent, said: "We have been fortunate in gaining the co-operation of our patrons in this movement. The shipper is just as desirous of receiving his freight in first-class condition as the railway is of delivering it to him in first-class condition. Our interests, therefore, are mutual. When we asked the shippers to assist us by adopting modern methods for the preparation of packages for transportation, and to see that their employees exercised more care in handling freight to and from the depots and cars, they promptly complied with our requests. On our part we hope, by a more careful loading and unloading of cars and of handling trains, to improve our showing year by year, till the item complained of is practically eliminated."

The Railway Club of Pittsburgh.

The monthly meeting of the Railway Club of Pittsburgh was held at the Monongahela House, Pittsburgh, Pa., Friday, April 24, 1914. A paper was presented on the subject of "Braking Power, Its Interpretation and Application," by Mr. Walter V. Turner, chief engineer of the Westinghouse Air Brake Co. This paper appealed especially to those interested in or responsible for brake design, installation or maintenance, it being an exposition of the underlying principles of brake installation which must be rigidly adhered to if brakes are to operate harmoniously and efficiently. An endeavor was made by Mr. Turner to clear up a situation which is at present befogged by a confusion of conflicting views.

Western Railway Club.

The regular March meeting of the Western Railway Club was held in the Florentine room of the Congress hotel, Chicago, on Tuesday evening, April 21, 1914. The subject presented for discussion at that meeting was entitled "Some Notes on Present Day Running Repairs," a paper thereon having been proposed by Mr. W. E. Dunham, supervisor

of motive power and machinery, Chicago & Northwestern Ry., Winona, Minn. This proved to be of unusual interest to the master mechanic, superintendent of shops, round house foreman, as well as the shop foreman. Attention was called in detail to where considerable economies could be obtained in the matter of care of running repairs, Mr. Dunham's varied experience having enabled him to speak authoritatively on this subject. The May meeting of the club, being the annual meeting, will be held on May 26, at the Sherman hotel, Chicago. A special entertainment program is being arranged for that meeting, in addition to which an election of officers will be held.

The head-line man sometimes gets mixed up, when he cannot use his favorite words "faces," "hit," "target," etc. "Death rides on prow of engine" is the latest. Next we shall hear that the pilot or cow catcher of a boat has struck a bridge pier, or something to that effect.

The Hedjaz Railway to Medina.

Until a few years ago the trip from Damascus to the moslem holy city of Medina was a journey of 35 to 40 days duration. With the recent construction of the Hedjaz Railway the journey from Haifa or Damascus to Medina has been reduced to 58 hours. United States Vice Consul S. Edelman says in a report, that it is enjoined upon Moslem pilgrims to visit at least once in their lives the cities of Medina and Mecca. The route now in use is by way of the Hedjaz line to Medina, return the same way, then embark at Haifa or Beirut for Jedda on the Red sea, the nearest port to Mecca. The administration of the Hedjaz railway has entered into a contract with the Khedivial mail line steamers to have ships in waiting at Beirut and Haifa for the trains from Medina. Immediate embarkation is possible and pilgrims lose no time in their journey.

It is the ambition of the Ottoman government to extend the Hedjaz Railway to Mecca, thus entirely eliminating the sea route. At present the distance from Medina to Mecca is 12 days by camel through an arid desert, and pilgrims as a rule, prefer to return north and reach Mecca by the sea route.

Until last year only first and third class cars were in use, but lately second-class cars have been introduced and commodious sleeping cars have been added for the benefit of first-class passengers. For this accommodation an additional charge of 100 piasters (\$4.40) is added to the price of the first-class tickets. All passenger cars are provided with necessary toilets, and fresh water is carried on all cars. Trains make five stops daily for a sufficient length of time to enable moslems to make their required devotions. At Derra and Maan are comfortable dining rooms and at the smaller stations, as Tebouk, Aman, and Medain-Salih, native buffets are provided.

The rates on the Hedjaz line are as follows: From Haifa to Medina and return—first class, 1184 piasters (\$52.10); second class, 888 piasters (\$39.07); third class, 570 piasters (\$26.05); from Damascus to Medina and return—first class, 1158 piasters (\$50.95); second class, 869 piasters (\$38.24); third class, 570 piasters (\$25.08). From the first of Chaaban (June 24) to the end of Zelcaade (October 18) a special reduction is allowed of 50 per cent on the above prices. Non-moslems are allowed to travel only a part of the way; entrance to Medina and Mecca to non-moslems being rigidly prohibited.

Heavy Freight Car Repair Facilities, L. S. & M. S. Ry., Ashtabula, Ohio

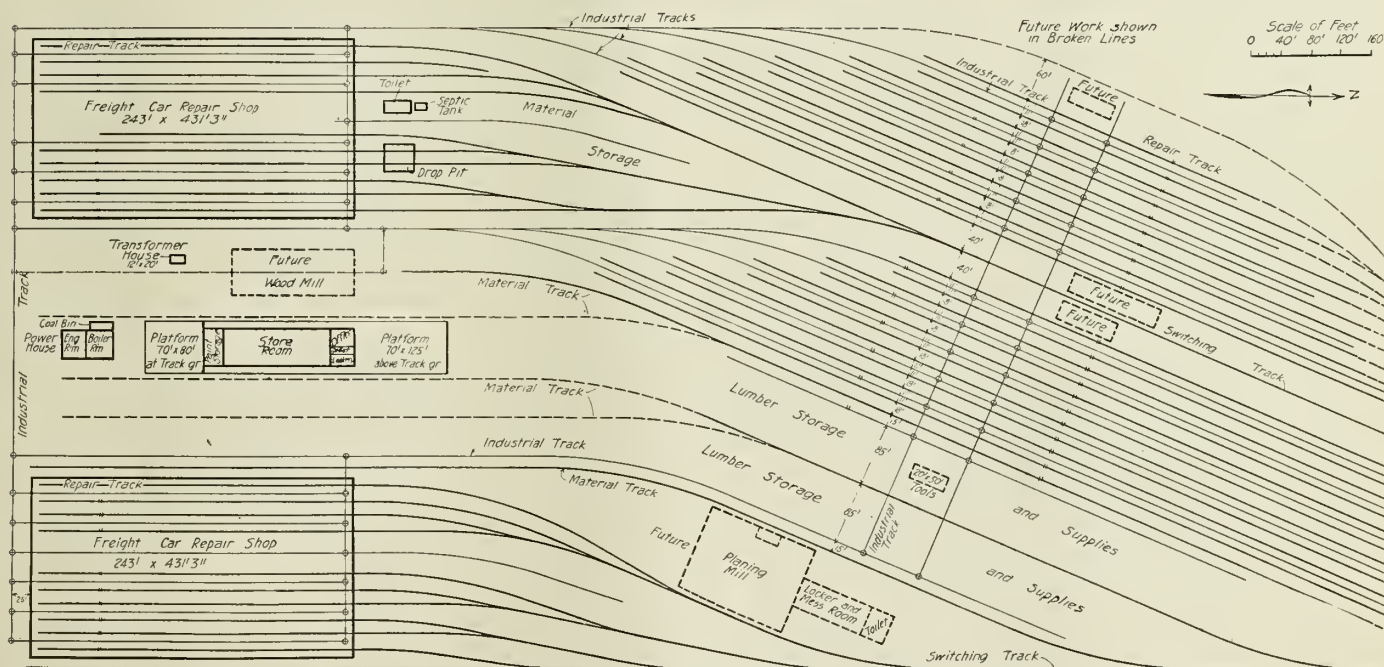
The Lake Shore & Michigan Southern Ry., having a considerable coal and ore traffic centering about Ashtabula, O., has found it expedient to establish a heavy car repair plant devoted exclusively to the equipment used in that traffic. This arrangement will have the effect of localizing the greater portion of the road's steel hopper and gondola car repairs at a point to which practically all of this equipment is brought in service, will eliminate the necessity of considerable amounts of non-revenue mileage in getting these cars to and from repair points not in this immediate territory, and will serve to relieve much of the congestion at those points where these repairs would otherwise have to be made.

The Lake Shore & Michigan Southern Ry. is now constructing at Ashtabula, O., new facilities for making heavy repairs to steel freight cars. This plant is being located at the largest ore and coal shipping point on the entire system, and also where the bulk of steel cars converge, and it is therefore obvious that the site selected is the most convenient for a shop of this kind. The general ultimate layout embodies the following features: Two large car repair buildings, wood mill, storehouse, machine shop, light repair yard to take care of about 400 cars, mess and

trial track between each pair of shop tracks. These industrial tracks connect with like tracks from all other shops and storage yards in the group by means of turntables.

Shop Equipment: The car repair shop is to be equipped with the following tools and apparatus: One 20-ton electric traveling crane which serves the middle bay (the cranes for the side bays are not installed at the present time); twenty-four stationary oxy-acetylene welding stations and two portable oxy-acetylene welding outfits, twenty-four stationary rivet forges 13½ by 33 in., six stationary rivet forges 9 by 27 in., six portable rivet forges, ten portable oil heaters with "Mars" fuel oil burner, and two portable riveting machines, 8 in. reach, 8¼ in. gap.

The blacksmith outfit consists of one 6 ft. 9 in. by 10 ft. double-end plate furnace, one 4 ft. 1½ in. by 8 ft. 3 in. double-end plate furnace, one 3 ft. 6¾ in. by 1 ft. 1½ in. furnace to serve 200-lb. Bradley hammer, one 2 ft. 3 in. by 3 ft. furnace to serve 1500-lb. hammer, one 1000-lb. capacity jib crane to serve 1500-lb. hammer, two large face plates, one small face plate, six standard forges, eight 300-lb. "Peter Wright" anvils, one large blacksmith forge, one ransom 18 in. by 3 in. dry grinder, one 1500-lb. Erie single-frame hammer, air driven; one 200-lb.



Layout of Freight Car Repair Shops and Yards, Lake Shore & Michigan Southern Ry., Ashtabula, O.

toilet building in yard to accommodate 306 men, toilet building at shops to accommodate 250 men, air brake shop and paint storage building, tool building, drop pit building, power house, etc. The buildings being constructed at the present time are as follows: Large car repair shop, power house, storehouse, drop pit building, toilet room, air brake shop, and a paint storage building.

The Car Repair Shop: This building is 243 ft. wide by 431 ft. 3 in. long and 23 ft. from floor to top of crane rail. It is divided into three bays—the middle bay for blacksmith, machine, and wood working tools, and the side bays for car repair tracks. It is constructed of concrete, brick and steel. The roof construction is of the monitor type, thus affording excellent light in all parts of the shop. Steel sash is used throughout. The building is designed for three 20-ton electric traveling cranes, one for each bay. There are ten freight car repair tracks running longitudinally through shop, with a standard gage indus-

trial track between each pair of shop tracks. These industrial tracks connect with like tracks from all other shops and storage yards in the group by means of turntables.

Bradley hammer, driven by 7½ horsepower motor, and one No. 8 Ajax bulldozer, driven by 20 horsepower motor. The plate and structural steel outfit comprises one 96 in. No. 3 Hilles & Jones plate straightening rolls, driven by 30 horsepower motor; one 70-ton Allen compression riveter; one Cleveland Punch & Shear Works Co. horizontal punch, driven by 7½ horsepower motor; one 200-ton hydraulic flanging press, driven by 15 horsepower motor, one Cleveland Punch & Shear Works Co. 48 inch vertical punch, driven by 7½ horsepower motor; one Weiner Machinery Co. combination punch, shear and angle cutting machine, driven by 10 horsepower motor.

In the general machinery department will be found one double-gap journal turning lathe, driven by a 15 horsepower motor; one Jos. T. Ryerson No. 2 friction saw, driven by a 35 horsepower motor, one Prentice 36 in. upright drill press, driven by a 10 horsepower motor, and one Baker Bros. 36 in. upright drill press, driven by a 10 horsepower motor. The following tools are group driven by means of a 15 horsepower motor: One

No. 304-A Oster pipe cutting and threading machine, one Wilmarth & Mormon twist drill grinder, one 2 in. Landis single-head bolt cutter, one 1½ in. Landis triple-head bolt cutter, one 2 in. Acme six-spindle nut tapper, one Fay & Egan automatic knife grinder, one 48 in. grindstone, one Ransom double emery wheel, one Lodge & Shipley 16 by 8 ft. engine lathe, and one layout table.

The following wood working machines are to be installed: One Fay & Egan 36 in. cut-off saw, driven by 15 horsepower motor; one Hamilton 42 in. band saw, driven by 7½ horsepower motor; one Fay & Egan 36 in. self-feed rip saw, driven by 15 horsepower motor; one Hamilton single-cabinet surfacer, driven by 10 horsepower motor; one American No. 7½ combination saw and dado machine, driven by 7½ horsepower motor; one Fay & Egan No. 331 extra range, heavy automatic car gaining machine, driven by 20 horsepower motor; one Fay & Egan No. 163 heavy 5-spindle vertical car boring machine, driven by a 15 horsepower motor; one Fay & Egan No. 350 extra range vertical hollow chisel mortiser, driven by 20 horsepower motor; one Fay & Egan No. 171 four-side timber dresser, driven by a 50 horsepower motor; one Hamilton 42 in. swing cut-off saw, driven by 15 horsepower motor, and one large layout table.

Air for the furnaces and rivet forges is to be furnished by three 4000 cu. ft. pressure blowers driven by 25 horsepower motors. Natural gas is used to heat the plate furnaces and stationary riveting forges, while oil is used in the portable forges. The artificial lighting throughout shop consists of 400-watt, 110-volt Mazda lamps with Holophane reflectors; suitable plug boxes are provided at columns and walls for hand extensions. The current supplied to this building for driving the tools and cranes is 440-volt, 3-phase, 25-cycle. The building is heated by direct radiation, high pressure steam being used through pipe coils, with loop return vacuum system.

Power House: This building is 67 ft. 2 in. long by 39 ft. 2 in. wide. Its foundation and floors are of concrete, the walls of brick, the roof trusses are of steel, and a composition roof is applied. The power house equipment includes the following: Two 110 horsepower locomotive type boilers, which furnish steam for heating system only, and one Ingersoll-Rand 1500 cu. ft. air compressor, driven by a General Electric 254 horsepower, 440-volt, 3-phase, 25-cycle motor, mounted on the main shaft of the machine. The air after-cooler and storage tanks are located outside of the power house building. There is also one 6 by 9 by 10 in. Blake-Knowles horizontal steam vacuum pump for handling the condensation from heating system, and which discharges same into an open-type feed water heater. Natural draft is obtained by the use of a steel stack 3 ft. 6 in. in diameter and 90 ft. high. Electric current for all purposes is purchased from the Cleveland, Painesville & Eastern Ry. Co. and delivered to the transformer building at 13,000 volts, 3-phase and 60 cycles, it then being transformed to 440 volts for power and 110 volts for lighting purposes. The transformer building is 12 ft. wide by 20 ft. long. The foundation and floor are of concrete, walls of brick, and roof is composed of 6 in. "I" beams covered with concrete roofing slabs.

Storehouse: This building is 50 ft. wide by 201 ft. 6 in. long. It is constructed of concrete and brick and has a shed type of roof. On one end of building is a second floor on which are located the offices of the general foreman of the shops and his assistants, also the file and record rooms. In the other end of building there is an oil room 15 ft. 9½ in. wide by 47 ft. 10 in. long in which the barreled oil and baled waste are stored. A 10 ft. receiving platform is provided on one side of the building and a 10 ft. delivery platform on the other; there are also large storage platforms at each end of the building. The platforms and first floor of the building are 4 ft. 8 in. above the top of the rail, and are composed of 4½ in. of concrete covered with 1½ in. of mastic finish.

The above data and information were made available through the courtesy of Mr. D. R. MacBain, superintendent of motive power, Lake Shore & Michigan Southern Ry., Cleveland, O.

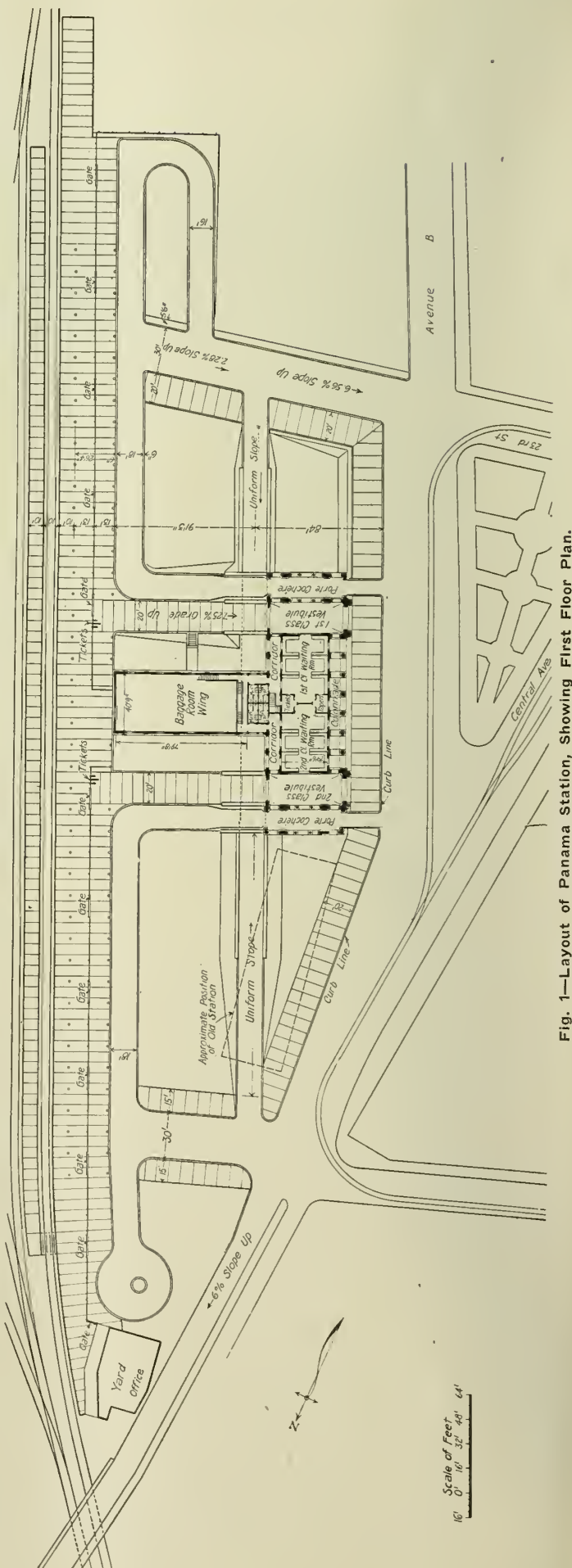


Fig. 1—Layout of Panama Station, Showing First Floor Plan.

New Station for Panama R. R. at Panama

The Panama R. R. has completed a new passenger station in the city of Panama, replacing the old one on nearly the same location. The plan of the new structure is T-shaped, the head portion, fronting 170 ft. on Central Avenue, with a depth of 55 ft., being occupied by the waiting rooms, while the leg of the "T," 106 ft. long and 40 ft. 9 in. wide, is occupied by the baggage room, toilet rooms, various offices, etc.

The main portion of the building is of the Renaissance style of architecture, with a front row of six columns of concrete 3 ft. 4 in. in diameter and 27 ft. high, flanked on either side by an arched vestibule 20 ft. wide, through which entrance is had to the waiting rooms, located as shown in Fig. 1, the vestibule at the right being for first-class passengers and that at the left for second-class passengers. The exterior walls of the building are of stucco, on terra cotta blocks, and the interior walls are of plaster on terra cotta. With the exception of the door frames and the window sash the building is fireproof. The main section of the building is two stories high, the first floor resting on the ground, at the street level. The back part of the structure, or the leg of the "T," also rests on the ground, 8 ft. below street level, and has three stories, including a mezzanine floor. The lower floor of the baggage room is used exclusively for baggage and express matter.

The station is of the through terminal type, and is so designed that the movement of passengers and vehicles is intended to be continuously forward. It being desirable to segregate the two classes of travelers, separate vestibules were provided for each, at opposite ends of the building, and these vestibules connect directly by inclines, at a slope of $7\frac{1}{4}$ per cent, with the train platform. The waiting rooms, between these two vestibules, are each 38 ft. 8 in. long, $29\frac{1}{2}$

ft. wide and 18 ft. 4 in. high, with a ticket office between the two. Between each waiting room and the tracks there is also a corridor, $7\frac{1}{2}$ ft. wide. The first-class waiting room has a floor of 12x12-in. red tiles on a reinforced concrete slab $6\frac{1}{2}$ in. thick, with ornamental paneled ceiling and walls. The second-class room has 6x6-in. tile floors, with walls and ceiling of plain plaster. The second floor has a reinforced concrete slab designed for a live load of 75 pounds per sq. ft.

The main portion of the building has a flat roof, consisting of a waterproof concrete slab. The baggage wing of the building has a hip roof, constructed largely out of iron work taken from the old station. The roof surface of this is of cement tile. The train platforms are of concrete laid on the ground and rough-finished with a spiked roller.

The train platform is 36 ft. wide and 800 ft. long, covered with a "butterfly" roof which projects 13 ft. over the driveway in rear of the same. The driveways are so arranged that a carriage may enter the station at the south, drive up to the platform, and leave at the north end of the station, passing under the inclined passageways which lead from the waiting rooms to the train platform. The platform is elevated 4 ft. above the roadway, as is also the floor of the baggage room. It should be noted that on each side of the station, adjoining the vestibules, there is a port-cochere, where carriages may drive up and discharge passengers. The train platform is separated from the grounds by an iron fence, in which there are ten gates or exits, five for the passengers of each class. In order to conveniently separate the two classes of passengers (the first-class being principally white, and the second colored laborers, East Indian coolies, etc.) the trains are made up with the baggage cars in the middle, the first-class passenger coaches on the south end and the second-class coaches on the north end,

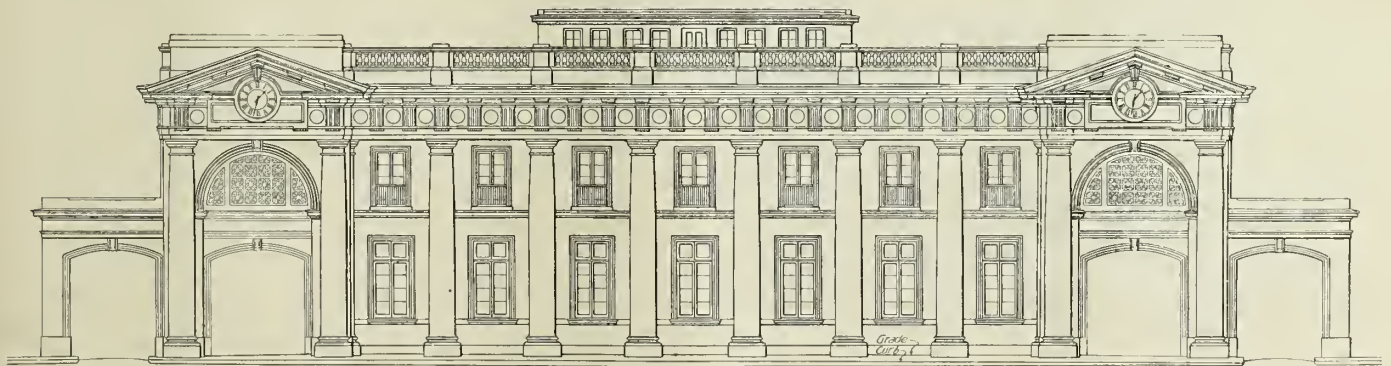


Fig. 2—West Elevation (Front) of Panama Station.



Fig. 3—South Elevation of Panama Station.

irrespective of the direction the train is to move. Hospital cars and observation cars are attached to the rear of the train.

The station was designed by the engineering department of the railroad, under the general supervision of Mr. Frederick Mears, chief engineer and general superintendent, of the Panama R. R. Mr. Homer R. Bartlett was the architect. The foundation walls, piers and platforms of the building were constructed by the regular forces of the Panama R. R.,

serving under engine tenders, passenger cars, those on the equipment of private car lines and street car lines we find that 20,000,000 chilled iron wheels in service is a conservative estimate of the total number, and indicating the extent to which it is necessary for the substitute to show itself to be superior, both in safety and economy, before it can be replaced by any other wheel.

The number of broken wheels and broken flanges in the chilled iron class as reported by the Interstate Commerce

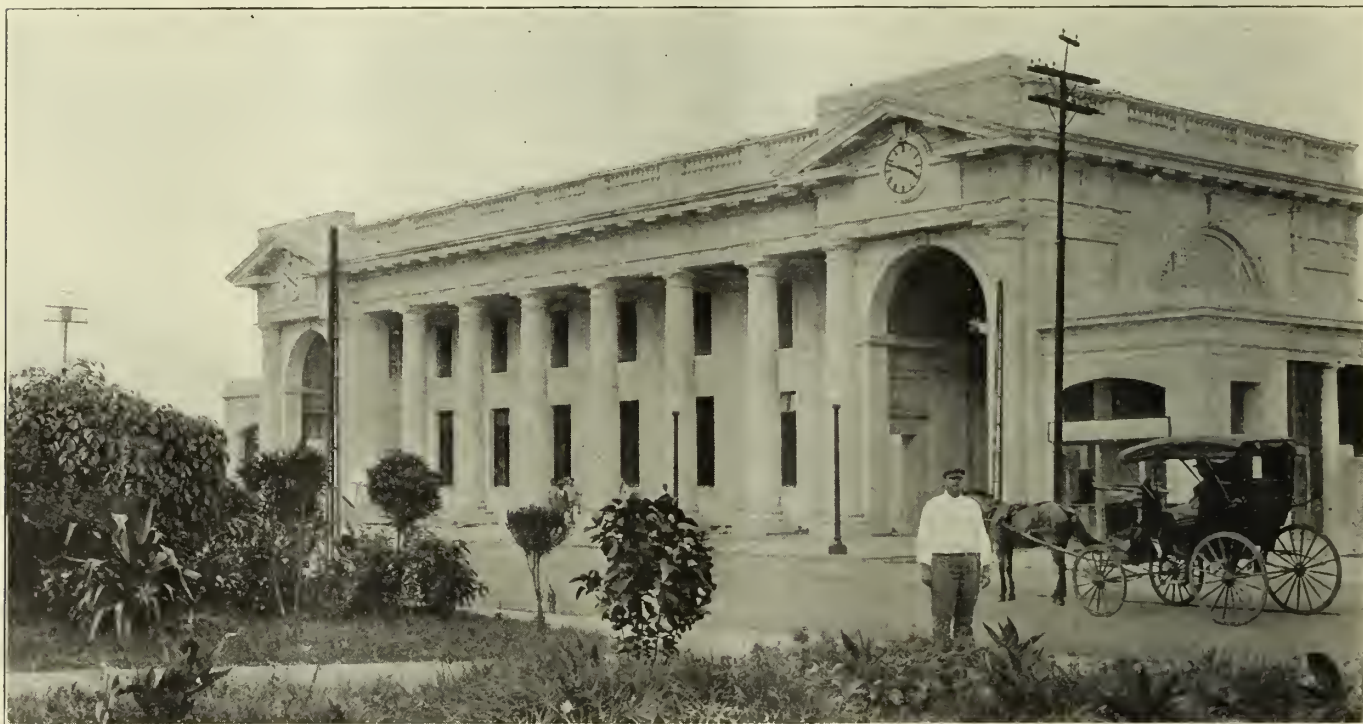


Fig. 4—Front View of Panama Station.

and the remainder of the work was let by contract to the Central American Construction Co. We are indebted to Mr. Mears for the photographs and drawings reproduced in this article.

Correspondence.

CHILLED IRON CAR WHEELS.

Chicago, Ill., March 2, 1914.

Editor, Railway Review:

In the evolution of the American railroad the chilled iron wheel has been a most important factor. This form of wheel came into prominent use in the year of 1850 with the introduction of the Washburn pattern, and for 64 years it has been a standard factor in transportation. The Interstate Commerce Commission gives a classified statement showing the number of locomotives and cars in service for the year ended June 30, 1911, as follows:

Locomotives	61,327
Passenger Cars	49,818
Freight Cars	2,309,517

Total 2,420,662

Reducing from this, the number of wheels in service we find about 1,000,000 wheels serving under engine-tenders and passenger cars and 18,476,136 wheels serving under freight cars. In as much as statistics will show that 97 per cent of all wheels in freight service are chilled iron wheels, there are in freight service at the present time, 17,921,852 chilled iron wheels. Adding to this number the chilled iron wheels

Commission for the year ended June 30, 1912, amounts to 5/1000 of 1 per cent of the total number of wheels in service. No known type of wheel is immune from structural failure in the flange, tread, plate and hub and the percentage of failures of other types of wheels to the number in service is so high, that no claim for superior safety can be consistently made for them.

In order to keep pace with the rapid development of freight cars, which, since the introduction of the chilled iron wheel, have increased from 10 to 50 tons in capacity, wonderful improvement in that form of wheel has been made and it is recognized that greater progress has been made during the past five years than in all the previous time of development. In addition to the general improvement, many manufacturers have recently introduced special wheels at a slightly increased price. These wheels embody all of the latest ideas in metallurgy and improvement in design made possible by extensive laboratory tests and years of careful study into the stresses produced in wheels under all kinds of service conditions.

During the past three years more than 300,000 special chilled iron wheels have gone into freight service, the majority of them being placed under cars of 50 tons or greater capacity, and many of these cars operate in localities where the conditions imposed on the wheels are of the severest character. The record shows that not one removal from service due to cracking or breaking of the metal in any part of the wheel has been reported to date. Thousands of special wheels have also been placed on engine-tenders and on steam and electric passenger cars with excellent results. Owing to the difficulty of maintaining accurate rec-

ords and the consequent lack of reliable data, opinions differ widely as to the average life of wheels in service under 50-ton freight cars. To determine this point, as well as to compare several makes of wheels, one of the large railroads inaugurated a test in 1907, in which year 500 50-ton coal cars were equipped with special chilled wheels. These cars operate as a rule in mountainous country and are constantly kept in service. It is found that at the close of the sixth year, more than 80 per cent of the wheels are still in service. It is safe to predict that the average life will be from eight to ten years.

It has been demonstrated by tests in laboratory and in actual service that chilled wheels have the following advantage over other types of wheels:

1. Greater economy in first cost and shop expense.
2. Less loss of metal in tread and flange per ton mile of service.
3. Greater ability to carry heavy loads, as the tread metal does not flow under pressure.
4. Twenty to 25 per cent greater braking efficiency.
5. Twenty to 40 per cent less consumption of brake shoes.
6. Less abrasion of steel rails.
7. Less power consumption.

It is sometimes claimed that there is a saving by the use of multiple wear wheels, because the cars are not removed from service so often for wheel renewals. The average mileage of single service chilled iron wheels is greater than the average mileage of multiple wear wheels between turnings, therefore this claim has not been substantiated; furthermore, as a result of wear and turning, the diameter of multiple wear wheels is reduced as much as four inches and it is readily seen that with this great variation in diameter it is practically impossible to maintain uniform braking force on the wheels under the same car and secure the proper braking force on the various cars of a train. In addition to this, the standard height of couplers cannot be maintained without great expense, and in electric service, motor trouble is encountered when all of the driving wheels are not of the same size.

Considerable attention has been given to the development of other kinds of one-piece and built-up wheels during the past 50 years and the fact that at the present time not more than 5 per cent of the total wheels in all classes of service in this country are of such types would seem to indicate that they have not yet proven entirely successful in providing increased safety, and certainly no one can seriously question the greater economy of the chilled wheels. It is evident that the long continued use of chilled iron car wheels is due to the fact that they are the best for any kind of service.

Geo. W. Lyndon, secretary.
Association of Manufacturers of Chilled Car Wheels.

Gasoline Locomotive for the Georgia Coast & Piedmont R. R.

Baldwin gasoline locomotives, built in accordance with patents granted to A. H. Ehle, have now been in service for several years, and have fully demonstrated their efficiency in light industrial and contractors' service. The success of these machines is, unquestionably largely due to the fact that they follow steam locomotive design where practicable, and embody features which have proved successful in this class of power.

The illustration shows a Baldwin gasoline locomotive recently built for the Georgia Coast & Piedmont R. R. This engine is used in light switching and road service, and was

designed for handling a load of 30 tons over grades of 0.5 per cent and curves of 300 feet radius. In preliminary trials, it handled approximately twice this tonnage. The track gage is standard, and the locomotive has a nominal speed of 6 miles per hour on low gear and 12 miles per hour on high gear. The hauling capacity given above applies to the latter speed.

This locomotive is propelled by a four-cylinder, four-cycle, water-cooled engine, of 50 horsepower nominal capacity. The power developed by the engine is transmitted to the wheels through a system of shafting, gearing and side rods. This furnishes a positive drive, with large journals and bearings throughout. The engine and transmission are covered by a hood, on top of which the gasoline tank is placed. This tank has a capacity of 30 gallons of fuel, sufficient to propel the locomotive a distance of 50 or 60 miles under average working conditions. The frames are steel castings, of the familiar bar type. The open construction of these frames facilitates the ventilation of the engine and the inspection of the transmission. This design of frame is very strong, and is also convenient for the suspension of the brake work, sand boxes and other fittings.

The locomotive is required to handle trunk line rolling stock, and its equipment has received special attention. Electric head-lights, iron pilots, and M. C. B. automatic couplers are provided at each end. Air-brake equipment is applied, air being furnished by a compressor driven from the main engine. The air reservoirs are mounted over the hood. Another important feature is a self starter for the main engine. This is driven by an electric motor, which receives its current from a storage battery. The latter is automatically charged by a generator driven from the main engine. This battery also furnishes current for the head-lights and cab-lights. The



Gasoline Locomotive for the Georgia Coast & Piedmont R. R.

equipment also includes a hand-brake, a bell, an air-operated whistle, and four sand-boxes with spouts to all the wheels.

Special attention has been given to the arrangement of the cab and cab fittings. The cab is roomy, with large side windows, and the fittings are so arranged that the operator can handle the locomotive without leaving his seat. Steps and grab irons are arranged as far as possible, in accordance with the requirements of the Interstate Commerce Commission. The appearance of the locomotive is strongly suggestive of steam practice. The effect is more pronounced because of the position of the muffler, which stands vertically and looks like a smoke-stack. This device is more efficient, rendering the locomotive almost noiseless in operation.

These machines possess special advantages for light switching and industrial service. They are like steam locomotives, self-contained, are reliable and simple in operation, and can be handled easily by one man. An advantage which is most apparent in intermittent service, is that they consume no

tives are designed with sufficient flexibility to take a curve of 31 degrees (180 ft. radius) at slow speed.

The freight traffic consists largely of copper ore and amounts to more than 5,000,000 tons per year. This material is handled in steel ore cars weighing about 18 tons and having a capacity of 50 tons each. Trains of 30 loaded cars weighing 2000 tons are made up at the Butte Hill yards and hauled by two-unit locomotives to the Rocker yards, where 4000-ton trains are made up for the main line. At the East Anaconda yards, the trains are again broken up and 1400-ton trains are sent up Smelter Hill to the ore bins. All of the shifting and "spotting cars," at the smelters and in the sorting yards, is done by single locomotive units.

Eight passenger trains per day are operated between Butte and Anaconda, four in each direction. The main line trains were first hauled by electric locomotives on October 1, 1913, and promptly demonstrated their ability to make better time than was possible with steam engines. Single locomotives are used, hauling trains of from three to five passenger and baggage cars.

Energy for the operation of electric trains is purchased from the Great Falls Power Co. The generating plant is located at



Fig. 3—Two-Unit Electric Locomotive Hauling Freight Train, Butte, Anaconda & Pacific Ry.

Great Falls, Mont., on the Missouri river, and has for some time been supplying electric power for the operation of the mines and smelters at Butte and Anaconda. Six hydroelectric units are installed, having a nominal rating capacity of 21,000 kw. The machines are of the horizontal type, generating 6600 volts, 3 phase, at a frequency of 60 cycles. The power is stepped up to 102,000 volts for transmission to the transformer substation at Butte, a distance of 130 miles, over two separate parallel lines constructed on the same right-of-way. An extension of the system transmits power at 60,000 volts to a second transformer station at Anaconda, 26 miles farther on.

The Butte station forms the center of the extensive power system operated by the Montana Power Co. Besides the Great Falls, 102,000-volt transmission lines, there are several 60,000-volt transmissions terminating at this point, which form a part of the Montana Power Co.'s system. These lines bring in power from the Hauser Lake, Canyon Ferry, Madison and Big Hole plants. At the Butte substation, this power is stepped down to 2400 volts, 3 phase, and all of these lines are tied in on the 2400 volt alternating current bus. Ample protection is therefore afforded from interruption of service.

It is an interesting fact that the railway load was taken on without any increase in the high tension transmission facilities. It is estimated that the additional load from this source is approximately 20 per cent of the railway, industrial and lighting load furnished by the street railways, mines, and smelters at Butte and Anaconda.



Fig. 4—Single-Unit Electric Locomotive and Passenger Train at the Butte Station.

The two existing electric substations at Butte and Anaconda were used to house the 2400-volt motor-generator sets required for operating the electric trains, so that no additional buildings were constructed for this purpose. Power is furnished by two 1000-kw., 3-unit motor-generator sets in each substation, taking power from the 2400-volt alternating current buses. These units operate continuously 24 hours per day, seven days of the week, to supply the necessary current for train operation. Each set consists of a 3-phase, 60-cycle, 1450-kva., 720 r.p.m., synchronous motor direct connected to two 500-kw., 1200-volt generators, insulated to operate in series for 2400 volts. The generators are compound wound and have both commutating poles and compensating pole face windings. These fields are connected on the grounded side of the armature, and the main fields are separately excited from 125-volt exciters.

The 1200-volt generators are provided with heatproof insulation and, owing to their unusually good commutating characteristics, will carry three times normal load for periods of five minutes, as well as the usual 30 per cent overload for two hours. An automatic voltage regulator is used to maintain an approximately constant voltage at the terminals of the motor by power factor regulation.

The 2400-volt switchboards for controlling these sets are the first direct current boards to be constructed for this high voltage. In general, they are similar to the standard 600-volt types with increased insulation and special provision for interrupting the 2400-volt current. The circuit breakers and switches are also

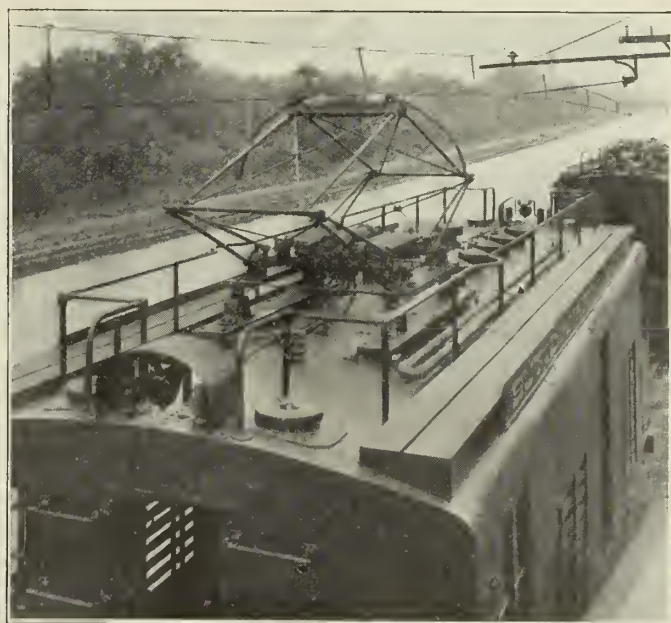


Fig. 5—View Showing Arrangement of Equipment on Roof of Electric Locomotive.

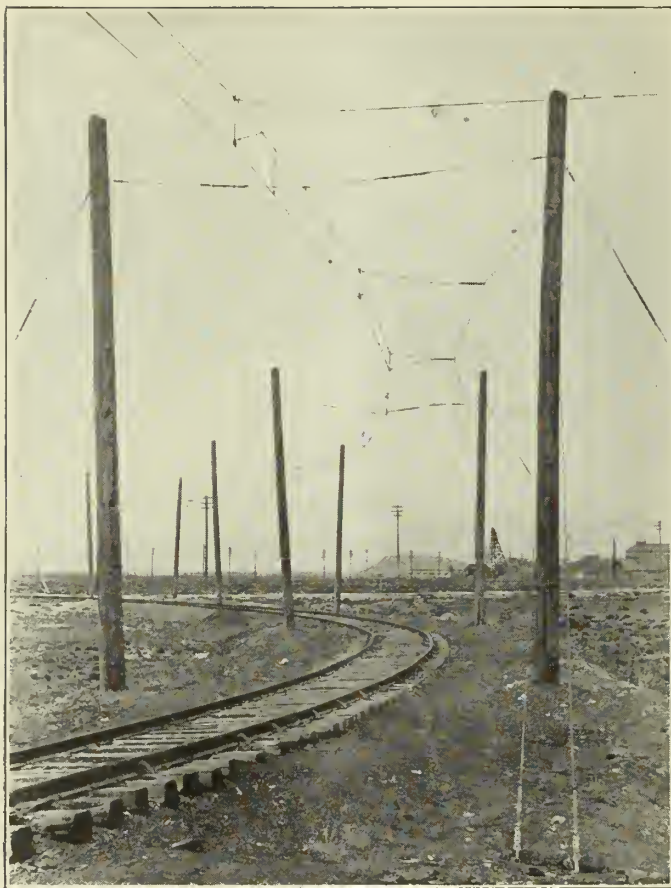


Fig. 6—Overhead Construction on Single Track Curve, Butte, Anaconda & Pacific Ry.

arranged for remote control, and all apparatus on the panels is provided with ample insulation to insure safety to operators. The 2400-volt circuit breakers and switches are installed on separate panels above and back of the main panels, and are operated by connecting rods from handles mounted on the front of the main switchboard. These handles are similar in appearance; and to avoid confusion, the circuit breaker handles are inverted. The breakers are equipped with special magnetic blowouts and are chutes, and provision is also made for automatically inserting a high resistance in the generator field at the same instant the main circuit breakers open, thus reducing the generator voltage.

The overhead construction for this system was especially designed to give the flexibility necessary for satisfactory operation of the pantograph trolleys used on the locomotives. The 0000 grooved copper trolley wire used over all tracks is supported by an 11-point catenary suspension from a stranded steel messenger cable. Both side bracket and cross span construction are used as required by the local conditions. There is a large amount of special work on account of the many yards and sidings, and in one case twelve tracks are spanned. The cross span construction used at this point is supported by a third pole between the eighth and ninth tracks. The hanger used on the straight line construction is a rolled steel strap looped over the messenger wire. This loop is closed at the car and the wire is clamped in place by a single bolt. Special pull-offs are used to increase the flexibility of the suspension. These hangers and pull-offs were illustrated and more fully described in the *Railway Review*, September 28, 1912.

The section breakers were designed for the 2400-volt service, and at six points insulated crossings are necessary at the intersection of the 2400-volt trolley with the 600-volt trolley of the city system. On the main line a very simple section insulator is used. This consists of paralleling the two trolley wires from

the ends of each section at a suitable distance for insulation so that the pantograph bridges the two circuits for a short distance, thus avoiding interruption of the power supply to the locomotive. The construction in the yards and sidings is simplified by paralleling the trolley from the side tracks for a short distance along the main line. This avoids the use of switch plates or similar devices. At some of these junction points the pantograph engages as many as six trolley wires.

The feeder layout with section insulators, switches, etc., is shown in the accompanying diagram. The 0000 trolley is reinforced between the substations with two 500,000-c.m. bare copper cables tapped to the trolley at intervals of 1000 ft. A 0000 negative return wire is also installed between Rocker and East Anaconda. This wire is carried on the trolley poles and is connected to the cross bonds at intervals of 1000 ft. The rails are connected by 0000 bonds at every joint. The substations are normally connected together by these feeders, allowing an interchange of current. In emergency either station can supply current to the entire system.

The locomotive equipment consists of seventeen 80-ton units, fifteen for the freight and two for passenger service. The freight locomotives are geared for slow speed and are operated in pairs for the main line service. The maximum free-running speed is 35 miles per hour.

The two passenger locomotives are of the same construction as the freight units, but are geared for a maximum free-running speed of 55 miles per hour. A speed of 45 miles per hour is made with three passenger coaches on straight level track.

The continuous tractive effort of a single 80-ton freight locomotive is 25,000 lbs., at 15 miles per hour. The maximum tractive effort for a period of five minutes is 48,000 lbs. based on a tractive coefficient of 30 per cent. These locomotives are of the articulated double truck type with all the weight on drivers. The cab contains an engineer's compartment at each end and a central compartment for control apparatus. An illustrated description of both the passenger and freight locomotives was published in the *Railway Review*, June 14, 1913. One of the machines was on exhibition at the Master Mechanics' convention, at Atlantic City, N. J., during the same week. It may be of interest to repeat here, however, a tabulation of the principal data and dimensions applying to the locomotives:

Length inside of knuckles.....	37 ft.	4 in.
Length over cab.....	31 ft.	
Height over cab.....	12 ft.	10 in.
Height with trolley down.....	15 ft.	6 in.
Width overall.....	10 ft.	
Total wheel base.....	26 ft.	
Rigid wheel base.....	8 ft.	8 in.
Track gauge	4 ft.	8½ in.
Total weight	160,000 lbs.	



Fig. 7—Section of Overhead Construction Where the Pantograph Engages Six Trolley Wires.

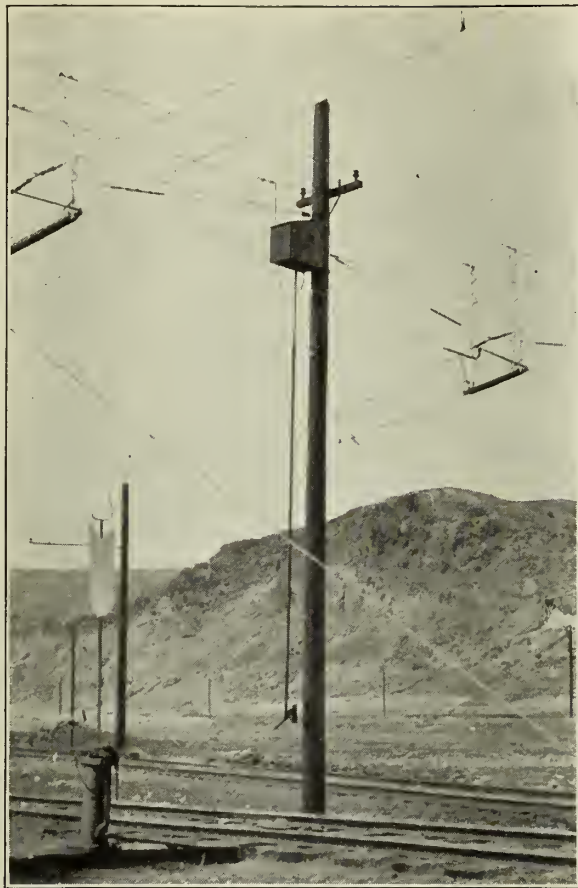


Fig. 8—One of the Insulated Sections at the Intersection of a City 600-Volt Trolley Line and the 2,400-Volt System.

Weight, per axle.....	40,000 lbs.
Wheels, steel tired.....	46 in.
Journals	6 in. x 13 in.
Gears, forged rims, freight locomotives.....	87 teeth
Gears, forged rims, passenger locomotives.....	80 teeth
Pinions, forged, freight locomotives.....	18 teeth
Pinions, forged, passenger locomotives.....	25 teeth
Tractive effort, at 30 per cent. coefficient.....	48,000 lbs.
Tractive effort, at one hour rating.....	30,000 lbs.
Tractive effort at continuous rating.....	25,000 lbs.

The locomotives have been maintained by the regular shop force with the assistance of one man experienced in electrical apparatus.

Standard 600-volt lighting fixtures are used on the cars, and each passenger and baggage coach is wired for five groups of five lamps in series. Lighting current is taken from a 600-volt

train line bus, which is connected to the dynamotor on the locomotives.

All of the passenger and baggage cars now used between Butte and Anaconda will be heated as well as lighted by electricity as soon as the equipment can be installed. The cars will be heated from a single heating unit installed underneath the car floor and supplied from a 2400-volt bus connected directly to the 2400-volt bus on the locomotive. This unit will have a maximum capacity of 25 kw. and will be used to heat the air which is distributed to different parts of the car by means of a small motor driven blower. Cool air will be drawn into the insulated case, enclosing the heating units, from some point on the roof of the car. After passing over the heating coils the air will be carried through ducts under the floor of the car to radiators placed between alternate seats. The blower has a capacity of from 500 to 1000 cu. ft. of air per minute, and the motor is connected in series with the heating units.

In order to increase the range of the heating equipment to meet the requirements of varying temperatures, provision is made for connecting the coils to give a total consumption of 10, 15, 17.5 or 25 kw. The temperature of the car is regulated at all times by a thermostat.

All apparatus for the electrification of this road was furnished by the General Electric Co., of Schenectady, N. Y.

Motor Cars for Use by Telegraph and Telephone Line Men.

By F. F. RIEFEL.*

This paper, read by the author before a recent meeting of the Western Division Association of Telegraph Superintendents, serves to contrast existing conditions in telegraph line maintenance with those of a decade or more ago when trains were depended on to carry repair men to and from the points at which work was to be done. At present, the delay and danger of congestion resulting from this practice could not be tolerated. The motor section car, in the author's experience, has demonstrated its utility as an economical means of keeping pace with the new conditions and the greater demands on the line-repair forces.

Before the advent of motor cars, station or section linemen depended entirely upon train service and the use of hand velocipede cars, and in some instances were compelled to walk many miles in attending to their duties out on the road. In those days train service was limited to about two or three trains in each direction, usually in the early morning, about noon and late

*Superintendent of telegraph, New York Central Lines West, Cleveland, O.



Fig. 9—Eight Track Tangent in the Butte Yards, Butte, Anaconda & Pacific Ry.

in the evening. Freight service was infrequent and on uncertain schedules. If line trouble developed after the departure of the morning or noon train, the linemen were compelled to resort to the use of velocipede cars or else wait for freight trains and it was sometimes a question, depending on the distance required to be traveled, whether or not the trouble could be cleared on the same day it developed. After a case of trouble had been cleared, there was usually a further delay in waiting for a return train, or else the long and tedious pumping of a velocipede car to headquarters, and in many instances no other work could be performed on that day.

Gradually the railroads have increased passenger and freight service, quickened schedules, reduced the number of stops, and increased tonnage so that at the present time the stopping of trains to let off and pick up linemen would materially increase the cost of train operation and also result in the congestion of traffic. In contrast with former conditions the motor car affords quick and cheap transportation with little physical exertion, and passenger and freight schedules no longer interest the linemen except in the matter of his own safety. By the use

passed the lineman; one a limited excess fare train, the other a local.

In another case, an "intermittent ground," measuring approximately fourteen miles from the lineman's headquarters, was reported at 6:30 a. m. and cleared 7:30 a. m., one hour before a train of any kind passed. In this case the ground was caused by a small piece tinsel and could not possibly have been seen from a moving train, and required several tests before locating. Without the motor car it would have taken at least two hours to have cleared the trouble. In still another case of trouble, the report was received at 7:30 a. m., and cleared at 8:30 a. m., delay one hour. This could have been cleared in thirty minutes by passenger train but would have required a wait until late in the afternoon for a return train. These are but a few of the many instances which occur every day that serve to prove the worth of the motor cars used by stationed or section linemen.

The importance of gang cars on general repairs and reconstruction is becoming more apparent each day, especially on railroads where camp cars are used and sidetracking facilities are far apart, or on the other hand, where the telegraph company's

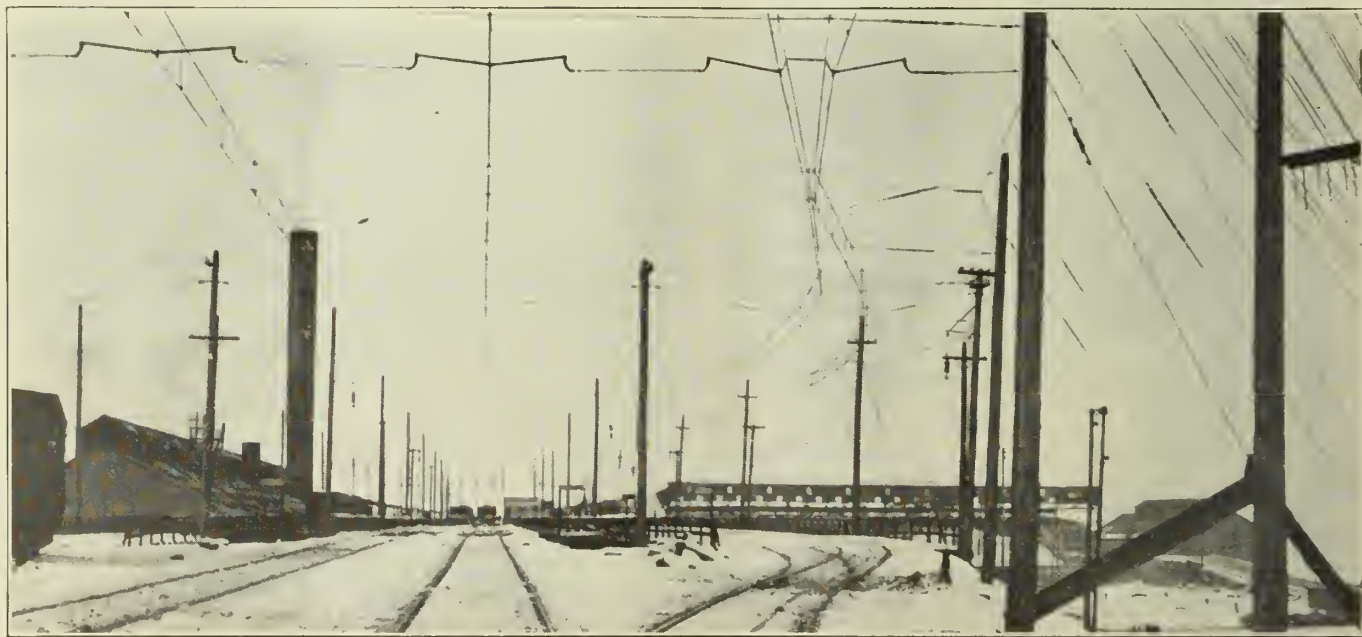


Fig. 10—Overhead Construction in Switching Yards, Showing Catenary Pull-Offs.

of motor cars linemen can cover the ground quickly, clear several cases of line trouble on a single trip, do a fair day's work at maintenance and reach headquarters at a reasonable hour at the end of the day without being fatigued to any greater extent than is induced by the actual work performed on the line.

On the Lake Shore & Michigan Southern Ry., the Toledo & Ohio Central Ry., and the Lake Erie & Western R. R., every stationed lineman has the use of a motor car, the individual territories covering from 40 to 225 miles of road. There are also nine telephone inspectors whose territories cover from two hundred to two hundred and fifty miles of road. These men look after all telephone equipment and maintenance. They are required to make an inspection of all equipment every thirty days, and in order that this may be accomplished, they are each furnished with a motor car. A few cases may be cited to show the advantage of use of motor cars in clearing troubles. Three cases of trouble on one lineman's territory, consisting of two opens and one cross, were reported at 6:30 a. m.; the first passenger train thereafter, was due at 8:45 a. m. The lineman started with his motor car and cleared the first case at 7:50 a. m., the second case at 8:30 a. m., and the third case at 11:30 a. m. This resulted in the saving of one hour ten minutes on the first case, two hours on the second and one hour twenty minutes on the third. During this time two passenger trains

boarding gangs are used. It is not unusual for gangs to cover from four to ten miles getting to and from work on account of inconvenient boarding facilities and one can well appreciate what it means in the way of lost time under these circumstances for gangs to use ordinary hand cars for transportation, to say nothing of the wasted physical energy of the men. By use of large gang motor cars the time consumed enroute is reduced at least one-half and the men are in better condition to perform a good day's work.

There are today, several good substantial motor cars on the market any one of which will answer the purposes herein cited. The small cars, such as are used by stationed or section linemen and telephone inspectors, weigh from 325 to 425 pounds fully equipped, and the gang cars weigh from 900 to 1200 pounds. Experience has shown that a one-man car should weigh not to exceed 350 pounds. A car of this weight can be easily handled by one man and can be removed from the track quickly. These small cars should be equipped with four wheels and a carrying tray. The usual load of material carried by stationed linemen or by inspectors, averages from 60 to 100 pounds, depending on the class of work to be undertaken. The cost of this class of car is about \$165.00, and the cost of operation averages about seventy-five cents per hundred miles. Cars of this class weighing over 350 pounds should ordinarily be accompanied by

two men, in order that the car can be quickly removed from the track when necessary. The large gang cars will accommodate from eight to fourteen men and should not be run unless accompanied by at least four men in order to be able to remove them from the track quickly. The cost of these cars is from \$250 to \$650 each.

Carefully framed rules for the handling of motor cars should be in the hands of every man intrusted with the operation of such cars. There should be a speed limit not to exceed twenty-five miles per hour and cars should not be permitted to run through congested yards unless accompanied by two men, on small cars, and four on large cars, and then only with extreme caution. While the motor car is a time saver and is safe to operate, like many other pieces of machinery it becomes dangerous when in charge of careless men. Practically every accident, in which motor cars are involved, is chargeable to lack of reasonable care on the part of the operator. Ordinarily cars should not be operated after dark, except in cases of emergency. When necessary to run cars after dark, a white light should be displayed on the front of the car. In all cases where the view is obstructed, operators should run with caution and if possible should make frequent inquiries from train despatchers as to the whereabouts of trains, particularly on single track railroads. A pilot should accompany large gang cars except when run by competent railroad men who are familiar with the territory.

The use of motor cars by stationed linemen, telephone inspectors and repair gangs has proven their worth on the Lake Shore & Michigan Southern and allied lines, the cars having answered all requirements. The cars being of standard design prompt and economical repairs are insured. Their simplicity of construction and ease in operation permits of their use by men who have not been specially trained for the purpose. The cost of the cars, maintenance and supplies, is more than offset by the resultant saving made in time and labor.

Railway Operation More Safe Than City Streets.

More than three times as many people in proportion to population were killed on the streets in Chicago in the every day course of traffic during 1913 than were killed by all the railways of the United States, including passengers, employees, trespassers and others, in all classes of accidents. Such a showing of comparative liability to fatalities as between railway traffic in the United States and the ordinary traffic of the streets is based by the Bureau of Railway News and Statistics, with whom the comparison originates, upon a comparison of the annual accident statistics of the Interstate Commerce Commission for the twelve months ending June 30, 1913, with records of the coroner's office showing fatalities on Chicago streets in 1913.

In a population of approximately 100,000,000 there were killed in all classes of accidents on the 250,000 miles of railway in the United States 10,550 persons, of whom 5558 were trespassers and only 759 of the remainder were killed in accidents to trains.

Records of the coroner's office show for the twelve months a total of 802 persons killed on the streets during the twelve months of 1912. With a population only approximately one-fortieth as great, there was a total killed one-thirteenth as great, or in other words, 321 fatalities per 1,000,000 inhabitants occurred on the streets of Chicago against only 105 per 1,000,000 inhabitants, due to railway operation, more than one-half of which were of trespassers.

During the year there were 136 persons killed on Chicago streets by automobiles alone. This comes within 5 of equaling the total number of passengers killed by all the railways of the United States during the year in accidents to passenger trains, reported by the Commerce Commission as 141, in the gigantic task of accomplishing 34,500,000 passenger miles of travel. Added to fatalities on Chicago

streets due to automobiles were 82 attributable to vehicles, making a total from these two causes alone of 218 killed, or 20 per cent more than all passengers and others carried "under agreement," such as porters and mail employees, killed in accidents to passenger trains, reported by the commerce commission as 181.

In other accidents on the streets there were killed 584 persons, the causes being such as bicycles, elevated railways, streets and steam railways and motorcycles. All passengers on the railways killed in other accidents, such as falling from cars, getting on or off cars, being struck at stations or in yards, etc., numbered only 222, making a total of all passengers and others carried "under agreement" in all accidents of 403, against 802 on the streets of Chicago.

How serious the question of automobile accidents alone has become is shown by the fact that there was an increase of fatalities from this cause from 98 in 1912 to 136 in 1913, or 38.8 per cent. In New York there was a simultaneous increase from 226 to 302, or 33.6 per cent, in deaths due to automobiles.

During the fiscal year 1913 the railways carried 245,000,000 passengers one mile for one killed in a train accident. Were the same proportion of immunity to prevail on Chicago streets, with 802 persons killed every man, woman and child would have traveled 78,600 miles on the streets in the year, or 218 miles per day!



Fig. 11—Trestle at Washoe Smelter, Showing Steel Bridge Employed in Overhead Construction.

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SATURDAY, APRIL 25, 1914.

The country is now plunged into another foreign war, which many believe ought to and could have been avoided. An interference with the affairs of Mexico once begun, may easily become a perpetual responsibility and a care, without any resulting benefit to this country. War means waste of life and property and is an unmitigated evil. That the immediate tendency is to make many kinds of business active, is small and unworthy comfort. It will not go far towards counteracting the legislative and administrative war on business which has brought it to its present low condition.

With the completion by the Baldwin Locomotive Works of the new triplex articulated locomotive "Matt H. Shay," for the Erie R. R., another very notable innovation in American locomotive construction has been accomplished. This engine has been built in accordance with the ideas of Mr. Geo. R. Henderson, consulting engineer of the Baldwin Locomotive Works, and differs from accepted practice in Mallet locomotive building mainly from the fact that by placing a set of driving wheels under the tender, the weight of that member is transformed from a condition of inert-

ness to one wherein it becomes the agency for a very material increase in tractive power of the locomotive. Whereas in the ordinary design of Mallet engine of the same approximate size and proportions, some 65 per cent of the gross weight of the engine and tender is available for purposes of adhesion, the arrangement adopted in this case makes 90 per cent of the gross weight available for that purpose. The resultant tractive power in the Erie engine is 160,000 pounds, placing this unit nearly 40 per cent in advance of the most powerful of the many large engines which this country has hitherto produced.

The idea of placing driving wheels under locomotive tenders is not strictly new,—the great difficulty thought to have been in the way of such action being the diminishing weight of the tender as the coal and water carried therein is used up during the progress of every trip. This, however, is a matter that in pusher service, for which this engine was built, can be controlled without very particular difficulty since an engine in such service is not likely to be at any time a very great distance from a sufficient source of ballast in the form of water. The arrangement of the cylinders, giving the supplemental pair an independent exhaust at the rear of the tender, makes for the convenient adoption of the principle of feed water heating,—a practice which thus far at least has not met with as much encouragement as the anticipated results would seem to warrant. This instance appears to be the most promising for the success of this practice that has thus far been brought to notice. The results of experience with this and several other novel aspects of this design cannot fail to add considerably to the existing fund of knowledge on modern locomotive practice. A full technical description of this engine will appear in an early issue of the Railway Review.

Whom Does Clifford Thorne Represent?

The leadership of the interests which are opposing, before the Interstate Commerce Commission, the application of the eastern roads for approval of advanced rate schedules, has been assumed by Clifford Thorne, chairman of the Iowa Board of Railroad Commissioners. Mr. Brandeis has, latterly, fallen into a secondary position, due to Thorne's activity and persistency. A private publicity bureau has spread his charges before the public, and his output has received credence on the part of the public, due partially to his sensational matter and presentation, but more by reason of the claim that he represents the railway commissioners of eight western states. He had entered appearance for these and also for several shipping interests. When criticism was made of the fact that he was representing as attorney private organizations of shippers while also representing sovereign states which are presumed to stand for the general public interest, he took refuge under the statement that he represented the shipping

interests only by courtesy, and received no pay from them.

The Interstate Commerce Commission permits attorneys (either at law or in fact) to enter appearances and to offer testimony and argument and to question witnesses. Apparently it does not require other credentials than the attorney's statement; or if it does receive and file them, does not inquire further into them. It is not to be presumed that the commission will be influenced by any name, but when the official boards of eight states oppose any proposed action, that fact has a sentimental value. Public opinion is influenced by their official backing and presumes, naturally, that those boards have examined and approved the arguments and methods of their representative before the commission.

It is important, therefore, to inquire whether this is true and to ask what Thorne's credentials are. We happen to know that his profession that he represents the commission of his own state, of which he is chairman, is a misrepresentation. The board has never, by resolution or otherwise, so authorized him. He has assumed the authority, and the other two members of the board are not in sympathy with his attitude and his action. In fact, they are opposed to his views and believe that they misrepresent the great state of Iowa.

If this is true of his own board, it is proper to inquire about the other seven. Have these commissions, by resolution of the majority, authorized this appearance of Thorne; or, is he presuming on the expressions of single members who are in sympathy with his views? If they did authorize, in legal form, his representation of them, did they know of and approve the stuff which he has presented at the hearings, and the reports of the same in the press? It appears to us that it is up to these commissions to make answer to these questions, and to the Interstate Commerce Commission to make inquiry.

It is believed by candid men who have watched these proceedings that Thorne is dominated by personal ambition for notoriety. The members of the commission at Washington, doubtless, have their own views about this, and the effect of his talk upon them will depend upon the question whether he is presenting facts and what the true value of his argument is. Nevertheless, he went to Washington with a blare of trumpets regarding the interests he represents. Now it is a fact that *he does not represent the commission of his own state*. Does he really represent anybody or anything but himself?

Refusal to Permit Fair Rates Amounts to Destructive Taxation.

From time to time, certain writers and speakers on economic subjects call transportation charges a "tax." Apparently their theory is that transportation should

be free like the air we breathe and that it is a commodity to which every one is entitled without money and without price. They would hesitate to make this claim in so many words, because the bare statement proves its absurdity. If the cost of transportation is a tax, food is a tax, clothing is a tax; and all the necessities and luxuries of life are taxes.

The primary meaning of "tax" is "an enforced proportional contribution levied on persons, property or income by the authority of the state for the support of the government." Because taxes were often burdensome and believed to be unjust, they have always been more or less odious. Hence any charge or cost which seemed oppressive or constituted an unfair demand or strain or required and enforced payment in excess of value received, came to be designated as a tax. Even in this sense a charge is not properly called a tax unless it is clearly exorbitant and oppressive, and is made by a practical monopoly from which there is no escape.

Railway transportation requires large investment of money in plant and continuous expenditure in operation. The carriers are entitled to fair average return on their investment, commensurate with profit made in other lines of business. In prosperous years they are absolutely entitled to make sufficient to tide them over unprofitable years and to recoup for past years of loss. These things must be taken into the consideration in determining whether rates, existing or proposed, are excessive for the carriers and oppressive to the public.

It is evident also that the earnings of a given carrier may seem to be excessive without being oppressive or burdensome to the public. The public, served by that particular carrier, shares in its prosperity and benefits by the excellence of its service in promptness, reliability and safety. Travelers flock to it and freight offers itself in spite of the fact that other rails are at their doors. Industry thrives along its lines; and the prosperity of the road and the territory is mutually reflected.

Manifestly the less prosperous road bidding for the same business, cannot charge higher rates. It may be also that the less prosperous road cannot continue to exist at the current rates, because it cannot get fair returns on its investment. If it goes to the wall, the process must be repeated and ultimately the road be absorbed into the more prosperous system; or if that is not permitted, the district which it serves will be deprived of needed transportation facilities. In deciding, therefore, whether the general rate structure is too high and imposes a burden upon the public in excess of the value of the service rendered, the true criterion must be the situation of the weaker lines. These lines are absolutely necessary and public welfare demands that they provide efficient and safe service. Rates must enable them to do this, even although they permit the stronger roads to make larger profits. In

every industry there are establishments which reap large returns as a result of foresight, industry, patience, and good management. It is as impossible to put a dead level of percentage return on railways as it would be on any other industry or on any learned profession.

In the sense that an undue and oppressive burden or strain is a "tax," the United States is now taxing its carriers to the breaking point, by refusing them permission to increase their rates to meet the increased costs of construction, maintenance and operation. Real taxes, levied for support of government, had already been imposed by every taxing body far in excess of the proportions levied on other classes of property. The carriers in the official classification territory ask for fifty millions of dollars more operating revenue. Even this will not "make good" and enable the weaker lines to meet the public service demands upon them. To withhold this increase is to impose a tax in the sense of an oppressive burden upon the carriers. It is taking from them their legitimate and due earnings, not "for purposes of government," but to bestow upon the public or a portion of it. The imposition of this oppressive burden upon the carriers, moreover, does not render any material assistance to either the shipper or the consuming public. In fact they don't want it and cannot discern that it benefits them. Yet the government takes it from the carriers and distributes it in the form of largess to unwilling recipients. Like the theft of reputation, this burden does not enrich anyone but makes the carriers "poor indeed."

The attempt is made by paid attorneys and political agitators to put this in a different light to the public. They denounce the carriers for attempting to levy additional "tax" upon the country, whereas the fact is the reverse. The government is "taxing" the railways, to the breaking point by withholding the revenue that on all principles of business and equity is fairly theirs. The railways are struggling against oppression rather than seeking to oppress. Iniquity may be perpetrated under forms of law and the taxing power of the national legislature is practically unlimited. It may destroy vicious and undesirable commerce simply by taxing; but when it aims to destroy all commerce by oppressive burdens, the end can only be subversion of good government.

Electrification of the Pennsylvania R. R. Suburban Line at Philadelphia, Pa.

The Pennsylvania R. R. started last week the actual work of erecting overhead equipment for the electrification of suburban traffic on its main line, between Philadelphia, Pa., and Paoli, a distance of 20 miles. The work was started at St. David's, which is at a point 14 miles distant from the Broad Street station. It is the present intention to have the entire installation ready for testing by December 31, of this year. The plans as a whole are in the hands of Gibbs & Hill, consulting engineers, of New York city, and are now in an advanced stage of preparation.

The Pennsylvania R. R. has been carrying out some tests with an experimental installation of overhead work, one mile in length, which was erected at St. David's. This installation included all four main line tracks, and comprised a number of different forms of overhead suspension. With the exception of structural steel anchor bridges at either end of the 1-mile installation, which will be placed at ½-mile intervals in the final installation, the main supports throughout consist of tubular steel poles, with 10-in. butts, set in concrete foundations. Each pole is made up of three telescopic sections, with the bottom reinforced by an extra section of tubing extending several inches above the top of the ground to afford additional protection where corrosion is greatest.

A form of bridge support which was tried consisted of an 8-in. I-beam as a transverse member, which was attached to the poles by means of split clamps, bolted together. This I-beam was reinforced by diagonal T-bars extending from the pole downward to a point on the I-beam about 15 ft. out from the pole. From suspension insulators fixed to the I-beam, the longitudinal catenary wires were hung.

This form of construction will not be used, however, in the regular installation; as it has been abandoned in favor of another which gave more favorable results in the tests. The same type of poles are used, but they are guyed by two 1¼-in. steel rods with turnbuckles, which are attached to the poles at the point of connection for the cross-catenary cables, and anchored in the ground. On both curves and tangents with this type of construction, the high points of the longitudinal catenary cables are provided with horizontal steady strains insulated from the poles by double porcelain insulators, and wooden insulators about three feet long are installed between each pair of tracks, so that the various tracks are kept separated electrically.

On a part of the line a single contact wire or trolley wire was hung from the catenary by flexible hangers. On other parts was installed the type finally given preference. This consists of a copper messenger wire suspended from the catenary, and the contact or trolley wire, to be of copper or bronze, suspended from this at intervals of 15 feet by flexible hangers.

The choice has settled upon the single-phase system, for this important installation, although the full details have not as yet been given out, or are as yet undecided. Power will be purchased from the Philadelphia Electric Co. and transmitted along the line at 33,000 or 44,000 volts. There will be three transformer stations which will reduce the pressure to 11,000 volts, single-phase, in which form the current will be supplied to the trolley wire.

There will be no service by electric locomotives on this line, for the freight traffic will be handled by steam, and all through passenger business will be handled by steam, as at present. The only service to be operated by electric power will be passenger, of strictly suburban character; and motor cars, operated in trains by the multiple unit system, will be utilized exclusively.

The Pennsylvania R. R. has had in use a type of steel passenger car built during several years past, which was designed with the ultimate idea of operation by electric power specifically in view. These coaches are 54 feet 6 inches long over corner posts, with platform 5 feet long at each end. The seating capacity is 68, and the weight of the body complete is approximately 54,000 lbs. Each of these cars will be equipped with two 225-h.p. single-phase motors, mounted on one of the trucks. This will call for a new design of motor trucks, which will be built in the company's shops; but the trailer truck of each car will be the same as used in the under the present steam operation. One hundred of these cars will be required for the service contemplated, and the trucks discarded from the cars already in service will be utilized under the cars which are to be supplied new, either

with the first order, or in the future. A pantograph trolley will be installed at one end of the car, over the truck.

Relative Advantages of the Telephone and Telegraph in Railroad Operation.

By H. H. CLAPP, SUPERINTENDENT OF TELEGRAPH, NORTHERN PACIFIC RY.

The author discusses the relative advantages and disadvantages of telephone and telegraph in railroad work. He believes that the telephone will eventually be used for all train dispatching, local messages and business requiring conversation, but that the telegraph will continue to be used for long distance message work. Extracts from a paper presented at the March, 1914, meeting of the American Institute of Electrical Engineers, New York City.

While trains were handled by telephone for short distances, principally in and about terminals, beginning back in the early nineties, it was not until the latter part of 1907 that any real attempt was made to handle trains on long stretches of main-line by telephone. The Chicago, Burlington & Quincy R. R. was one of the first to use telephone train dispatching circuits on their main lines, and by the latter part of 1908 this company had a considerable mileage of its lines dispatched by telephone. The principal railroads in the East and the middle West at once began to install telephone circuits, so that at present there are some 70,000 miles of railroad in the United States dispatched by telephone.

The use of the selective-ringing telephone circuit for the dispatching of trains was soon followed by the use of the same kind of circuit for the handling of messages. The growth of the telephone message circuit has, however, been very much slower than that of the dispatching circuit. The primary reason for this is the fact that the telephone message circuit does not meet the conditions on the average railroad to the same advantage as the dispatching circuit, there being complications to meet than in the case of the dispatching circuit. In general, the message circuit requires a considerable amount of traffic to justify its use. However, it will only be a question of time when all telephone dispatching circuits are paralleled by telephone message circuits.

The outside and inside plants used by different railroads necessarily vary to a large degree on account of the different sizes, resources, locations and conditions of the railroads served. A description will be given, therefore, of the system on one of the large transcontinental railroads with which the writer is most familiar.

The average cost per mile (1.6 km.) for furnishing and erecting a No. 8 B.W.G. iron wire, including insulators, tie wires and pins, is about \$25.00. This wire makes a very good telegraph circuit up to 400 miles without any intermediate offices. At this distance the wire can be worked either singled, duplexed or quadruplexed. With intermediate (way) offices on the line the above-mentioned distance would be cut down to about 200 miles. The matter of line insulation has a very important bearing on the distance that an iron wire, or, in fact, any telegraph wire can be successfully operated. The distances given above assume a high grade of insulation.

The cost per mile for providing and erecting No. 9 B. & S. gage copper wire including insulators, pins and tie wires, varies greatly with the price of copper, but assuming 15-cent copper, it would be, on the average, about \$38.00. The equipment of a telegraph office is comparatively simple and needs no description. The following costs will be of interest in comparison with the cost of telephone equipment:

A way station can be cut-in on a telegraph wire, includ-

ing the battery (gravity) in the office, at a total average cost of \$12.00.

A switchboard (peg type) large enough to take care of ten wires, in and out, can be provided and installed at a cost of \$42.00.

The cost of providing and installing a twenty-five line Western Union switchboard, with twenty wires cut in and out, and eight sets of telegraph instruments with necessary tables and battery, is about \$140.00.

Nineteen-conductor cable (No. A.W.G.) suitable for connecting the wires from the line into the offices, can be provided and installed at an average cost of, per foot 30c.

The average cost of providing and installing a quadruplex set would be about \$200.00.

The average cost of providing and installing a single-line repeater set would be about \$50.00.

At terminals, of course, more apparatus is necessary than at the way-stations along the line. However, a cost of \$400.00 would provide and install the equipment in almost any terminal or relay office along the line, except the very largest.

Principal Advantages of the Telegraph.

The principal advantages of the telegraph are its simplicity and its small cost, both as regards installation and in maintenance; this statement being made, of course, in comparison with the telephone. There are no very complicated circuits in connection with the telegraph, especially at the great majority of the offices along the line. The ordinary lineman has no difficulty in learning how to install and maintain sets of telegraph instruments, and with a little experience, he is able to install duplex and quadruplex apparatus, and Western Union peg switchboards. In general, no particular care is necessary in running telegraph circuits, with respect to one another, in order to avoid induction either in the offices or on the line. In making the last statement, however, the author fully appreciates that telegraph circuits have been seriously interfered with by induction in certain cases; the conditions in mind are those which exist, as a rule, on the great majority of railroads where the telegraph is used.

A telegraph circuit will operate under defective maintenance conditions, such as loose connections, unsoldered joints, defective office and cablebox wiring, high resistance in series with circuit, etc., where a telephone circuit would absolutely fail. In other words, the telegraph circuit usually has a considerable amount of margin in operation and will stand a large amount of neglect and abuse. The cost, as already indicated, is small for both line wires and office equipment, and while copper wire is used to some extent, iron wire serves the purpose in a great many cases where it would not be possible to use it in connection with the telephone. The telegraph, also, has the advantage of being a very accurate means of communication. A telegraph sounder makes very clear and distinct signals, and to an expert operator, there is no question as to what has been transmitted; and, if the wire is working at all, the distance is not much of a factor, because the sounder is in a local circuit.

Disadvantages of the Telegraph.

The great disadvantage of the telegraph is its lack of universality. It requires a specialist in order to operate it; that is, an operator who has spent a considerable amount of time, years in some cases, in order to qualify for the work. When carrying on a telegraphic correspondence, one is always working through some one else, never directly. This condition is satisfactory in handling some kinds of business, but not for all kinds. The train conductor out on the line can, in the case of an accident, send messages by telegraph to his superior if there is a telegraph office near at hand in which operators are on duty, and accomplish certain results; however, if he can talk directly with his su-

perintendent, a great deal more can be accomplished. The same is true of the section foreman out on the line, the superintendent in his office, and other employees on the division.

This disadvantage of the telegraph is especially noticeable when one attempts to discuss any subject over the wire by telegraph, even between expert operators. The telegraph is at its best in handling messages that are comparatively brief, making definite statements or reports or answering definite questions. As soon as one attempts to ask several questions on different phases or points of a subject, in other words, attempts to discuss it, the telegraph becomes a comparatively slow means of communication.

There is also the trouble experienced in obtaining operators, which in recent years has become a serious problem, especially when times are prosperous. A railroad which depends at present entirely upon the telegraph has considerable difficulty in securing operators of any kind, without much regard for their ability.

The Railroad Telephone Plant.

The outside plant necessary in connection with the telephone is substantially the same as that required for the telegraph, except that in practically all cases copper wires are used. The cost of telephone circuits for use between the exchanges along the line depends, of course, on the kind and the size of line-wire used. The cost per mile of a No. 9 A. W. G. copper circuit in place, on the basis of 15-cent copper, is about \$75.00. The cost per mile of a No. 6 A. W. G. copper circuit on the same basis would be about \$150. The latter circuit would give, under ordinary conditions, satisfactory telephone transmission up to 1000 miles, while the former would be satisfactory up to about 500 miles.

The telephone dispatching and message circuits are the most interesting and peculiar to the railroad service. The provisions of a means of selectively signaling the different stations along the line was a problem that took some time to solve satisfactorily. These selectors have different designs and principles of operation. In general, the selection is made by a step-by-step mechanism which responds to a certain number of pulsations or combinations of pulsations sent over the line, making it possible to arrange a large number of selective combinations, and thus signal any given station at will, without disturbing the others. At the stations along the line a special form of telephone set is installed for the use of the operators. These sets have a certain combination of apparatus and wiring that provides a so-called "booster" effect in transmission. This is secured by a switch which is so connected in the circuit that when the operator is talking, the receiver is short-circuited, and when the operator is listening, the receiver is connected directly to the line and the transmitter disconnected.

The cost of providing a selector circuit ready for operation under average conditions is as follows:

Cost per station of providing and installing the selector and telephone equipment, protectors and wiring, both outside and inside of the offices, \$80.00.

Cost of providing and installing the necessary telephone and selective apparatus, including the battery, in the office of the dispatcher, \$250.00. Assuming that a telegraph pole line is already available, the cost of a suitable telephone circuit has already been placed at \$75.00 per mile, so that the cost of providing and installing a selective telephone circuit along 100 miles of railroad, where there are thirty offices to serve, would be a little over \$10,000.

A telephone circuit as described above can be used either as a dispatching circuit or a message circuit.

Two very useful and time-saving auxiliaries which are available with a telephone system are installations of telephones in booths or boxes along the railroad right-of-way

at so-called "blind sidings" (where no regular operators are employed, and where there may be not even a station building) and portable telephones for the use of the train crews. Telephones of these types can be used to great advantage by the trainmen in handling the many emergencies that arise, and are also of material assistance to the dispatcher, in reducing train delays. Order-forms for use of the trainmen are usually provided along with the telephones installed in booths or boxes and, in some cases special forms of registers are provided in which the order forms are placed so that three copies can be made of all orders transmitted to the trainmen, one copy in each case being given to the engineman, the second copy to the conductor, and the third copy remaining in the machine as a record.

The cost of a booth installed along the right of way, with the necessary telephone apparatus, depends on how elaborate an installation is desired; a very substantial and satisfactory installation can be provided for \$90.00, but this can be reduced to possibly \$30.00. A good portable telephone can be purchased for \$12.00.

In addition to the uses already described, there are various miscellaneous ways in which the telephone can be used on a modern railroad, in the observation cars of limited trains, in freight sheds and in freight yards so as to provide a means of ready communication from one point to another, etc.

The method employed in handling train orders by telephone contains some points of interest. All figures or names of stations occurring in the orders are spelled out letter by letter, both in the giving of the order and in all repetitions; also, in handling a "31" order, the name of the conductor is spelled out. The dispatcher writes the order in his train-order book at the same time that he telephones it to the operator or operators on the line. Each operator who receives the order repeats it back to the dispatcher, the dispatcher underlining each word or number as repeated. In operating a message circuit, the same general practice of spelling out words and figures is followed as in the case of the dispatching circuit.

In the author's opinion, specially trained men should always be employed to maintain the telephone station equipment, although on some railroads the section linemen are required to maintain the telephone equipment; the last plan, however, produces in most cases indifferent results. In order to maintain properly four selective telephone circuits, having an average length of 100 miles each, at least one telephone inspector should be provided at a monthly rate of \$85.00 with expenses, and there should be additional force if there are many telephones maintained at different "blind sidings" along the line, or special apparatus installed at various terminals, private-branch exchanges, etc. All of this expense is practically in excess of what is necessary to maintain the telegraph to handle the same work, although, as already indicated, the telephone handles a great many transactions that were never attempted by telegraph.

Comparative Advantages of the Telephone.

The advantages of the telephone are many; some direct, some indirect and some psychological. The first and most important in the author's opinion is that it permits direct dealing between the parties desiring to transact business. The superintendent can talk directly with his subordinate; the chief dispatcher can talk directly with the trainmen out on the line, and any two employees can deal directly with one another, if the proper telephone facilities have been provided. This is what might be termed the universality of the telephone as compared with the telegraph; every one from the president to the section foreman can use the telephone directly.

The telephone, compared with the telegraph, is a great

time saver on account of its speed of transmission. Train orders can be handled more rapidly by telephone than by telegraph. This is due to the fact that the orders can actually be transmitted faster over the telephone; also, to the fact that the operators along the line can be made to answer the calls on the telephone bells quicker than their calls on the telegraph.

By the use of the telephone, the field from which dispatchers and operators can be recruited is naturally broadened. It is no longer necessary on a railroad where the telephone has been installed with a sufficient number of circuits to keep the service intact, to depend on telegraph operators, in other words, specialists. There is, for example, one division on the Pennsylvania Railroad where out of about 400 operators' positions along the line, it is necessary to fill only eight of them with telegraph operators. This is a very important point for consideration in these days when, as already stated, the supply of telegraph operators is not equal to the demand. Also, it is possible to use as a dispatcher an employee other than one who has obtained his experience in the telegraph or telephone service, as, for example, a freight or passenger conductor.

While a telephone circuit is, in most cases, more susceptible to outside influences than the telegraph, experience shows that in heavy weather, heavy fog, mist, rain or snow, less trouble is experienced with the telephone than with the telegraph; and the telephone is affected only to a small degree by earth currents or by the aurora borealis.

Finally, we have for consideration the saving in the operation of the railroad by the use of the telephone. Unfortunately, it is hard to show in all cases a saving, because many of the best-known economies are more or less intangible. One is generally sure that he is saving time by using the telephone, and it seems at least a fair assumption that there is a corresponding money saving.

In the way of direct saving, the ability of the dispatcher to get his trains over the division quickly, thereby economizing in operating expenses, is the most evident, and easiest to understand. This is especially noticeable in the amount of overtime that can be saved in the pay rolls of the trainmen and the enginemen. As it is conservatively estimated that the trains can be handled over a division from 10 per cent to 20 per cent more rapidly by telephone than by telegraph, an approximate estimate of the overtime saved can be prepared by considering a certain operating division before and after the telegraph is replaced by the telephone. For example, on a certain division where the Northern Pacific is now installing the telephone, both for handling trains and for handling the messages along the line, it has been estimated that a saving of about \$200.00 per month will be made in overtime paid to trainmen and enginemen.

In some cases, a direct saving can be made by using a smaller number of dispatchers when handling a given section of railroad by telephone, as compared with the telegraph. For example, there is a division on the Northern Pacific which is made up of four consecutive districts, having an average length of a little over 100 miles each. Part of the year, the four districts can be handled by using two telephone dispatching circuits; but when there is considerable business on the railroad, four dispatching circuits are used. It would be necessary with the telegraph, to handle the four districts by using four circuits at all seasons of the year. As it requires three dispatchers to handle one dispatcher's circuit during the entire twenty-four hours, and as the salary of a trick dispatcher is \$155.00 per month, the abandonment of any of these positions even for a part of the year is a very desirable thing from the standpoint of saving in expenses.

Disadvantages of the Telephone.

The principal disadvantages of the telephone as compared with the telegraph is its cost of installation and maintenance. However, these increased costs are overcome by the savings that are made possible. Another disadvantage is that the telephone, in the present state of the art, is not adapted, on account of excessive cost, for use on the railroad for any considerable distance. While there is a circuit about 1000 miles in length in operation on one railroad in this country, at least, this circuit is used entirely as a talking-circuit and is not used for message work. It requires a good margin of transmission to handle messages over a telephone circuit and, according to the author's experience, a circuit equating to more than 26 miles of standard cable should not be used in railroad service; at least, not in connection with handling trains or messages.

While it is possible to construct a telephone circuit 2000 miles long, or even longer, that would have the proper transmission efficiency, it will apparently be some time before a railroad can justify such a circuit from the standpoint of first cost and maintenance expense, and benefits derived. The telegraph will probably continue to handle the messages for the long distances, such as 500, 1000 or 1500 miles, for a considerable time to come.

The telephone is not as flexible as the telegraph when making patches in cases of troubles on the regular wires.

The telephone requires a much higher efficiency of maintenance than the telegraph. This is not, strictly speaking, a disadvantage. In fact, the telegraph wires and apparatus should be maintained as well as the telephone system, but in practice this is not done except in very few cases.

Applications of the Telephone.

As yet very few railroads are using the telephone as much as they could or should. Because many of the economies with the telephone are more or less intangible, railroad managers are rather cautious in authorizing its wholesale installation. They are usually ready to authorize telephone dispatching circuits, as the savings from them are more easily understood than in other applications. In the author's opinion, the up-to-date railroad of the future will handle its operating divisions entirely by telephone, the telegraph being used only for message work for long distances between the terminals and the general headquarters. On the divisions, the typical way office will have no telegraph instruments, and will depend entirely upon the telephone for handling all messages. At all terminal points and important offices along the line, private-branch exchanges will be installed, which will be connected with each other by means of talking circuits, so that any two employees on the same division or adjacent divisions can communicate with one another easily and quickly. Telephones will be installed in booths or boxes along the right-of-way at frequent intervals, such as every half-mile, and the necessary lines and apparatus provided.

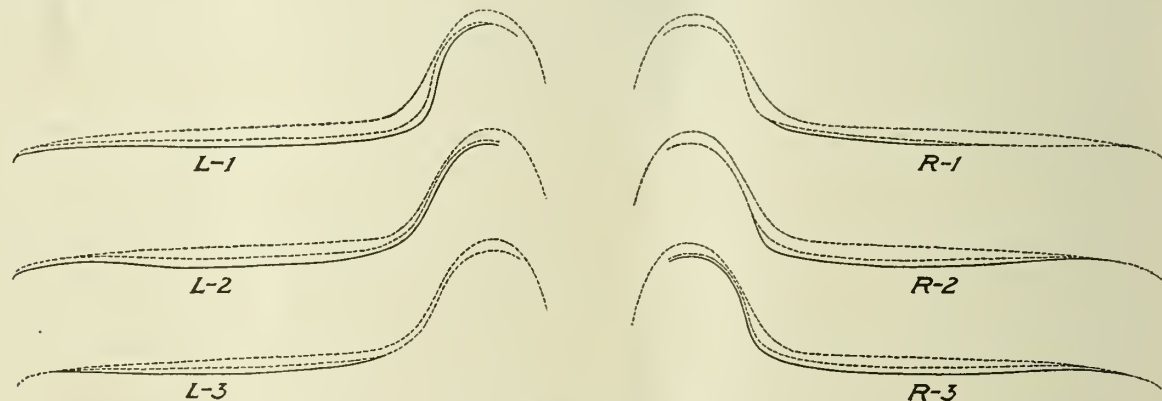
The local use of the telephone has been well developed in a great many places, and the same is true of its use in dispatching trains; but its universal application as a means of communication, and its substitution for and its use as an auxiliary to the telegraph, have only in a very few instances been carried to a logical conclusion.

The property of the Pere Marquette R. R., which is in the hands of a receiver, is to be appraised under the joint direction of the court and the Michigan state railroad commission. The appraisal in that way will have a standing somewhat different from that generally applying to appraisals of property in the hands of the court. Prof. Mortimer E. Cooley of the engineering department of the University of Michigan has been

approved as appraiser by Judge Arthur J. Tuttle of the United States District Court.

Service Records of Heat-Treated Chrome-Vanadium Steel Tires.

Progress reports from a number of roads which are testing heat-treated chrome-vanadium steel tires have recently been made available by the American Vanadium Co., and also records to date of one of the first sets of vanadium steel tires made, which have been in service over four years. These records are given below.



Contours of Vanadium Steel Tires, Western Maryland Ry.

Chicago, Rock Island & Pacific Ry.—In April and July of last year, the Chicago, Rock Island & Pacific Ry. purchased three sets of heat-treated chrome-vanadium steel switch engine tires for test purposes. In February of this year, contours were taken of two sets of these tires and also of two sets of plain carbon steel tires on the same class of switchers, and in their first term of service. Comparing the two sets of vanadium and the two sets of carbon steel tires on the basis of mileage per average tread wear, there is an increase of 108 per cent in favor of the former. The mileage per 1-16 in. average wear for each of the four engines is as follows:

Vanadium Tires		Carbon Tires	
Engine No.	Mileage per 1-16 in. average wear	Engine No.	Mileage per 1-16 in. average wear
196	11,494	235	5,333
124	11,042	228	5,483
Average	11,268	Average	5,408

Western Maryland Ry.—This road purchased two sets of heat-treated chrome-vanadium steel tires, applying same to Pacific type locomotives early last year. Contours of one set of these tires, after 11 months' service, showed, in comparison with the average for three sets of plain carbon steel tires on sister engines running in the same district, an increase of 148 per cent in mileage per 1-16 in. maximum tread wear in favor of the vanadium steel tires. Up to March 1, the vanadium steel tires had made 49,096 miles. The maximum tread wear was 3-16 in., or 16,365 miles per 1-16 in. maximum wear. The three engines equipped with carbon steel tires showed, respectively, 5393, 6140 and 7250 miles per 1-16 in. maximum tread wear, or an average of 6394 miles per unit maximum wear.

The uniform service of the vanadium steel tires is very clearly shown by the accompanying illustration. This shows the present contours and contours taken in October, after 6 months' service, superimposed on each other and also on the original contour to which the tires were rolled.

Grand Rapids & Indiana Ry.—This road has in service some of the first heat-treated chrome-vanadium steel tires made. A set of these tires was applied in November, 1909,

to a ten-wheel locomotive in passenger service, and is still in service after four years and four months. Up to February 1 of this year these tires had made 281,646 miles, having already made 100,000 miles more than the average total mileage for plain carbon steel tires of the same thickness on the same class of engine.

Up to the time the engine was last shopped, in March, 1913, they had made 226,124 miles, which was equivalent to 11,900 miles per 1-16 in. loss in thickness due to wear plus turning. From such records as we have, this would seem to be an exceptional performance. In September, 1913, when contours were last taken, they had made 40,000 miles since being turned and showed a maximum of only 3-32 in. tread

wear, or 26,660 miles per 1-16 in. wear. They are still from ½ to 7-16 in. above the limit of wear allowed and may reasonably be expected to make 300,000 miles before requiring to be scrapped.

Railway and Engineering Literature.

Poor's Manual of Railroads for 1914 (47th annual number) is issued. It contains 2052 pages of text, or about 200 pages more than last year. It is devoted entirely to steam railroad securities. A special feature this year is the information given in the manual, showing whether or not interest on railroad bonds is payable without deduction for the United States income tax. This is the first publication to give this important information in practically complete form. The manual contains many other new features, including about 500 new comparative tables, and new analytical tables, all contributing to help the investor to form an opinion of the value of railroad securities. The manual is issued about one month earlier in the year than any previous edition. It is to be followed later in the year by the Manual of Public Utilities and the Manual of Industrials. The three manuals together cover the entire field of corporate investment in America.

A "Manual of Electrical Testing" is the subject of a new 48-page bulletin, size 8x10½ ins., issued by the Wagner Electric Mfg. Co., of St. Louis, Mo. Besides describing the line of portable instruments manufactured by the Wagner company, this bulletin describes various types of electrical instrument movements, the errors to which they are subject and gives suggestions for their handling and care. The methods for making tests on alternating current and direct current motors and generators and on transformers are described at length and illustrated by comprehensive and instrumentive diagrams. The publication is one that will be of interest to everyone who has anything to do with the use of electrical instruments, and copies may be had upon application to company named above.

The General Electric Co., Schenectady, N. Y., has issued bulletin No. 45601, describing aluminum lightning arresters for alternating current circuits. Bulletin No. 45600 has also been issued and describes aluminum lightning arresters for use in connection with railway signal circuits. It supersedes the company's previous bulletin on the same subject. Bulletin No. A4209 is devoted to strain insulators and strain clamps suitable for insulating and supporting powerhouse wiring and overhead distributing cables and wires. The construction of these insulators and clamps is illustrated and described, and the bulletin contains also catalog numbers and prices of the various articles.

Type ML governors for motor-driven air compressors are described in bulletin No. 44590. The function of the type ML governor is automatically to control the operation of either stationary or railway motor-driven air compressors in order to maintain air pressure in a storage reservoir between predetermined limits. This bulletin supersedes the company's previous bulletin on the same subject. Bulletin No. 47400 illustrates and describes type F, form K12 oil switches.

A recent bulletin by the Gold Car Heating & Lighting Co., 17 Battery Place, New York, gives a description of that company's thermostatically controlled high-pressure

car heating apparatus, together with data pertaining to a series of tests comparing the workings of this system with that of the straight manually-controlled system. Besides saving something like 800 lbs. weight in radiators per car, the system has been shown to save from 60 to 80 per cent on steam consumption, at the same time, maintaining a more uniform temperature.

The Consolidated Railway Electric Lighting & Equipment Co., Nassau & Pine Streets, New York city, has issued bulletin No. 11, which is a complete catalogue of "Axle Light" equipment for car illumination.

The Railway Supply Man's Point of View

Cessation and Resumption.

How long can railways subsist and be operated without purchases of other materials and equipment than fuel, lubricating oils, and the like? This question always comes up with renewed interest in a time when orders for supplies are withheld, as is the case at present. Operation constantly calls for replacement and the difference in actual consumption between fat times and lean times is really small. The margin between good business and dull business in railway traffic is less than ten per cent of gross tonnage; in fact, a study of current figures as compared with the active business of a year ago, does not show a decrease of more than seven and a half and on many systems five per cent. It appears therefore that everything which the railways buy is wearing out at a rate of from 90 to 95 per cent as fast as in the active periods, such as a year ago, when the demand for equipment and supplies was at the maximum.

If purchases, therefore, have fallen to a very low ebb, there must be compensation in time and the longer the elapsed time the greater the manufacturing congestion will be. Transportation costs have to be met right along—they cannot be deferred. Maintenance costs can be deferred and accelerated within certain limits of time. Hence we have conditions of famine or feast in the supply business, with corresponding increased average cost amounting to a very large percentage.

Of course there is a large amount of the supply business which can be indefinitely postponed; viz., that which is for improvement or betterment rather than for mere maintenance. Such items are new structures, signalling, new shops and machine tools, appliances for handling materials, etc. The necessity for such improvements from an economic standpoint is nearly as great; but they are things which can be put off; and many roads are operated wholly without them.

The decision of the rate advance case even if adverse, must be the signal for letting out orders of the former class—that is, for maintenance. Should the decision be favorable, railway credit will be re-established or at least greatly improved so that betterment will also be entered upon. The present condition is partly artificial and partly natural. It is natural for improvement to depend upon net earnings; it is artificial for maintenance costs which must be met some time, because things are wearing out nearly as fast as ever, to be deferred. The artificial barrier must first be removed and maintenance be provided for before there can be any great investment in betterments.

Railways must meet their interest on bonded indebtedness regularly; and the maintenance of dividends is necessary to their credit. The result is a shifting of maintenance costs and a postponement of improvement, when this may not be and in fact is not good policy for economic results in the long run. The manufacturing capacity of the coun-

try is constantly developed on the basis of the demand in flush times, and the irregularity of demand is expensive both to the manufacturers and the railways.

As boys, we used to call out "What goes up must come down." Just as inevitable is the turn of business. The more pronounced a depression the sooner the turn, as a rule. Railway business cannot be utterly closed down. A railway must operate and consumption must go on. Holding back orders whether an expedient or a necessity, is necessarily temporary.

Iron and Steel Industry.

Iron and steel conditions remain unchanged. Transactions are at a minimum. Prices are steady and shadings on large orders from recent low levels reached are exceptional. A spirit of confidence as to the ultimate expansion of business to practically maximum limits prevails. The peculiarity of current business is the multitude of small orders placed for early delivery. Production is again slowly declining with relation to capacity.

SUPPLY TRADE NOTES.

—The Transportation Utilities Co. of 30 Church St., New York, has acquired and taken over the entire business of the General Railway Supply Co. of Chicago.

—Charles P. Williams, connected with the Chicago office of the National Lock Washer Co., has resigned. Mr Williams was for several years eastern manager for the Chicago Railway Equipment Co., in charge of their New York office.

—The Chicago office of the Pantasote Company formerly in the Fisher building, is now located in the Peoples Gas building, 122 South Michigan avenue.

RAILWAY NEWS.

Arkansas, Louisiana & Gulf.—The sale of the franchises and property, real and personal of the Arkansas, Louisiana & Gulf Ry. Co. at Monroe, La., May 16, 1914, is advertised by A. A. Gunby, special master.

Buffalo, Rochester & Pittsburgh.—The Buffalo, Rochester & Pittsburgh Ry. has awarded contract to the Miller Construction Co., Lock Haven, Pa., for one mile of double-track work through the Creek Side, Pa., yards to Cummings and also additional trackage in the yards at Creek Side on the Indiana branch.

Canadian Northern.—It is stated that in return for guaranteeing \$50,000,000 bonds for Canadian Northern Ry. the Canadian government will, according to plans discussed at Montreal, between Sir William MacKenzie and the collector general, require that \$40,000,000 stock of the company be turned over to the government to be held as a pledge for fulfillment of all agreements. The company has \$77,000,000 of stock outstanding; it is proposed to issue \$25,000,000 new stock to the government, in addition to which MacKenzie and Mann, owners of the \$70,000,000, will pledge

\$10,000,000 of their holdings to the government. It is announced bonds now to be guaranteed will be sufficient to complete the coast to coast system. The proposition has yet to go to parliament for approval.

While the program of construction for 1914 by the Canadian Northern Ry. has not yet been fully decided upon, owing to negotiations pending with the Dominion government in connection with the guarantee of its bonds, it is given out in Edmonton that more than \$10,000,000 will be expended in the Province of Alberta. This includes \$6,500,000 received from the sale of bonds in England of the Canadian Northern Western, a subsidiary company, which are guaranteed by the provincial government. The government has insisted, it is said, on the line being constructed this year from the Little Bow, south of Calgary, to Macleod. This is guaranteed at \$15,000 a mile.

Cape Girardeau & Northern.—John W. Fristoe of St. Louis, Mo., has been appointed receiver for the Cape Girardeau Northern Ry., which was built by Louis Houck to be sold to the St. Louis & San Francisco R. R., but the purchase of which the Frisco receivers refused to complete. The suit for the receivership was brought by Gibony Houck, a son of the builder. The receivership was authorized by Judge R. G. Ranney of the Cape Girardeau Court of Common Pleas.

Chesapeake & Ohio.—The Chesapeake & Ohio Ry. is considering building under a subsidiary company a connecting line between the Chesapeake & Ohio near South Portsmouth, Ky., and the Hocking Valley Ry. near Columbus, Ohio, the line to be about 93 miles in length. Vice-president M. J. Caples will have charge of this work.

Chicago, Milwaukee & St. Paul.—The Chicago Milwaukee & St. Paul Ry. has filed application with the Illinois public utilities commission for approval of an issue of \$30,000,000 general and refunding mortgage bonds.

Detroit Bay City & Western.—The Detroit, Bay City & Western R. R., now building from Snover, to Sandusky, Mich., expects to complete construction within a few days. Trains will be operating as far as Sandusky, within 30 days, it is said. The company proposes to continue building and will eventually extend to Port Huron, Mich.

Missouri, Kansas & Texas.—Directors of the Missouri, Kansas & Texas Ry. on April 22 decided to pass the 2 per cent semi-annual dividend on the preferred stock. It was the opinion of the directors that, on account of the adverse effect upon earnings caused by the extensive drought in the Southwest of last July and August and the Texas floods of November and December, it would not be prudent at this time to declare the dividend. The road has paid 4 per cent, annually since 1906.

New Orleans, Texas & Mexico.—A petition asking the United States District Court of New Orleans to order the sale of the New Orleans, Texas & Mexico R. R. has been presented to Judge Foster by the New York Trust Co. The court fixed May 11 as the date upon which the road is to answer.

New York, New Haven & Hartford.—The details of the New York, New Haven & Hartford R. R. company's financing were completed April 23 at a conference between the officials of the company and the banking syndicate organized by J. P. Morgan & Co. The plan calls for the raising of \$60,000,000. This sum will take care of all New Haven's requirements, including the \$45,000,000 of notes maturing May 18 and \$5,000,000 due the latter part of July, leaving a balance which, it is thought, will carry the road through the remainder of the year. The \$60,000,000 will be acquired through the sale of \$20,000,000 New Haven one year 5 per cent notes, with various securities as collateral; \$20,000,000 Harlem River & Port Chester R. R. one year 5 per cent notes guaranteed by New Haven, and \$20,000,000 New England Navigation Co. three year 6 per cent notes. It is understood that practically the entire \$60,000,000 has been underwritten, most of the participants being the bankers and other financial interests which were asked to take part in the \$67,550,000 debenture issue, later declared illegal by the Massachusetts Supreme Court.

The stockholders of the New York, New Haven & Hartford R. R. on April 21 voted to ratify the agreement reached by its officers and the government for the dismemberment of the system. They also adopted an amendment to the bylaws, making the number of directors 23 instead of 27.

Pittsburgh & Lake Erie.—The annual report of the Pittsburgh & Lake Erie R. R. contains the following information with reference to progress in construction of new lines:

The extension of the Monongahela Railroad to the Pennsylvania-West Virginia line and of the Buckhannon & Northern R. R. from a connection with the Monongahela at the Pennsylvania state line to Rivesville, W. Va., will be completed during 1914.

The Pittsburgh, Chartiers & Youghiogheny Ry. (jointly owned with Pittsburgh, Cincinnati, Chicago & St. Louis Ry.) is building from a point near Van Emman's station, Washington county, Pa., to near the village of Eighty-four, to connect with Chartiers Southern Ry. The Chartiers Southern Ry. is under construction to connect with the Greene County R. R., to reach the coal properties of that section.

The construction of the Lake Erie & Eastern R. R., extending from Struthers, Ohio, through Youngstown, and owned jointly by the Mahoning Coal R. R. and the Pittsburgh & Lake Erie R. R., will progress during the coming year; and, contingent upon the revival of industry in that region, may be brought to completion about December 1. This construction will enable the Lake Shore & Michigan Southern Ry. and the Pittsburgh & Lake Erie to establish a satisfactory through line from Pittsburgh to Cleveland, via the Lake Erie & Pittsburgh R. R., and also to reach the industries in Youngstown directly over system lines rails.

Southern Pacific.—See Western Pacific Ry.

Western Pacific.—The Southern Pacific Co. and the Western Pacific Ry. are said to be arranging for the reciprocal joint use of each company's trackage between Winnemucca and Wells, Nev., a distance of 191 miles. The proposed agreement, it is understood, provides that all trains of the Western Pacific and the Southern Pacific running eastward between the two points be sent over the Western Pacific tracks, and that all trains of either road running westward be routed over the Southern Pacific tracks. Both roads virtually parallel each other for the entire distance between Wells and Winnemucca.

PERSONALS.

C. W. Nelson, assistant to the president of the St. Louis Southwestern Ry., has been elected vice-president of the company.

Guy Hopkins, acting general superintendent of the Louisiana Western R. R. and Morgan's Louisiana & Texas Railroad & Steamship Co., with headquarters at New Orleans, La., has been appointed vice-president of those lines.

George A. Gaston has been elected president of the Northwestern Pennsylvania Ry. to succeed H. W. Thornton, resigned.

Walter V. Wilson has been appointed assistant general auditor of the Chicago, Milwaukee & St. Paul Ry. with office at 1368 Fullerton avenue, Chicago.

L. R. Wood has been appointed assistant auditor of the Oregon Short Line R. R. with office at Salt Lake City, Utah.

C. F. Cater has been appointed auditor of the South Georgia Ry. with office at Quitman, Ga., succeeding Jesse Hennaman.

H. W. Davies has been appointed assistant to the president and general manager of the Pacific & Idaho Northern Ry., with headquarters at New Meadows, Idaho.

J. F. Patterson, whose appointment as superintendent of the Peoria division of the Vandalia Railroad was noted in a previous issue of the Railway Review, was born at Alliance, Ohio, January 8, 1871. He received a high school education at Alliance and started to work for the Pennsylvania Company as a messenger in 1884. The following year he became a telegraph operator. Mr. Patterson was made train-dispatcher, Western division, at Fort Wayne, Ind., in 1890. He was appointed assistant trainmaster in January, 1899, and from October, 1899, until his recent promotion, April, 1914, served as trainmaster of the Northwest system of the Pennsylvania, at Fort Wayne, Ind.

G. D. Brooke, whose appointment as superintendent of the Ohio division of the Baltimore & Ohio R. R. at Chillicothe, Ohio, has been announced in a previous issue, was born at Sutherland, Va., September 15, 1878. He was educated in the public and in private schools and Virginia Military institute, graduating in 1900 from that institution. From September, 1900, to June, 1902, Mr. Brooke was instructor in mathematics and military tactics at Culver Military academy, Culver, Ind. He entered the service of the Baltimore & Ohio, June 17, 1902, as axeman, and has been

in the service of that company since then in the following positions: rodman, levelman and transitman to May, 1904; May, 1904, to October, 1904, assistant engineer in office of engineer of surveys, Baltimore, Md.; March, 1905, to June, 1907, assistant engineer with office at Cumberland, Md., in charge of trunk line surveys in Pennsylvania and West Virginia east of the Allegheny mountains; June, 1907, to June, 1908, assistant engineer with office at Morgantown, W. Va., in charge of trunk line surveys from the Ohio river east to Harpers Ferry and on construction work, embracing line revision, double tracking and extension of branch line; July, 1908, to July, 1909, assistant division engineer at Pittsburgh, Pa.; July, 1909, to March, 1911, division engineer, Baltimore, Md., in charge of maintenance on the Baltimore



G. D. Brooke, Superintendent of the Ohio Division of the Baltimore & Ohio Railroad.

division; and March, 1911, to February, 1912, assistant engineer operating department in office of general manager, Baltimore. In this position he was engaged chiefly in making special reports on operation and remodeling of yards and terminals, and studies of operation on various divisions with a view of increasing tonnage per train mile. From February, 1912, to May, 1912, he was assistant superintendent, Cumberland, Md., with jurisdiction over the Eastern district of the division; May to September, 1912, assistant superintendent, Cumberland division, at Keyser, W. Va., in charge of operation on West district of the division embracing the line over Allegheny mountains from Grafton to Keyser, and from September, 1912, to April 1914, Mr. Brooke was superintendent of the Shenandoah division at Winchester, Va.

M. F. Leamy, assistant trainmaster of the Delaware & Hudson Co. at Albany, N. Y., has been appointed trainmaster of the Saratoga division, with headquarters at Albany, succeeding C. J. Downey, transferred. W. H. Davidson has been appointed assistant trainmaster of the Saratoga division, succeeding Mr. Leamy.

J. V. Williams is now terminal agent of the Rock Island Lines at Fort Worth, Tex., instead of general agent, his title having been changed effective April 16.

M. J. Caples, vice-president of the Chesapeake & Ohio Ry., has been relieved of responsibility in connection with the operation of the Chesapeake & Ohio, and will devote all of his time to the building of the proposed line from Columbus, Ohio, to the Ohio river and supervising the operation of the Hocking Valley Ry., until the connecting line referred to shall have been completed. Mr. Caples retains the position of vice-president of the Chesapeake & Ohio.

H. E. Hutchens, whose appointment as superintendent of passenger transportation of the Southern Railway has been announced in these columns, was born in Butts county, Ga. He was educated at Union Point academy and entered railway service in 1872 as telegraph operator with the Georgia

Railroad. He served in a similar capacity in various positions until 1882 and from then until March, 1896, was successively telegraph operator, freight clerk, ticket agent, yard master, agent, chief clerk traffic department, assistant master of transportation and master of transportation with the Savannah, Florida & Western Ry. From March 3, 1896, to March 1, 1897, he was yardmaster with the Central Railroad of Georgia; March 1, 1897 to September 1, 1899, assistant superintendent and superintendent of the Atlanta & Danville Ry. Then Mr. Hutchens was appointed superintendent of the Norfolk division of the Southern Railway at Norfolk, Va.; from 1901 to 1907 was superintendent of the Memphis division of that road and the Northern Alabama Ry., and from 1907 to 1910 general superintendent of the Eastern and Southern districts of the Southern Railway. He was made general superintendent of the Northern district of that road, March 12, 1910, which position he held until his promotion recently announced.

R. E. Simpson, whose appointment as general superintendent of the Southern Railway has been previously noted in these columns, was born October 20, 1870, at Glen Alpine, Burke county, N. C. He received a common school education and entered the service of the old Richmond & Danville Ry. (now Southern Railway) in the capacity of water boy for a section gang on April 13, 1884. Since then he has served as follows: May, 1886, to June, 1887, section hand at Glen Alpine; June, 1887, to February, 1889, section master same section; February, 1889, to May, 1892, extra gang foreman and conductor; May, 1892, to September, 1899, freight conductor on the Lehigh Valley R. R. out of Jersey City, N. J.; September, 1899, to June, 1902, supervisor, Asheville division, Southern Railway, headquarters, Hickory, N. C.; June, 1902, to September, 1903, roadmaster, Asheville division, Asheville, N. C.; September, 1903, to September, 1905, roadmaster and trainmaster, Murphy division, Bryson City, N. C.; September, 1905, to January, 1907, assistant superintendent, Atlanta division, Atlanta, Ga.;



R. E. Simpson, General Superintendent of the Northern District of the Southern Railway.

January, 1907, to December, 1907, superintendent, Spartanburg division, Columbia, S. C.; December, 1907, to May, 1909, superintendent, Asheville division, Asheville, N. C.; May, 1909, to April 15, 1914, superintendent, Knoxville division, Knoxville, Tenn. April 15, 1914, as has just been announced, he was appointed general superintendent of the Northern district of the Southern Railway, with headquarters at Greensboro, N. C.

TRAFFIC.

Fred Wild, Jr., general freight agent of the Denver & Rio Grande and Rio Grand Southern railroads at Denver, Colo., has been appointed freight traffic manager of those companies, with office at Denver, vice H. M. Adams, resigned to accept service with another company. W. M.

Lampton, assistant general freight agent at Denver, has been appointed general freight agent in place of Mr. Wild.

F. G. Adams, division freight agent of the Grand Trunk Pacific Ry. at Edmonton, Alta., has been appointed commercial agent of the Grand Trunk, with headquarters at Winnipeg, Man., succeeding W. J. Hunter, deceased.

A. W. Symes has been appointed traveling freight agent of the Canadian Northern Ry., with headquarters at Toronto, Ont., effective April 20.

Louis Jackson, industrial development commissioner of the Erie Railroad, has resigned to retire on April 30. Mr. Jackson was born in Liverpool, England, March 23, 1856, and served an apprenticeship in the freight business there, after which he came to America and secured a position as car loading clerk at packing houses in Chicago. Subsequently he did special traffic work for the Chicago, Burlington & Quincy R. R. He organized and established on the Chicago, Milwaukee & St. Paul Ry., in 1891, the first American industrial development department, the object of which was to bring factories to the West, help in the opening of mines, the utilization of water powers, and the development of the timber districts. He remained in the service of that road for thirteen years. In 1903 he went to the Erie Railroad and organized and created conditions for increasing manufacturing development along the Erie. He has been in the Erie's service for eleven years. Mr. Jackson is a contributor on railroad economics to magazines and other publications, and has lectured to students of several universities on traffic matters.

S. J. Henry has been appointed assistant general western freight agent of the Northern Pacific Ry. at Tacoma, Wash.

H. W. Pinnick, traveling passenger agent of the St. Louis & San Francisco lines at Houston, Tex., has been appointed district passenger agent at that place.

J. Beels has been appointed dairy agent of the Chicago, Burlington & Quincy R. R., with headquarters at St. Paul, Minn., succeeding H. D. Weber, resigned, and E. N. Altmeier has been appointed assistant dairy agent, succeeding Mr. Beels.

James T. Nicol has been appointed general agent of the Waterloo, Cedar Falls & Northern R. R., with office at Cedar Rapids, Iowa. He will represent the company in traffic and operating matters. William C. Welsh succeeds Mr. Nicol as commercial agent at Waterloo, Iowa.

MECHANICAL.

P. O. Wood has been appointed superintendent locomotive performance of the St. Louis & San Francisco R. R., with headquarters at Springfield, Mo., effective April 20, succeeding Robert Collett, resigned. W. H. Malone has been appointed assistant superintendent locomotive performance, with headquarters at Springfield, succeeding Mr. Wood.

Henry Gardner, supervisor of apprentices of the New York Central & Hudson River R. R. has resigned to accept a position with the Baltimore & Ohio R. R. as assistant shop superintendent at the Mt. Clare shops, Baltimore, Md. Wilbur D. Arter has been appointed supervisor of apprentices of the New York Central & Hudson River, vice Mr. Gardner.

Robert Collett, superintendent of locomotive performance of the St. Louis & San Francisco R. R. has resigned to enter the service of the Pearce Oil Corporation, as assistant manager of the railway lubricating department, with headquarters at St. Louis, Mo.

ENGINEERING.

J. R. Holman, chief engineer of the Oregon-Washington R. R. & Navigation Co., Seattle, Wash., has been appointed to succeed G. W. Boshke, chief engineer at Portland, Ore., who has resigned.

H. C. Lothholz, assistant engineer of design of the Chicago, Milwaukee & St. Paul Ry. has been appointed engineer of design, with headquarters at Chicago, succeeding J. H. Prior, resigned to become assistant chief engineer of the Illinois public utilities commission.

OBITUARY.

James J. Harding, formerly engineer of masonry construction and a member of the bridge and building and engineering departments of the Chicago, Milwaukee & St. Paul Ry., died at Seattle, Wash., February 28. Mr. Harding entered the service of the company in 1895 and remained until 1910 when his health failed and incapacitated him from arduous work. It was hoped that a period of rest would en-

able him to return to work again but this hope was not fulfilled. Mr. Harding was born in Dickinson county, Kan., March 8, 1872. When eight years old his parents moved to Leavenworth, Kan., and after passing through the high school there and spending a year with the Missouri valley Bridge & Iron Co., he entered the Kansas State university at Lawrence, in 1891, graduating from there in the course of electrical engineering in June, 1895. The same year he went to Chicago and after a short time in the employ of the American Bridge Co., entered the bridge and building department of the Chicago, Milwaukee & St. Paul of which Mr. Onward Bates was then engineer and superintendent. Mr. Harding occupied positions of increasing responsibility in the drafting room of that department until in 1901, when he was made assistant engineer in charge and responsible, under the engineer and superintendent of bridges and buildings, for all plans required by the large field of activity of the department. In 1905, at the time when the construction of the Puget Sound Line was commenced, Mr. Harding was made engineer of masonry construction and had the supervision of the field forces engaged in building the many masonry structures, not only on the old lines but also on the new railroad rapidly growing westward, including the big bridge that spans the Missouri river at Mobridge. In the fall of 1907, in order that he might be in closer touch with the work on the new lines Mr. Harding was relieved of duties on the old lines and transferred to Miles City. In 1909 the development of the new line in Washington called for the organizing of a bridge and building department to take care of that class of work there and Mr. Harding was transferred to Seattle, Wash., for that purpose and it was there that he continued his work as long as his health permitted. By nature quiet and unassuming, Mr. Harding won the esteem of all those with whom he came in contact and not only his friends and associates in the engineering department mourn his loss but those of his profession who knew him regret that a career of so much promise should have been cut short. He was a member of the Western Society of Engineers and of the American Society of Civil Engineers and was an enthusiastic student in all things pertaining to his work.

Edward White, formerly from 1885 to 1898, treasurer of the Erie Railroad, with office at New York, died at his home in Brooklyn on April 12, at the age of 70.

Thomas H. Johnson, consulting engineer of the Pennsylvania Lines West of Pittsburgh, died at his home in Pittsburgh, Pa., April 16. Mr. Johnson was born January 12, 1841, in Coshocton, O., the son of William Kerr Johnson and Elizabeth Humrickhouse, and was graduated from Jefferson college, now Washington and Jefferson college, with the degree of bachelor of arts, in 1861, the degree of master of arts being conferred upon him in 1866. He entered railroad service as a rodman in 1863. From 1864 to 1865, he was assistant engineer of the Pana, Springfield & Northwestern railroad and served consecutively as engineer in various departments on the Pittsburgh, Cincinnati, Chicago & St. Louis Ry.; civil engineer and architect at Columbus, 1873 to 1875; engineer for contractors of the Indiana state house; principal assistant engineer and chief engineer of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. and consulting Engineers, the Engineering Society of Western Pennsylvania. Mr. Johnson was a member of the American Society Civil Engineers, the Engineering Society of Western Pennsylvania, Natural Geography Society, Technischer Verein, Phi Kappa Psi, and other fraternal and scientific organizations.

Alfred Noble, chief engineer of the Pennsylvania Tunnel & Terminal R. R. and a former president of the American Society of Civil Engineers, died April 19 at St. Luke's hospital, in New York city. Mr. Noble was born in Michigan, August 7, 1844, the son of Charles and Lovina Noble. He served three years in the Army of the Potomac. He was graduated from the University of Michigan in 1870 as a civil engineer, and for the next twelve years was in charge of improvements in the St. Mary's Falls canal and St. Mary's river. From 1883 to 1886 he was general assistant engineer of the Northern Pacific Ry., and for some years after that was in charge of the construction of railroad bridges in various parts of the country. Mr. Noble was a member of the Nicaragua canal board in 1895, of the United States board of engineers on deep waterways in 1899 and 1900, of the Isthmian Canal Commission from 1899 to 1903, of the board of consulting engineers of the Panama canal in 1905, and was chief engineer of the East River division of the Pennsylvania, New York & Long Island R. R. and successor from 1902 to 1907. This company and the Pennsylvania, New Jersey & New York R. R., in 1907, became

the Pennsylvania Tunnel & Terminal R. R., organized to build the electric division of the Pennsylvania Railroad including the tunnels under the Hudson river. For his work at this time Mr. Noble received the John Fitz medal. In May, 1912, he received the Elliott Cresson medal from Franklin Institute at Philadelphia. He was president of the American Society of Civil Engineers in 1903, and of the Western Society of Engineers in 1897.

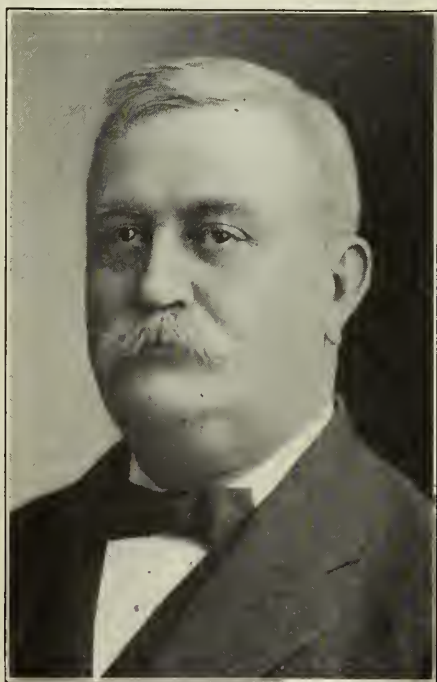
Emil Gerber, assistant to the president, and general manager of the erecting department of the American Bridge Co., died at his home in Pittsburgh, Pa., April 16, 1914. Mr. Gerber's death came as a severe shock and personal loss to the large number of friends who admired his sterling worth and felt for him that affection which his personality so readily inspired. The deceased had held, at various times, many responsible positions. He had been connected with and had had charge of a large amount of important work and he made a success of everything he undertook; yet a mere review of his successful life would give an inadequate conception of his place in the engineering profession and in the American Bridge Co. In the course of his career he had a large range of experience and the advantage of intimate association with such men as Ainsworth, Morison, Noble and Ziesing which, combined with his natural ability, gave him breadth of view, soundness of judgment, stability of character and ever-present poise. Mr. Gerber was born at Reichendach, Saxony, Germany, January 31, 1858. He was graduated from the Worcester Polytechnic Institute, Worcester, Mass., class of 1876. After graduation he taught school for one year at Southbridge, Mass. Subsequently he was assistant engineer in the location and construction of the Fremont, Elkhorn & Missouri Valley R. R. In 1879 he was appointed assistant engineer of the Sioux City & Pacific R. R., now a part of the Chicago & Northwestern Ry. As resident engineer he had charge of construction of the Blair bridge, Missouri Valley, Iowa, the Sioux City bridge, Sioux City, Iowa, and Jacksonville bridge, at Jacksonville, Fla., which bridges were designed by the late George S. Morison, consulting engineer. In 1889 he was made principal assistant engineer to George S. Morison, resigning in 1897 to accept the position of chief engineer of the Lassig Bridge & Iron Works of Chicago. He was manager of the Lassig plant during the years 1900 and 1901, and was then appointed assistant to the president of the American Bridge Co., at Pittsburgh, also serving as operating manager of the Pittsburgh division of the Amer-

of the largest bridges in the United States. He was a member of the American Society of Civil Engineers, of which he was also a director; of the American Railway Engineering Association; the American Iron & Steel Institute; the Western Society of Engineers; the Engineer's Society of Western Pennsylvania; the Chicago Engineer's Club, the Duquesne



EMIL GERBER
January 31, 1858—April 16, 1914

Club, and the Junta, Pittsburgh. Recently he was appointed on a joint committee of the American Society of Civil Engineers and the American Railway Engineering Association, on railroad tracks and roadbeds. Mr. Gerber is survived by his wife, his daughter, Mrs. Albert Olsen, and son, Emil.



ALFRED NOBLE
August 7, 1844—April 19, 1914

ican Bridge Co., from 1905 to 1911. During the years 1910 and 1911, the construction of the Gary plant of the American Bridge Co. was under his direction. In 1911, in addition to his duties as assistant to the president, Mr. Gerber assumed duties of the general manager of the erecting department. Mr. Gerber has been identified with the construction of many

NEW ROADS AND PROJECTS.

Illinois.—The La Salle Terminal Ry. has been incorporated for the purpose of constructing a railroad from La Salle, Ill., to Oglesby, Cedar Point and Standard, Ill. J. B. McCaffery, La Salle, Ill., is said to be interested.

Manitoba.—See New Roads and Projects under Ontario.

Mississippi.—See New Roads and Projects under Tennessee.

Montana.—At a recent meeting of the Boston & Montana Development Co. and A. F. MacArthur, president, and Sir Robert W. Perks, chairman of the board of MacArthur, Perks & Co., of London, arrangements were made whereby the English company will construct the Butte, Wisdom & Pacific R. R. The railroad will be 119 miles in length and will open up a large mining, timber and ranching district in western Montana and southern Idaho.

North Carolina.—The Watauga & Yadkin River R. R. does not contemplate any new construction work until the special railroad rate commission of North Carolina shall have rendered a finding in connection with the Justice freight rate act. The commission will not meet until July 7.

The Carolina Railroad, according to report, plans to construct a 16-mile extension of the Kinston-Snow Hill branch to Stantonsburg, N. C.

Ontario.—The Ontario government is evidently preparing to extend the Temiskaming & Northern Ontario Ry. to Port Nelson. Notice has been given of a bill to be introduced providing for the transfer of "certain lands and privileges within the province of Manitoba and belonging to His Majesty in the right of Canada, required to make provision for the extension of the Temiskaming & Northern Ontario Ry. to a port to Hudson Bay, at or near the mouth of the Nelson river."

Tennessee.—The Wauhatchie Railway Extension Co. has applied for a charter to build 5 miles of railway from Wau-

hatchie to Chattanooga, Tenn., including a bridge of either steel or concrete over Chattanooga creek. The incorporators are: Chas. A. Lyerly of Chattanooga, Henry Fonde of Knoxville, E. Watkins, W. H. Watkins and W. B. Otto. This would be the proposed extension of the Alabama Great Southern R. R. previously mentioned in these columns.

A charter of incorporation has been granted to the Shiloh & Corinth R. R. by secretary of state of Tennessee. The company is capitalized at \$100,000 and proposes to build a new line from Nashville, Tenn., to Corinth, Miss.

Texas.—The report with reference to the Atchison, Topeka & Santa Fe Ry. having made arrangements for construction of a line from Station to Fort Worth, Tex., is denied.

Electric Railways.

The Morgantown & Wheeling Ry. has awarded contract to Keeley Bros. & Gilmore of Morgantown, W. Va., for the masonry and grading of the extension from Cassville to Blacksville, W. Va., 14½ miles, the work to be finished by October 1. Robert D. Hennen, Morgantown, is chief engineer.

A project is being organized to build an interurban railway from Opelika to Auburn, Ala. W. S. Lounbury, secretary of the Opelika and Lee County chamber of commerce, has been quoted as saying that a survey of the proposed route would be made at once.

The Connecticut Company has awarded contract for double-tracking some of its lines in Ansonia, Conn., to F. T. Ley Co., Springfield, Mass.

The Jackson-Clinton Motor Transit Co. has been chartered, capital \$10,000, to own and operate an interurban line between Jackson and Clinton, Miss., about 23 miles. Dr. J. W. Province of Clinton, E. J. Ellzy, Dr. Julius Crisler and J. M. Evans of Jackson are the incorporators.

The Fort Scott & Pittsburgh Ry., a proposed interurban line to connect with the network of electric lines in southwest Kansas, has been authorized by the Kansas utilities commission to issue bonds in the sum of \$950,000 for the construction and equipment of the line. This line is projected in connection with the proposed line between Fort Scott, Kan., and Kansas City.

It is proposed to build an interurban railway from McKinney via Blue Ridge to Bonham, Tex., about 40 miles. Among those interested are John L. Lovejoy, W. B. Newsome, R. L. Waddill, S. D. Heard, F. B. Pope, L. A. Scott, R. C. Merritt, J. R. Gough and J. P. Crouch, all of McKinney, Tex.

A trust deed for \$10,000,000 covering the Salt Lake & Utah R. R., together with all its franchise and easements, has been filed in the office of the county recorder of Salt Lake county, Utah. The deed is to cover a bond issue of equal amount authorized by the company for the purpose of carrying on improvements and extension work on its railroad line. It is not the intention of the road, according to F. M. Orem, secretary of the company, to issue the bonds all at once, and in fact, only \$200,000 worth of the bonds have been issued up to this time. Other bonds will be authorized as required to complete the construction of the interurban road to Provo and for other extensions as the company deems advisable.

Final surveys are being made for the Parker, Colorado River Valley Electric Ry. and it is planned to begin work about May 1 on the proposed line to connect Parker and Blythe, Ariz. The power house will be located about half mile north of Parker on the Colorado river. The repair shops will be in Parker. Capital stock is \$500,000. W. H. Thorpe is manager.

Surveys have been made by Manitowoc & Northern Traction Co. for an extension north of Two Rivers, Wis., to and beyond Mishicot, and line will be extended north to meet the lines of the Granite City Ry. south of Sturgeon Bay. This is said to be part of plan to build line through the Green Bay peninsula.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Coal & Coke Ry. has ordered 2 consolidation (2-8-0) locomotives from the Baldwin Locomotive Works.

—The Norfolk & Western Ry. has ordered 40 Mallet type (2-6-6-2) locomotives from the Baldwin Locomotive Works.

—The Lehigh Coke Co., South Bethlehem, Pa., has or-

dered one six-wheel switching (0-6-0) locomotive from the Baldwin Locomotive Works.

Freight Cars.

—The Chicago Burlington & Quincy R. R. is reported as ordering 1000 freight cars from the Haskell & Barker Car Co.

—The Charlotte, Harbor & Northern Ry. is inquiring for 30 phosphate cars.

—The Magnolia Cotton Oil Co. has ordered 10 tank cars from the American Car & Foundry Co.

—The Louisville & Nashville R. R. is in the market for 1400 underframes.

—The Bessemer & Lake Erie R. R. and the Duluth, Missisquoi & Northern Ry. have placed orders for 3500 freight cars, of which the Pressed Steel Car Co. will build 2250, including 1250 hopper and gondola cars for the former road and 1000 ore cars for the latter. The Standard Steel Car Co. will build 1000 gondolas for the Bessemer & Lake Erie and Ralston Steel Car Co., 250 hopper cars.

Passenger Cars.

—The Northwestern Pacific R. R. has ordered 12 coaches, 3 baggage and mail and 2 baggage cars from the Pullman Company.

—The Nashville, Chattanooga & St. Louis Ry. has ordered 2 coaches, 2 postal cars, 1 partition coach and 1 baggage car from the American Car & Foundry Co.

Iron and Steel.

—The Wabash Railroad is reported as having ordered 2500 tons of rails.

—The Northern Pacific Ry. has ordered 20,000 tons of rails.

—The Southern Railway, it is said, has ordered 9000 tons of rails from the Tennessee Coal Iron & Railroad Co.

—The Missouri Pacific Ry. is in the market for 10,000 tons of rails.

Bridges.

—The Pennsylvania Lines West of Pittsburgh have awarded contract to the Mt. Vernon Bridge Co. for 250 tons of steel for a bridge at Alliance, Ohio.

—The Seaboard Air Line Ry. and the Atlantic Coast Line R. R. have awarded the contract for the construction of a reinforced-concrete bridge at Fourth street, Hilton, N. C., to George L. Crafts Co., Macon, Ga., at \$18,940.

—The Southern Railway will erect a bridge over Chattanooga creek, Chattanooga, Tenn.

Buildings, Terminals, Etc.

—The Buffalo, Rochester & Pittsburgh Ry. is reported as awarding contract to the Miller Construction Co. for the construction of railroad yards at Creekside, Pa., to cost about \$50,000.

—It is reported that the Illinois Central R. R. is preparing to make extensive improvements at its shops at Clinton, Ill.

—The Southern Railway is reported as awarding contract for grading preliminary to building new yards at Spencer, N. C., to R. B. Oliver, Maryville, Tenn.

—The Snare & Triest Co., of New York city, who have a contract for the building of a large terminal in Cuba for the United Railways of Havana, have just concluded an arrangement with the Roberts & Schaefer Co. for the supplying of a 400-ton reinforced concrete, four-track, balanced bucket coaling station to be installed in the vicinity of Havana, Cuba.

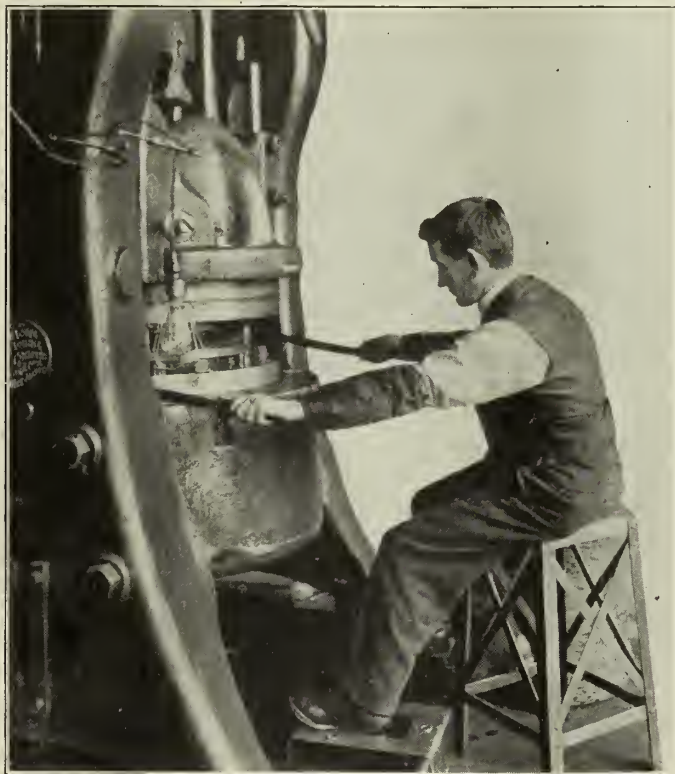
—The Cleveland, Cincinnati, Chicago & St. Louis Ry., according to report, will build an 18-stall roundhouse at Anderson, Ind.

Safety Suction Devices for Punch Presses.

For some time the Westinghouse Electric & Manufacturing Co., at East Pittsburgh, tried mechanical safety devices of various kinds for the punch shop, but with unsatisfactory results. The operators found them unsuited because of the fact that they tended to retard the production and consequently their earnings, while the management also objected to them because they afforded only partial protection, as the operator had to place his hand under the press

in every instance, in order to remove the scrap. The suction device illustrated herewith was developed with the idea of preventing the necessity of the operator approaching the danger point at any time during the operation, as he feeds and clears the press with the same tool. Another advantageous point is that the operator does not take hold of the material with his hands (this applies principally to the smaller sizes) and thereby escapes the numerous small cuts to which he was subjected when inserting the blanks with his fingers.

The double handle device used on large work and as shown in the illustration is absolutely safe, the operator being compelled to use the device owing to the size of the sheets handled, it being impossible to get hold of the sheets any other way. Before adopting this method a man was placed at the back of the press to feed in the sheets and he was the man who most frequently was injured because his fingers were entirely at the mercy of the operator. Since the adoption of the suction device there has not been an amputation on the large presses and up to the present time no



Suction Safety Guard for Punch Presses, Westinghouse Electric & Manufacturing Co.

fingers have been amputated in the punch shop. This freedom from injury has been due to the operation of the devices and the rigid enforcement of the rules by the management of the shop.

The device was exhibited and received the grand prize at the recent international exposition of safety and sanitation in New York city and is now on exhibition in the American Museum of Safety in New York city. The Westinghouse Electric & Manufacturing Company also employs a number of other safety devices such as magnetic lifters, sliding devices, etc., adapted for the different kinds of punchings made.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE APRIL 14, 1914.

Long spring-base for trucks, 1,092,824—Andrew Christianson, Butler, Pa., assignor to Standard Motor Truck Co., Pittsburgh, Pa.

Car-ventilator, 1,092,879—John E. Ward, New York, N. Y., assignor to Standard Heat and Ventilation Co., New York.

Car-brake, 1,092,917—William F. Kiesel, Jr., Altoona, Pa. Car-door fastening, 1,092,939—Robert S. Miller, Cleveland, Ohio.

Refrigerator-car-hatch plug, 1,092,944—Edward A. Nix, John J. Dowling and Henry A. Bursley, New Orleans, La.

Air-brake apparatus, 1,092,949—William E. Parker, Manning, Tex.

Truck for one-rail tracks, 1,092,951—Edward B. Peirce, Lowell, Mass.

Automatic railway-brake valve, 1,092,958—Benjamin F. Shurz, Marion, Ohio.

Piston-valve, 1,092,967—Rudolf Wolf, Magdeburg-Buckau, Germany.

Means for indicating broken rails, 1,092,986—Joseph H. Gartside, Philadelphia, Pa.

Metallic railroad-tie, 1,093,013—Romano Serafin, Stafford Springs, Conn.

Railway-car ladder, 1,093,019, 1,093,020 and 1,093,021—William Erastus Williams, Chicago, Ill.

Nut-lock for track bolts, 1,093,050—Otto A. Heckel, St. Louis, Mo.

Locomotive spark-arrester, 1,093,054—Robert E. Jackson, Victoria, and Frank E. Bell, Norfolk, Va.

Locomotive, 1,093,069—Carl L. Nilson, Transcona, Canada. Refrigerating device for railway-cars, 1,093,075—Philipp Porges, Vienna, Austria-Hungary.

Railway-tie, 1,093,129—William P. Hastings, Henry, Tenn.

Railway-track construction, 1,093,153—John W. Stephenson, Toledo, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Anti-rail-creeper, 1,093,154—John W. Stephenson, Toledo, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Rail-joint, 1,093,155 and 1,093,158—John W. Stephenson, Toledo, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Guard-rail tie-plate, 1,093,156—John W. Stephenson, Toledo, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Rail-support, 1,093,157—John W. Stephenson, Toledo, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Valve for water-tanks, 1,093,165—Charles W. Arndt, Hutchinson, Kans.

Journal-box-securing mechanism, 1,093,170—Albert O. Buckius, Jr., Chicago, Ill., assignor to The National Malleable Castings Co., Cleveland, Ohio.

Brake mechanism, 1,093,172—William P. Collins, Boston, Mass., assignor to Automatic Air Brake Co., Boston, Mass.

Car-roof, 1,093,201—William J. Owen, Collinwood, Ohio, assignor to Peter H. Murphy, Pittsburgh, Pa.

Rail, 1,093,212—Edwin E. Slick, Westmont borough, Pa.

Method of preserving railway-tie timber against injury from splitting and decay, 1,093,230—William Erastus Williams, Chicago, Ill.

Tie-plate, 1,093,256—Lawrence Dilworth, Pittsburgh, Pa., assignor to Dilworth, Porter & Co., Pittsburgh, Pa.

Steam-superheater for locomotive boilers, 1,093,293—John George Robinson, Manchester, England.

Railroad-tie with cushions, 1,093,308—William C. Benson, Owensville, Ind.

Car-wrench, 1,093,388—Harry L. Flack, Dayton, Ohio.

Draft-gear, 1,093,392—Robert E. Frame, Michigan City, Ind.

Means for staying sectional firebox walls, 1,093,428—Frank M. Jacobs, Topeka, Kans.

Boiler-flue, 1,093,429—Henry W. Jacobs, Topeka, Kans., and Frank W. Shupert, Bristol, Ind.

Boiler, 1,093,430—Henry W. Jacobs, Topeka, Kans.

Air-brake apparatus, 1,093,454—Blythe J. Minnier, Watertown, N. Y., assignor to New York Air Brake Co., Watertown, N. Y.

Rail-brace, 1,093,482—William Scheuerman, Leoti, Kans.

Railroad safety appliance, 1,093,492—William Greenleaf Smith, Waterbury, Conn.

Tie and rail-fastening, 1,093,520—Christian Anderson, Aldermere, British Columbia, Canada.

Rail-joint, 1,093,555—James B. Evans, Sr., Fort Worth, Tex.

Rail-joint, 1,093,559—James W. Hunter, Andrew, W. Va.

Switch-operating mechanism, 1,093,589—John William Stone, Downingtown, Pa.



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Spotting Charges and Allowances to Industrial Lines.

Railroads in Eastern classification territory filed this week, with the Interstate Commerce Commission, tariffs fixing a charge for "spotting" cars. The action is taken to comply with the evident suggestions embodied in the commission's attitude in the industrial railways case. The provisions of the various tariffs are identical, being a charge of 5½ cents a ton, with a minimum of \$2.00 per car. The tariffs contain these descriptive statements: "Spotting service is the service beyond a reasonably convenient point of interchange between road haul or connecting carriers and industrial plant tracks, and includes: (a) One placement of a loaded car which the road haul or connecting carrier has transported. (b) The taking out of a loaded car from a particular location in the plant for transportation by the road haul or connecting carrier. (c) The handling of empty cars in the reverse direction." It is expected that an effort will be made by shippers to have the tariffs suspended, for many protests have been made in an informal way, against the imposition of such charges. Tariffs filed by many eastern trunk lines railroads canceling allowances heretofore made to twenty named industrial railways in various parts of the country have been suspended by the Interstate Commerce Commission until July 30. An inquiry now is in progress with a view to determining the propriety of such allowances.

Investigations of Two Systems Ordered.

The Interstate Commerce Commission issued an order April 27, instituting two investigations, one into operations of the Pere Marquette R. R., and the other into operations of the Chicago, Rock Island & Pacific Ry. The investigations will be conducted through the division of physical valuation of the railways. Both railroads have been the subject of criticism in resolutions introduced in congress.

Decisions of the United States Supreme Court.

The United States Supreme court handed down a number of important decisions affecting railroads and interstate commerce, April 27. That the finding by the Interstate Commerce Commission of what is a reasonable rate is not a necessary precedent to recovery for reparation for the charging of an unreasonable rate, is the ruling in an opinion which allows a decision the Baer Brothers' Mercantile Co., of Leadville, Co., \$3438 for the shipment of beer to it from St. Louis, Mo., over the Denver & Rio Grande. "The Hepburn rate law did not contemplate making a shipper wait for reparation for overcharges until the commission should promulgate a reasonable rate," said Justice Lamar. The St. Louis terminal case, involving the use by various railroads of the railroad terminals in St. Louis, was advanced for hearing by the Supreme court October 13. The North Dakota coal cases also were advanced for hearing October 13. These cases involve the question whether an unremunerative rate on a commodity is confiscatory within the hearing of the constitution. Two important points in employers' liability were also settled. The court decided that where the federal employers' liability law of 1908 makes railroads absolutely liable if they are violating a "law" at

the time an employee is injured, the word "law" means "federal" and not "state" law. The court set aside a judgment of \$7500 rendered by the Supreme court of North Carolina in favor of James T. Horton, an engineer on the Seaboard Air Line. The court also decided that a man injured while engaged in switching intrastate cars does not come within the federal employers' liability act simply because the next thing he intended to do was an act of interstate commerce. As a result of this decision the court held that John Behrens, a fireman of New Orleans, was not entitled to recover from the Illinois Central.

Senate Looks for Influences in Rate Case.

The United States senate passed without debate, Tuesday, April 28, the LaFollette resolution directing the Interstate Commerce Commission to send to the senate all communications it has received which were "manifestly designed to influence" its decision in the freight-rate advance case. Senator Newlands announced that members of the commission had no objection to the immediate passage of the resolution.

Southern Pacific Aids Refugees.

Lewis J. Spence, director of traffic of the Southern Pacific Co., has announced that in response to a request from the secretary of state, the Southern Pacific Co. has offered to co-operate with the government by transporting over its lines, at half rates, the refugees arriving from Mexico, whose expense of transportation the United States has undertaken to defray.

To Assit the Public With Engineering Service.

President E. P. Ripley, of the Atchison, Topeka & Santa Fe Ry., has announced that his road, as a large taxpayer in every city and township traversed by its lines, is interested in all public improvements to the extent of having the best work done with the funds available. Many townships in which public improvements are contemplated are not in position to engage for their needs the high-priced engineering talent found on the market. In view of this situation he states that his company will give local public officials in Santa Fe territory the benefit of its knowledge and experience in matters pertaining to the construction of highways, bridges, buildings, sewers and other work of that character when invited to do so.

Bridge Wreck on the M. K. & T. Ry.

On April 25 a Missouri, Kansas & Texas Ry. freight train, north bound, was wrecked by the failure of a bridge over Russell creek, 20 miles north of Vinita, Okla., killing four men and injuring six others. The foundation of the bridge had been weakened by sudden flood due to a cloudburst, so the newspapers state. The train was running at high speed at the time of the accident and many carloads of valuable goods were lost.

Central Railway Club.

The April meeting of the Central Railway Club was held at the Hotel Statler, Buffalo, N. Y., Friday evening, May 8, 1914. Mr. W. F. Goltra, president of the W. F. Goltra Tie Co., presented a paper on "Treating Railroad Ties and Timbers as Practised in North America," after which, in accordance with arrangements with the Conservation Commission of the State of New York, Mr. W. G. Howard, assistant superintendent of state forests, gave an illustrated lecture on "Forestry and Forest Fire Fighting in New York State."

A Comprehensive Exhibit at San Francisco.

The announcement is made that the United States Steel Corporation and its subsidiary companies propose to have a

comprehensive exhibit of its operations at the Panama-Pacific exposition in San Francisco. It will begin with the ore fields and carry on an educative picture of its operations in ore mining, rail and water transportation, dock operations, coal, coke and pig iron production, steel manufacturing in its various lines and will also present in a materially displayed way the processes of manufacturing of many of its subsidiary companies' products, including "National" pipe; also how it utilizes its by-products and the display of many uses in which its general products are employed, typifying the advancement in the uses of this country's resources. In addition to the material exhibits before mentioned, the corporation intends to exhibit in a comprehensive manner, by moving pictures, its operations throughout all departments showing the ramifications of the processes of operations. It is proposed as well, to set forth to the world the work which the United States Steel Corporation has done towards the

social welfare of its employees and those depending upon them. Also it will exhibit many favors of safety devices that have been devised by its officials and employees, and in the installation of which large sums have been, and are being, expended. In this social welfare department will also be shown the methods employed in the aid and care for the injured and the welfare of employees' conditions at work and the benefits that are aimed to be afforded to employees at their work and in their surroundings. Also the voice that is given to the employees through their committees in bringing about these improved working conditions and the general plans of the corporation's methods.

"You can't chase a hen around the yard merely to hear it squawk, and expect it to lay eggs." But Washington seems to prefer the squawk.—Wall Street Journal.

Triplex Articulated Locomotive, Erie R. R.

The design of locomotive herein illustrated represents a radical step in advance of anything hitherto attempted in this country for heavy freight-moving service. By providing an extra pair of low-pressure cylinders, making a total of six, the weight of the tender is utilized for purposes of adhesion, thus increasing the tractive power of the unit to that extent. Whereas in the usual Mallet design, but 65 per cent of the gross weight of the engine and tender is available for this purpose, in the new design, 90 per cent of the gross weight is so utilized.

The Baldwin Locomotive Works has recently completed, for the Erie R. R., a locomotive for pusher service, which develops a tractive force of 160,000 pounds, and is by far the most powerful unit yet built. This capacity is secured, not by using excessive wheel-loads or a rigid wheel-base of unusual length, but by placing driving-wheels under the tender and thus making the weight of the latter available for adhesion. In heavy grade work especially, the weight of the tender detracts materially from the net hauling capacity of a locomotive of the usual type; while in this case, the tender is used as a means for increasing the hauling capacity.

This locomotive is built in accordance with patents granted to George R. Henderson, consulting engineer of the Baldwin Locomotive Works. The wheel arrangement is 2-8-8-8-2, the third group of driving-wheels and the rear truck being placed under the tender section. The six cylinders are all of the same size, two acting as high pressure and four as low pressure. The two high pressure cylinders drive the middle group of wheels. The right-hand high-pressure cylinder exhausts into the two front cylinders, and the left-hand high pressure cylinder exhausts into the two rear cylinders. This arrangement is therefore equivalent to a compound engine having a ratio of cylinder volumes of one to two.

The boiler has a conical connection in the middle of the barrel, and is fitted with the Gaines type of furnace. The firebox has a total length of 13 ft. 6 in., and of this the grates occupy 10 ft. A combustion chamber 54 in. long extends forward into the boiler barrel, and the tubes have a length of 24 ft. 0 in. The brick arch is supported on six 3½ in. tubes; and heated air is delivered under the arch by seven 3 in. pipes which are placed vertically in the bridge wall. There are two fire-doors, placed 32½ in. between centers, and a Street mechanical stoker is applied.

The barrel of this boiler measures 94 in. in diameter at the front end and 102½ in. at the dome ring. The center line is placed 10 ft. 7 in. above the rail. The circumferential seams are triple riveted, while the longitudinal seams have sextuple riveted butt joints, which are welded at the ends, and have an efficiency equal to 90 per cent of the solid plate. The dome is of pressed steel, 33 in. in diameter and 13 in. high. It contains a Cham-

bers' throttle, which is connected with the superheater header, in the usual manner, by an internal dry pipe. The superheater is composed of 53 elements, and is the largest ever applied to a locomotive, the superheating surface being 1584 sq. ft. The header is divided, separate castings being used for the saturated and superheated steam sections. The front end contains a single exhaust nozzle, with a ring blower. The size of the nozzle can be varied by a simple adjusting device placed outside the smoke box. The stack is 22 in. in diameter, and it has an internal section which extends down to the center line of the boiler.

The superheated steam is conveyed to the high-pressure cylinders through outside pipes, and the high-pressure distribution is controlled by 16 in. piston valves, arranged for inside admission. Similar valves are applied to the low pressure cylinders. These valves are all driven by Baker gears and the three sets of motions are controlled simultaneously by the Ragonnet power reverse mechanism. All six cylinders are cast from the same pattern, and the valve motion and driving gear details used with the three groups of wheels are as far as possible interchangeable. A large number of these details also interchange with those of the heavy Mikado type locomotives in service on this road.

Among the details of the driving gear may be mentioned the pistons, all six of which are alike. The piston heads are steel forgings, of dished shape; and each is surrounded by a cast iron bull ring. The bull ring carries three packing rings, and is secured to the piston head by a retaining ring which is electrically welded into place. The cylinders and steam chests are bushed; and these bushings, as well as the piston and valve packing rings, are of Hunt-Spiller metal.

The pipes connecting the high and low-pressure cylinders are constructed like the flexible pipes in a Mallet locomotive. The high pressure cylinder saddle has cored in it two passages, one of which conveys the exhaust from the right-hand cylinder to the front receiver pipe, while the other conveys the exhaust from the left-hand cylinder to the back receiver pipe. The front cylinders exhaust up the stack in the usual manner, while the exhaust from the rear cylinders is discharged up a pipe placed at the back end of the tank. Between the rear cylinders and the exhaust pipe is placed a feed-water heater, through which the exhaust steam passes. The heater consists of a long drum, traversed by small tubes. The drum has connection with the tank through a suitable valve, and the exhaust steam passes through the tubes. The hot feed from the drum is forced into the boiler by two pumps, which are driven from the crossheads of the high pressure engine. Two injectors are also used, and they draw cold feed-water from the front end of the tank. The pump and injector checks are placed on the top center line of the boiler near the front end.

The tender section, as far as frames, wheels, equalization and driving gear are concerned, is arranged like a steam locomotive. The tank is supported on the frames by six bearers, which serve as transverse frame braces also. Three of these bearers are placed between adjacent pairs of driving-wheels; one is placed just back of the rear driving-wheels, one above the rear truck,

and one under the back end of the tank. The width of the tank is 10 ft. 8 in., and it is placed sufficiently high to clear the valve motion.

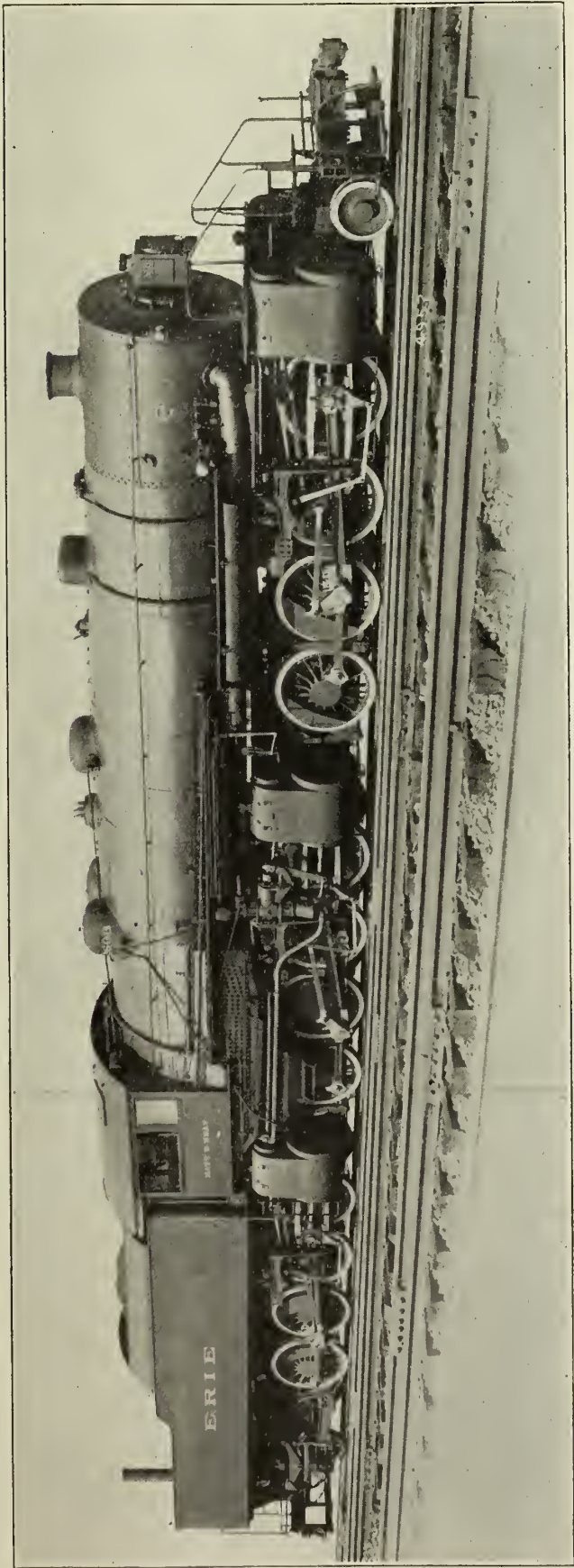
The articulated connection between the middle and rear frames is placed under the cab, and between the rear cylinders. The radius bar on the middle frames makes a ball-jointed connection with the hinge-pin. A similar connection is provided between the middle and front frames, and in this case the radius-bar is pinned to the front frames in such a way as to allow vertical flexibility. The frames are vanadium steel castings, 6 in. in width. Each is made in one piece with a single front section to which the cylinders and saddle are keyed and bolted. The front group of wheels is arranged with a continuous equalization system, the leading truck being center bearing and equalized with the driving wheels as in a Consolidation engine. The second group of wheels has a continuous equalization system on each side of the locomotive. In the rear group, the equalization is broken between the second and third pairs of driving-wheels. The rear truck, which is of the side bearing type with outside journals, is equalized with the two rear pairs of driving-wheels.

The arrangement of starting valve usually applied by the builders to Mallet locomotives, is used on this engine; except that in the present case, live steam is admitted to four low-pressure cylinders instead of two. The admission of steam is controlled by a manually operated valve in the cab.

This locomotive marks an interesting step in the development of heavy power for freight service. The efficiency of a locomotive for slow, heavy work, is measured largely by the proportion of the total weight that is available for adhesion; and in this respect the present locomotive excels. About 90 per cent of the total weight is carried on the driving-wheels, as against approximately 65 per cent in a Mallet locomotive of the 2-8-8-2 type, including, in the latter case, the weight of the separate tender.

The leading features of this locomotive are indicated in the following table:

Type	2-8-8-8-2
Service	Pusher
Cylinders (six)	36 by 32 ins.
Valves	16-in. piston.
Valve gears.....	Baker
Tractive power.....	160,000 lbs.
Boiler, type	Conical
Min. diameter.....	94 ins.
Working pressure.....	210 lbs.
Fire-box (Gaines), size.....	108 by 162 ins.
Grates, size	108 by 120 ins
Grate area	90 sq. ft.
Kind of fuel.....	Soft coal
Tubes, No. and dia.....	326—2¼ ins.
Flues, No. and dia.....	53—5½ ins.
Length	24 ft. 0 ins.
Heating surface, fire-box.....	272 sq. ft.
Combustion chamber	108 sq. ft.
Tubes and flues.....	6418 sq. ft.
Arch tubes.....	88 sq. ft.
Total	6886 sq. ft.
Superheating surface.....	1584 sq. ft.
Driving wheels, diameter.....	63 ins.
Journals	11 by 13⅞ ins.
Truck wheels, front, dia.....	33½ ins.
Journals	6 by 12 ins.
Back, diameter.....	42 ins.
Journals	9 by 14 ins.
Weight on driving wheels, estimated.....	743,000 lbs.
Total engine, estimated.....	830,000 lbs.
Wheel base, driving.....	71 ft. 6 ins.
Rigid, each group.....	16 ft. 6 ins.
Total	90 ft. 0 ins.
Tender—	
Capacity, water	10,000 gals.
Capacity, coal.....	16 tons



Triples Articulated Locomotive for Pusher Service, Erie R. R.

New Freight and Engine Terminals, Air Line Junction, Ohio, L. S. & M. S. Ry.

The improvements referred to in detail in this article constitute a notably complete plant for the handling and classification of freight and the housing and repairing of the equipment by means of which it is handled. Interesting features are the layout of the engine houses, one of them designed expressly for the housing of Mallet locomotives, and the location of the machine shop and related facilities between them. Unusually complete facilities for the comfort and convenience of the employes also are provided, illustrating in a striking manner, the extent in which the road recognizes that plant efficiency is no less dependent on the efficiency of the employee than it is on modern shops and tools. The plant is designed to care for all freight equipment on the Lake Shore lines centering in and about Toledo, O.

The Lake Shore & Michigan Southern Ry. is at present engaged in the construction of new freight and engine terminal and repair facilities at Air Line Junction, O. These facilities will be of such size as to take care of all freight engines and cars which converge from divisions east and west of Toledo. The engine terminal includes one 90 ft. 27-stall engine house, one 105 ft. 13-stall engine house, a machine shop, a power house, sand house, coaling plant, cinder pits, etc.

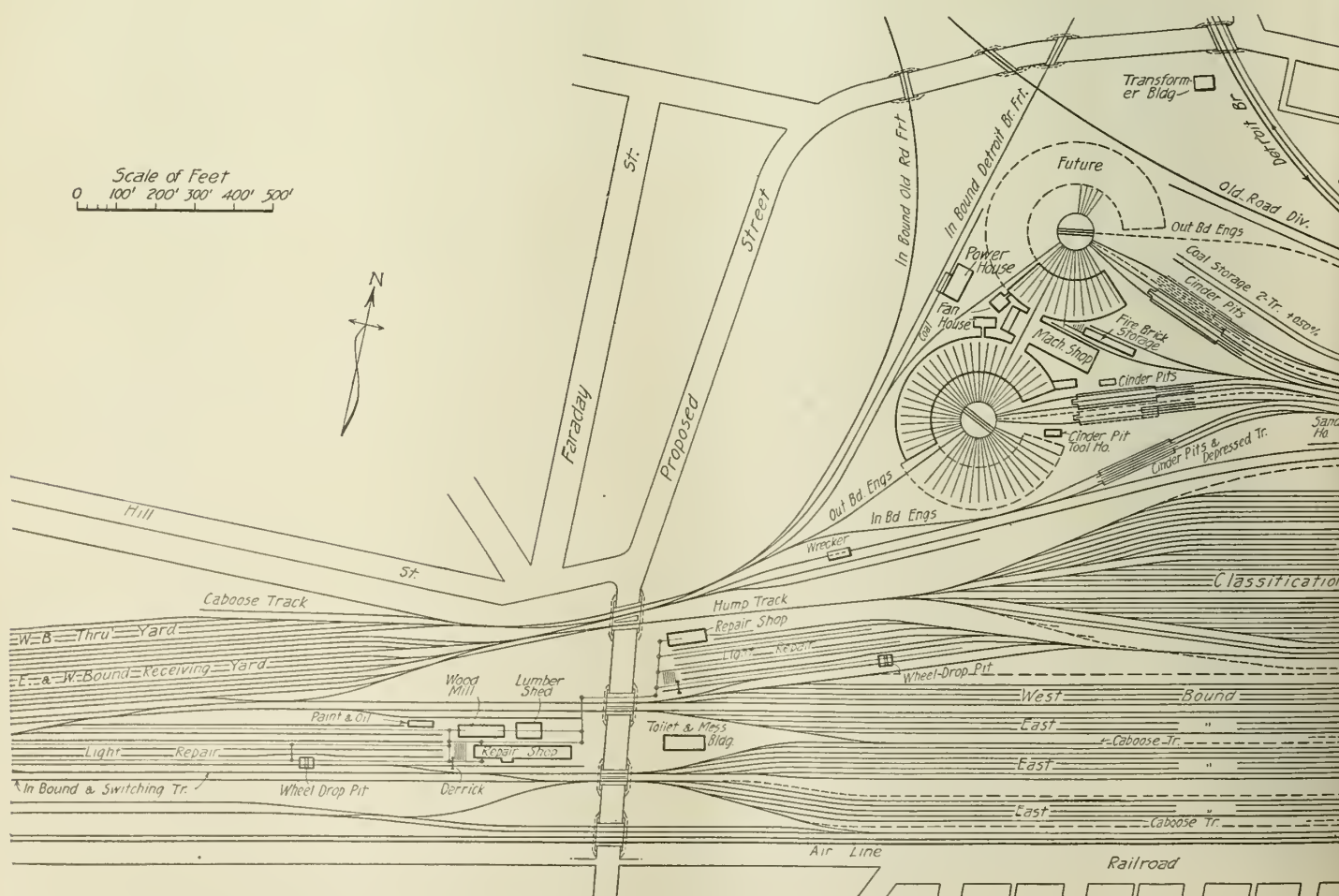
THE LOCOMOTIVE TERMINAL.

Engine Houses: The 27-stall engine house is 90 ft. deep. There are two 13 in. brick fire walls dividing the house into three sections of nine stalls each. This building is used for giving light repairs to heavy freight engines. No drop pits are provided. Room for the addition of 17 stalls to this house has been provided for. The 13-stall engine house was made 105 ft.

deep in order to give adequate space for repairs to Mallet type locomotives. It is provided with both driving wheel and truck wheel drop pits. The driving wheel drop pit is equipped with an 8-ton pneumatic jack mounted on a 4-wheel narrow gage carriage which is actuated by an air cylinder attached to the wall of the pit. The truck wheel drop pit is equipped with a 3-ton pneumatic jack mounted on a 4-wheel carriage which is actuated by hand. Room for an addition of 33 stalls to this house has been provided for.

Both the 17 and 13-stall houses have a maximum height of 22 ft. from top of rail to bottom of roof truss. The foundations are made of concrete; the walls of brick; the roof trusses, window frames and columns of wood; and the smoke jacks of asbestos board. Wood is used in the engine house frame construction on account of the rapid deterioration of structural steel when exposed to the gases and moisture from the engines. Composition roofing is used throughout. Great care was taken in designing the buildings to secure as much natural light as possible, and also to allow the smoke and gases to escape quickly. In addition to the ordinary windows there is in each case a monitor roof which extends the full length of the house. This has large windows in either side, affording excellent natural lighting facilities. The windows in the outer wall are of the triple sliding sash type, while those in the monitor are of the double sliding sash type.

The engine pits are made of concrete and are massively constructed, the bottoms being lined with selected hard burned foundation brick. The pit walls have cast iron copings which form the bases and anchor-plates for the 80-pound rails. For the



Layout of Freight and Engine Terminals, Lake Shore & Michigan Southern Ry., Air Line Junction, O.

27-stall engine house, the pits are 65 ft. long, 3 ft. 10 in. wide, 3 ft. 2 in. deep at the high ends and are made with a slope of $\frac{1}{8}$ in. per ft. For the 13-stall engine house the pits are of the same dimensions as above, except that they are 78 ft. long.

Heating and Ventilating: The heating system is of the indirect type furnished by the Green Fuel Economizer Co. It consists of three separate units, two for the 27-stall engine house and one for the 13-stall engine house. Each unit contains a heater, fan and engine. The heater has 8875 lineal ft. of 1 in. pipe, in five sections, giving a heating surface of 2960 sq. ft. The fan wheels are each 10 ft. in diameter by 55 in. wide at periphery and deliver 75,000 cu. ft. of air per minute when running at a speed of 150 r.p.m. The fans are driven in each case by 11 by 14 in. 35 horsepower horizontal steam engines.

With these units a complete air change can be made every eight minutes. A temperature of 65 degrees is maintained within the house when the outside temperature is 10 degrees below zero, and 25 per cent of the air passed through the heater is drawn from the inside of the engine houses and recirculated. The air ducts from the fans to the engine pits consist first of one large main duct extending around the outer circle of each engine house with branches leading to four screened outlets at each engine pit. The heating units are housed in separate buildings located adjacent to the engine houses, two units being located to serve the 27-stall house and one to serve the 13-stall engine house.

Lighting: The engine houses are illuminated by means of 250-watt tungsten lamps with white enameled steel Holophane reflectors hung 15 ft. above the floor. One row is hung near the outer circle of each building and one row is hung in the center between the pits. In the case of the 27-stall engine house, there are six 250-watt lamps with Holophane reflectors hung outside above the doors, and in the 13-stall engine house

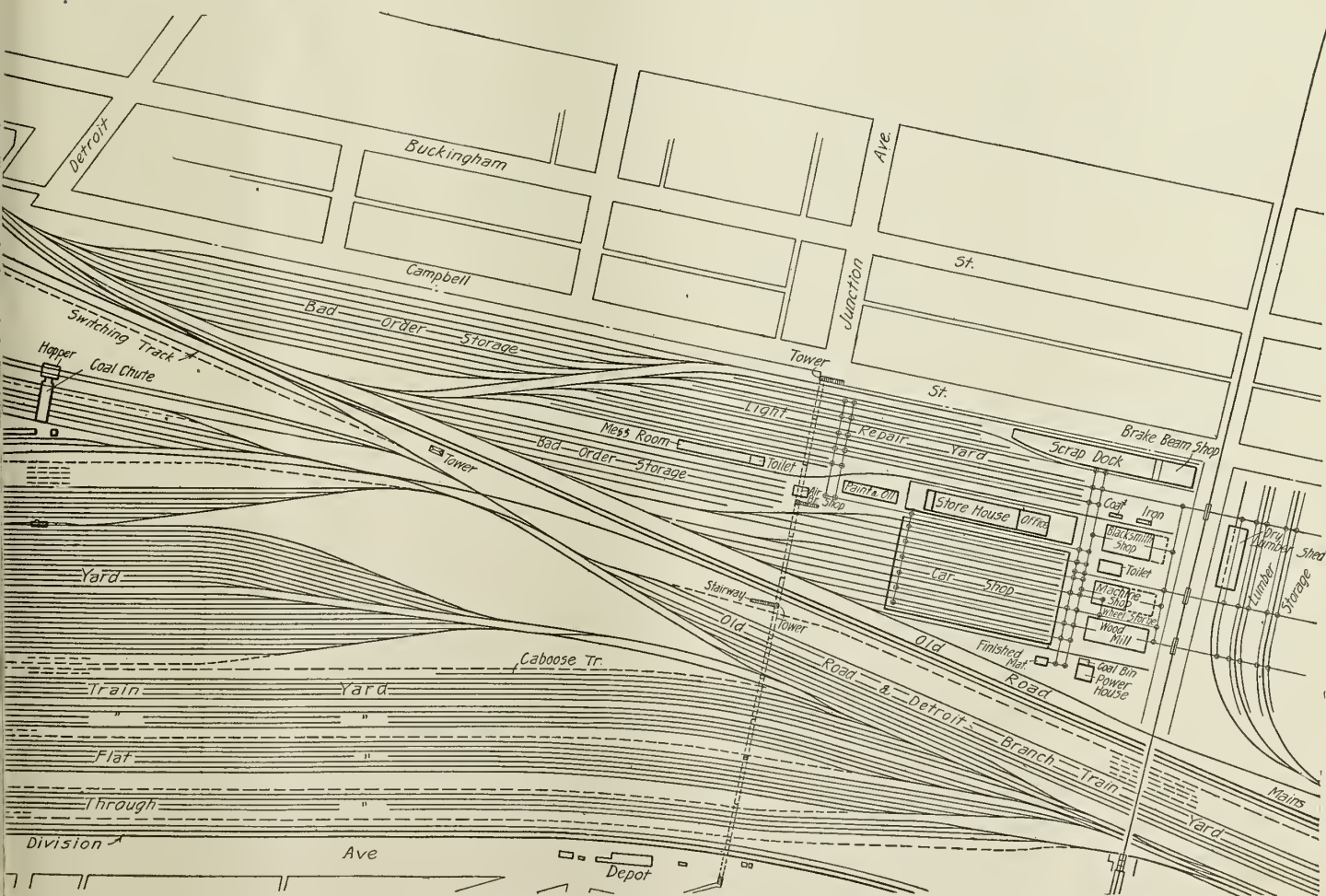
there are three 250-watt lamps similarly located. These are for the purpose of illuminating the tracks between turntables and the houses. Plug boxes are located on posts and at other suitable places on the walls for hand extensions.

Piping: The piping in the engine houses consists of washout, filling, blowoff and cold water systems, steam blower and compressed air lines. The washout, filling, blowoff and cold water piping is carried overhead on rollers with suitable drops at the posts in the middle row throughout both engine houses. Flexible connections also are provided for blowing off and refilling through the steam domes from overhead. The main blower is of 3 in. pipe with a 1 in. flexible drop at each pit. The main air line is $2\frac{1}{2}$ in. with 1 in. flexible drops located at the posts of the middle row in both houses.

Turntables: Both engine houses are equipped with 90 ft. turntables, driven by electric tractors, as furnished by Geo. P. Nichols & Bro., Chicago. Each tractor is equipped with a 22 horsepower, 440-volt, 3-phase, 25-cycle alternating current motor.

Engine House Office: The office of the roundhouse foreman is located at one end of the 27-stall engine house, and adjacent to cinder pits, thereby being conveniently located for the engine-men and firemen wishing access to the register room. The office quarters are 18 ft. wide by 62 ft. long and the space is divided into rooms as follows: Despatchers' office, bulletin room, register room, engine house foreman's office, office of the road foreman of engines, office of the chief clerk, and filing room. The office is heated by direct radiation, using low pressure steam and wrought iron pipe radiators, and is illuminated by means of 25 and 60-watt Mazda lamps with Holophane reflectors.

Machine Shop: The machine shop building is located between the two engine houses and is of the same general type of construction, except that the roof trusses are of steel instead of



Layout of Freight and Engine Terminals, Lake Shore & Michigan Southern Ry., Air Line Junction, O.

wood. It is 62 ft. 6 in. wide by 250 ft. long and also includes the blacksmith shop, the heater room, tool room, store room, oil house, electrician's room, locker room, toilet rooms, examiner's room, waiting room and the bunk room. The bunk room is located on the second floor over the five last named rooms.

The machine shop occupies an area of approximately 7775 sq. ft. In one end is located an erecting pit with tracks leading therefrom to each engine house. The pit is served by two Shaw electric 75-ton cranes used for lifting engines. The hoisting machinery is stationary and the bridge is traversed by hand, the controller for the hoist being located on the floor. The remainder of the machine shop equipment consists of the following tools: One 4 ft. radial drill, one 24 in. shaper, one 30-ton hydraulic press, one 48 in. engine lathe, one 18 in. engine lathe, two 10 in. engine lathes, one No. 4 belt cutter, one 32 by 32 in. by 9 ft. 8 in. planer, and one 2 by 18 in. double emery wheel. These machines are arranged in a single group and are driven by a 15 horsepower, 440-volt, 3-phase, 25-cycle alternating current motor.

The blacksmith shop is 20 to 50 ft. in size and contains the following equipment: A 200-lb. Bradley hammer, two 5 ft. standard forges, two anvils, a 1000-lb. jib crane, and one No. 7½ Buffalo blower. The blower and the Bradley hammer are driven by a 10 horsepower, 440-volt, 3-phase, 25-cycle alternating current motor.

The heater room, the floor line of which is 5 ft. below that of machine shop and engine houses, is 18 by 60 ft. in size. It contains two tanks each 10 feet in diameter by 20 feet long, one for the storage of hot water for filling boilers and the other for the storage of washing-out water. In connection with these tanks are two 14 by 10 by 12-inch duplex pumps, one for filling and one for washing out. The system was furnished by the National Boiler Washing Co.

The machine shop building is heated by direct radiation, steam being supplied to the pipe coils at 5-pounds pressure, illumination is by means of 25 to 100-watt Mazda lamps with Holophane reflectors.

Oil Room: This room is provided with a basement for the storage of the various kinds of oil, except the fuel oil, which is stored out in yard in two 6000-gallon tanks. Bowser long distance pumps are located in the store room for drawing the oil. The first floor is used for shifting oil barrels when storage tanks are filled by gravity from the barrels. A balcony 18 ft. 7 ins. by 18 ft. is located 9 ft. 6 ins. above first floor for the storage of baled waste. A suitable hoist on a runway directly over the balcony is provided for lifting the bales. Track boxes are located outside of the oil house on the service track so that tanks can be filled with oil from tank cars direct. The following oil storage is provided for: Fuel oil, 12,000 gallons; head-light oil, 3300 gallons; signal oil, 1500 gallons; valve oil, 1500 gallons; and car oil, 1500 gallons.

Power House: The power house building is 44 ft. wide by 84 ft. 4 ins. long, and its floor line is 8 ft. 6 ins. below the ground level. The section of the floor below the ground line, and foundation are built of concrete, while the upper walls are of brick. The roof trusses are of the Fink type, made of steel. An elevated ash storage bin, also made of steel, is provided. The power house equipment includes three McNaull horizontal water tube boilers, 250 h. p. each, fed by Taylor three-retort stokers; two 10 by 6 by 10-in. Canton-Hughes outside end-packed plunger type feed water pumps; one Cochrane open type feed water heater; and one Ingersoll-Rand 1500 cubic foot air compressor driven by a Westinghouse self-starting 249-h. p., 4000-volt, 3-phase, 25-cycle synchronous motor mounted on the main shaft of the machine. An after-cooler and storage tanks for air are located outside of the power house. The ash hoist is of the skip-bucket type actuated by air, and is located in front of the boilers. A suitable ash storage bin has been provided directly over the ash hoist. Natural draft is obtained by means of a brick chimney 6 feet 6 inches in diameter and 150 feet high. Electric current for all purposes is purchased from the Toledo

Railways & Light Co. and is supplied to the switchboard at 4000 volts, 25 cycles, which is transformed to 440 volts for power, and 110 volts for lighting purposes. All high-tension circuits are controlled by oil switches, each with an automatic release.

Sand House: The sand house is 14 feet wide by 103 feet long and is constructed of concrete and wood, having a green sand storage of 440 cubic yards. The dryer is of the gravity type heated by steam, the drying space being 6 by 13 feet with two receiving tanks, beneath. These tanks are provided with semi-automatic valves so that when air is admitted, the sand is elevated into the storage tanks located on the coal chute.

Coaling Station: This structure is built of steel with corrugated iron roof and sides and concrete foundations and pits. It offers a storage capacity of 1000 tons; has seven 20-ton scale hoppers; three 10-cubic-foot dry sand storage tanks; two continuous conveyors which handle 75 tons of coal per hour; and is driven by a 35-h. p., 440-volt, 3-phase, 60-cycle motors. There are also four feeders which convey the coal from the track hoppers to the crushers, and which are driven by 5-h. p., 440-volt, 3-phase, 60-cycle motors. The four track hoppers are served by two tracks. The plant is equipped with coal crushers, driven by 25-h. p., 440-volt, 3-phase, 60-cycle motors. Engines can receive coal or sand from each of seven different tracks. The machinery was manufactured by the C. W. Hunt Co., and the station was built by the Phillips-Lang Co.

Cinder Pits: The cinder pits are of the Lake Shore & Michigan Southern standard variety, having double tracks and open sides, with depressed tracks between. One 200-foot pit and 40-foot pit are located at each engine house. Space has been provided for extending the 40-foot pits to a length of 200 feet. There is also a 200-foot pit provided adjacent to the classification yards which is to be used for handling yard engines and through freight engines which are not required to be brought into the engine houses. The pits are constructed of concrete, are lined with vitrified paving block, and their outer rails are supported on concrete walls while the rails are supported on "I" beams and cast iron chairs. The floors of the pits are sloped $\frac{3}{8}$ inch in 12 feet so that water will run off easily. Suitable catch basins for water have been provided for at the ends of each pit.

Cinder Pit Tool House: This building is located adjacent to the cinder pits and is constructed of concrete and brick and is provided with a wooden roof. It is divided into three compartments, one serving as a locker and service room for the cinder pit men, and the other two for the storage of tools, etc., taken from the arriving engines at the cinder pits. The building is heated by means of high pressure steam through the medium of pipe coils.

Hostlers' Building: The hostlers' building is located adjacent to the coaling station and is constructed of concrete and brick and is provided with a wooden roof. It is used as a hostlers' locker and service room. The building also is heated by means of high pressure steam in pipe coils.

Water system: Two 100,000-gallon water tanks 30 feet in diameter by 24 feet high are provided in connection with the engine houses. Penstocks are located near the coaling station and also on the outgoing engine tracks. Ample fire protection has been provided for in all buildings and throughout the yards.

FREIGHT CAR REPAIR SHOPS AND YARDS FOR REPAIRING WOODEN CARS.

This group of buildings consists of a heavy car repair shop, a wood mill, a machine shop, a blacksmith shop, a brake beam shop, a dry lumber shed, a storehouse, including an oil room, also an office on second floor, a building including paint, tool, tin and oil rooms, an air brake shop, a mess and toilet room in the repair yards, a general toilet building, a finished material shed, a power house. Other facilities include a light repair yard, a lumber storage yard, bad order car storage yard, etc.

The Car Shop: This building is 243 feet wide by 441 feet

3 inches long and 23 feet to top of crane rail. It is constructed of concrete, brick and steel; the roof construction is of the monitor type, thus affording excellent light in all parts of shop. Steel sash is used throughout. There are 12 repair tracks with a standard gage industrial track to serve each pair of through tracks. These industrial tracks connect with all the other shops in the group by means of turntables. Three 20-ton cranes manufactured by the Cleveland Crane & Engineering Co., are provided in this shop for general service.

The Wood Mill: The wood mill is 61 feet 6 inches wide by 163 feet 2 inches long. The foundations are of concrete, the walls of brick, the roof trusses of steel, and the floor of wood. A wide monitor extends the entire length of roof and has windows on both sides. A list of the tools installed in this shop is as follows: One 14 by 20-inch planer and matcher, one 4-side 12 by 18-inch planer; one 42-inch band saw; one 36-inch cutoff saw; one 16-inch jointer; one 24-inch by 4-foot planer; one 20-inch wood turning lathe; one 36-inch swing cutoff saw; one extra heavy auto car gainer; one combination vertical and radial car borer (five spindles, three vertical and two radial), and one band, rip and re-sawing machine having a capacity for material 24 inches wide and 12 inches thick.

Machine Shop: The machine shop building is 61 feet 2 inches wide by 91 feet 2 inches long, having concrete foundations, brick walls, wood floor and steel roof trusses. A wide monitor having windows on both sides, extends the length of the roof. Industrial tracks are brought into this shop close to the journal lathes, so that wheels and axles may be handled with least possible movement. A 6-inch 12¼-pound I-beam trolley is also provided for the handling of material which comes from the blacksmith shop. The following is a list of the tools installed in this shop: Two 36-inch drill presses; one 32-inch drill press; two 1½-inch triple head bolt cutters; one 2-inch single head bolt cutter; one 24-inch shaper; one 3 by 16-inch emery wheel; one double journal turning lathe; one 6-spindle nut tapper, and one 18-inch by 8-foot engine lathe.

The Blacksmith Shop: This building is 71 feet 10 inches wide by 127 feet 6 inches long. It has concrete foundations, brick walls, cinder floor, and steel roof trusses. A wide monitor extends over the roof having windows on both sides. A 22-foot radius jib crane is provided to serve the 1500-pound steam hammer located in this shop. Individual motor driven tools are assigned to this shop as follows: One combination punch and shear, 36-inch shear end and 48-inch punch end; one friction saw, capacity 15-inch I-beam or its equivalent; one 200-pound Bradley hammer; one punch, 21-inch throat; one 3 by 16-inch emery wheel, and one pressure blower, having a capacity of 4000 cubic feet of air per minute. Other equipment consists of twelve 300-pound anvils; twelve 5-foot forges; one 10 by 16-foot furnace; one 4 by 8-foot furnace; and two 6 by 10-foot face plates.

Brake Beam Shop: The construction of the brake beam shop is similar to that of the blacksmith shop. It is used for repairing steel brake beams of all kinds, including the removal and the application of coupler yokes. The tool equipment of this shop includes the following: One iron shear; six 5-foot forges; one 3 by 7 by 4-foot double end furnace; one coupler pocket press; one 24-inch drill press with sliding head; six 300-pound anvils; one pressure blower, having a capacity of 4000 cubic feet of air per minute, and one 3 by 16-inch emery wheel.

Dry Lumber Shed: This building is a frame structure 50 feet wide by 160 feet long, resting on a concrete foundation. The roof is of the shed type having a monitor extending the full length of the building. On one side of this building is located a door shop, 15 feet wide by 69 feet 10 inches long in which car doors are to be repaired. The following tools are to be installed in this shop: One 2-spindle horizontal boring machine; one No. 3 self-feed rip saw; one 16-inch cutoff saw; and one 24-inch cutoff saw.

Storehouse, Office and Oil Room: This building is 47 feet 2 inches wide by 318 feet 10 inches long. It is constructed of

concrete and brick and has a shed type of roof. In one end of the building is a second floor on which is located the offices of the general foreman of shops and his assistants, and also the file and record rooms. In the other end of the building there is an oil room 15 feet 9½ inches wide by 45 feet long, in which is stored barreled oil and baled waste. A 12-foot receiving platform is provided on one side of the building and an 8-foot delivery platform on the other; large storage platforms also being provided at each end of the building. The platforms and the first floor of the building are constructed of 4½ inches of concrete covered with a 1½ inch mastic finish, and are four feet above the top of the rail.

Paint, Tool, Tin and Oil Room: This building is 32 feet 2 inches wide by 141 feet 2 inches long. The foundations are of concrete, the walls of brick, and the roof is constructed of 8-inch "I" beams covered with concrete slabs and composition roofing. The floors are of 2-inch yellow pine, except in the oil rooms and paint rooms, in which cement is used. Nine-inch fire walls serve to divide off the rooms, each of which is entered through outside doors.

Air Brake Shop: This building is 27 feet 2 inches wide by 37 feet 2 inches long. The foundations are of concrete, the walls of brick, the roof trusses of wood, and the floor of 2-inch yellow pine. This shop is equipped with one improved M. C. B. standard triple valve test rack and one 3-inch pipe cutting and threading machine.

Mess and Toilet Room for Repair Yard: This building is 25 feet wide by 225 feet 9 inches long. The foundations are of concrete, the walls of brick, and the roof is constructed of 12-inch "I" beams covered with concrete slabs and composition roofing. The floor is of 4½-inch concrete slabs with 1½-inch smooth finish. The toilet room occupies a space of 25 feet by 36 feet and is provided with a 5-foot basement which is used as a means of access to pipes and traps. In this building are suitable tables, benches, lockers and toilets to accommodate 314 men. The general toilet building is 25 feet wide by 62 feet 2 inches long and is similar in construction to the mess and toilet room in the repair yard. In it are provided toilet facilities to accommodate about 400 men.

Powerhouse: The powerhouse building is 41 feet 4 inches wide by 42 feet 2 inches long, and is of the same general construction as the machine shop. The powerhouse equipment consists of one 210-h.p. locomotive type boiler; one open type feed water heater; two feed pumps; and one Ingersoll-Rand 1500 cubic foot capacity air compressor driven by a Westinghouse self-starting 249-h.p., 4000-volt, 3-phase, 25-cycle synchronous motor mounted on the main shaft of the machine. An after-cooler and storage tanks for air are located outside of the power house. Natural draft is obtained by the use of a 3-foot 6-inch steel stack 80 feet in height. Space is provided in the power house for the installation of an additional boiler at a future date.

Light Repair Yard: The light repair yard is located adjacent to the repair buildings and has a capacity of 370 cars. Each pair of tracks is served by an industrial track which is connected with the repair buildings by means of turntables. There is also a bad order storage yards located adjacent to the repair yards, which has a capacity of 387 cars.

Heating and Lighting: The car shop buildings are heated by direct radiation, using high pressure steam and pipe coil radiators; the loop return system being connected to a vacuum pump located in the power house. The brake beam shop, the blacksmith shop, and the dry lumber shed are not equipped with steam heat. The shops and yards are illuminated by means of Mazda lamps with Holophane reflectors; suitable plug boxes for hand extensions are also provided along the various columns and walls in the different buildings.

The foregoing data were made available for publication through the courtesy of D. R. MacBain, superintendent of motive power, and P. P. Mertz, mechanical engineer, Lake Shore & Michigan Southern Ry., Cleveland, O.

Steel Passenger Car for the Canadian Pacific Ry.

The following is a description of the first all-steel passenger car constructed and placed in operation by the Canadian Pacific Ry. It involves a number of distinctive features such as cork insulation in the side walls, cork tile flooring, individual truck brakes, and an original and novel form of roof construction that combines the advantages of both the turtle-back and the clere-story types.

During the past two years, the Canadian Pacific Ry. has had in operation, a steel passenger car involving a number of original features in its design and construction. Conspicuous among these features is the roof which has been made in the form of a compromise between the clere-story and the turtle-back types, and seeks to retain as far as possible, the advantages of both. It has been designed by the designers as the "modified turtle-back," and as may be seen from the interior view of the car, serves to preserve the clere-story effect, admitting light and offering opportunity for ventilation through the deck-sash, and at the same time gives opportunity for some of the added strength characteristic of the turtle-back design.

In general dimensions, this car is 9 ft. 10 ins. in width over side sills, is 72 ft. in length over end-frames, and is 80 ft. 3½ ins. in length over pulling faces of the coupler knuckles. The car offers seating facilities for 84 persons, and weighs

ter sills. These are tied together by the bolster construction, the latter being 56 ft. on centers, and by means of four cross-bearers at approximately 11-ft. intervals. These members are made up of pressed shapes extending outwardly from the center sills to the 6 by 4 by ½-in. angle side sills. One-half inch material is used in the webs of the bolsters and 3/16-in. material in the cross-bearers. The diaphragms between the center sills in line with the cross-bearers are also of 3/16-in. material, and on these members, top and bottom, 8 by ½-in. cover plates are used. At each of the bolsters, two top cover plates ½ and ⅝ by 16 ins., and one bottom cover, 1⅜ by 16 ins., are employed. The fillers between the center sills at the bolsters are steel castings and these are riveted through the bottom covers to the center plates, also forming separable steel castings underneath. The end sills, like the bolsters and the cross-bearers, are pressed shapes, the thickness of the material in this case being ⅝ ins. These shapes have their flanges turned inwardly and block-shaped castings are used as fillers between the center sill members in line with the end sills. One-half inch top covers and ⅝ in. bottom covers are used in the end sill construction. Four-inch channel transverse floor beams are distributed at intervals of about 2 ft. in each of the several rectangular sections formed by the side sills with the bolsters and the cross-bearers. In each of the sections adjacent to the middle



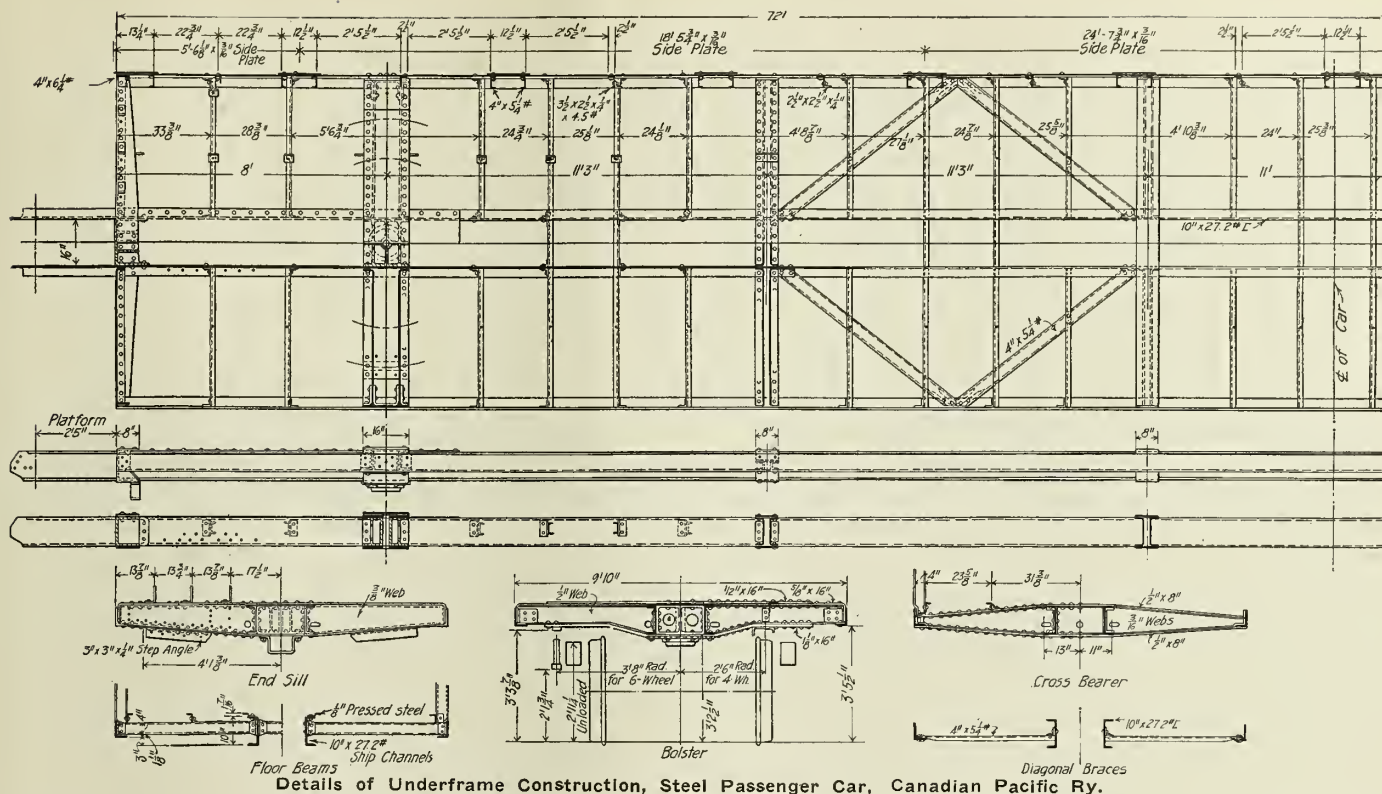
Steel Passenger Car with Modified Turtle-Back Roof Construction, Canadian Pacific Ry.

with four-wheel trucks, complete, 114,800 lbs. The trucks above mentioned, are of the structural-steel frame variety illustrated and described in the Railway Review for Feb. 14, 1914. The braking system employed on these cars is in accordance with the Westinghouse Air Brake Co.'s LN schedule, with cylinders and reservoirs mounted on the truck frames. The cars of the Canadian Pacific Ry. being operated much of the time under extreme cold weather conditions, more than usual precautions in the way of insulation are required and have been provided. So successful were the designers in this instance with respect to this particular feature, that in a test run from Montreal to Vancouver and return in cold weather, this steel car was demonstrated to be equally as comfortable as the usual design of wooden coach used in this territory.

In the construction of the underframe, two 10 ins. by 27.2 lbs. ship-channels placed 16 ins. apart, back to back, and running continuously from buffer to buffer, are employed as cen-

section, channel-iron diagonal braces are placed to assist in taking up the torsional stresses otherwise likely to be imposed on the right-angle joints in the underframe structure.

In the construction of the superstructure, the main side posts consist in each case, of a pair of 4-in. by 5¼-lb. channels resting on the inwardly extending legs on the angle-iron side sills. These channels are arranged with flanges adjacent and are spaced 12½ ins. over backs. For the intermediate side posts, 2½ by 3½ by ¼-in. angles are used, these having supplementary angles riveted to them, forming a channel or U-shaped arrangement to assist in holding the ¾-in. white ash furring forming the window casings. The furring is held to these angles by means of small bolts while in the case of the intermediate posts proper and the main posts, the furring is secured by means of ⅝-in. round-head steel screws inserted from inside the posts. The corner and end posts are channels set with their flanges parallel to the end of the car. The door posts are Z-irons having on their sides toward the doors, rounded wooden fillers



Details of Underframe Construction, Steel Passenger Car, Canadian Pacific Ry.

finished to correspond with the interior trim of the car. A 4 by ½-in. belt rail is set in depressions in the side posts, bringing the outer surfaces of the rail and posts into a common plane to facilitate the application of the exterior steel sheathing. The wooden window sills are supported on this rail and by short lengths of 2 by 3 by 3/16-in. angles bridging the space between the posts at the window level. At the top, the posts support a 4 by 4 by ¾-in. angle side-plate and a 13 by ¼-in. lettering plate, which with the 3/16-in. sheathing below the belt rail makes a girder-like form of side construction of ample strength. Welt strips of 3/16-in. material and 15 in. in width are used at the main side posts and serve further to bind the channel members comprising the posts and the several sections of the side sheathing together, as well as to give a more finished appearance to the exterior of the car.

The main carlines are made of 3¼ by 1½ by 3/16-in. angles bent to conform to the "triple-arched" contour of the roof, being used in pairs with flanges adjacent, 12½ ins. over backs, and immediately over the main side posts. The roof sheets are of 1/16-in. steel, 15-in. welt strips of the same material, over the main carlines being used in a manner similar to the welt strips on the main side posts. The deck plate construction is made up of ¼-in. pressed angles and ⅝-in. pressed channels of proper lengths to bridge the spaces between the main carlines. Similarly, suitable lengths of 3¼ by 1½ by 3/16-in. angles are used to form the ridge. The deck plate construction is supported in the planes of the intermediate side posts by means of 2½ by 2 by 3/16-in. angles used as intermediate carlines. The deck sash casings are made of ⅝-in. pressed steel.

In the interior of the car, mahogany and agasote are used as the finishing materials, the latter comprising the headlining in the center deck while steel headlining is used in the lower deck. The flooring consists of a cement and hardwood sawdust composition on Keystone sheets, with a wearing surface of ½-in. compressed cork. The sub-floor is of 20 gage galvanized iron to which is cemented a layer of three-ply Salamander hair felt for insulating purposes. The same material is used in insulating the roof while in the sides, this purpose is served by a 2-in. layer of cork. The windows are double and are set in wooden frames and are sealed with metallic weather stripping. Above the windows and below the letter plate there is fixed on

either side, in wooden frames, a row of plate glass inserts, 7⅝ by 7⅝ ins. square, adding considerably to the external appearance of the car. The deck sash lights are set in wooden frames. Mahogany side and deck-plate facing, with mahogany mouldings serve to heighten the favorable appearance of the interior finish. The end doors are of steel.

One of the interesting details found in this design and used also in the regular wooden passenger car equipment of this road is the step construction. The ⅛-in. plates forming the step sides are straight and are reinforced along their outer contours by having riveted thereto a ⅞-in. half round box. The treads and risers for the respective steps are of the form



Interior of Steel Passenger Car with Modified Turtle-Back Roof Construction Canadian Pacific Ry.

shown in the illustration and pressed in each case from No. 15 gage steel and are secured at their ends to the step sides by means of 1¼ by 1¼ by ¼-in. angles spot-welded to the sides and to the treads. Lead tread plates are secured to the steps by means of stove bolts, the nuts of which locked to prevent their coming loose. The car is gas lighted, is fitted with Canadian Pacific Ry. standard seats, and is heated by means of the Gold system with Frumveller heater and the C. P. R. system of control. On the exterior, the car is painted a mahogany color to harmonize with other C. P. R. standard equipment. The cars are equipped with friction draft gears and with long travel friction buffers.

The road has found this design so satisfactory that at the present time it is following this general scheme of design in the construction of 30 steel colonist cars now building at the Angus shops, and will employ it on 25 first class coaches and on 12 baggage cars, also ordered for construction at the Angus shops.

Some Notes on Present Day Running Repairs.

By W. E. DUNHAM.*

In the accompanying paper, read before the Western Railway Club at Chicago, on April 21, the author draws attention to a number of details in locomotive construction, each of which has a very important bearing on the expense of running repairs, from the standpoint of delays to traffic as well as from the basis of material and labor expense.

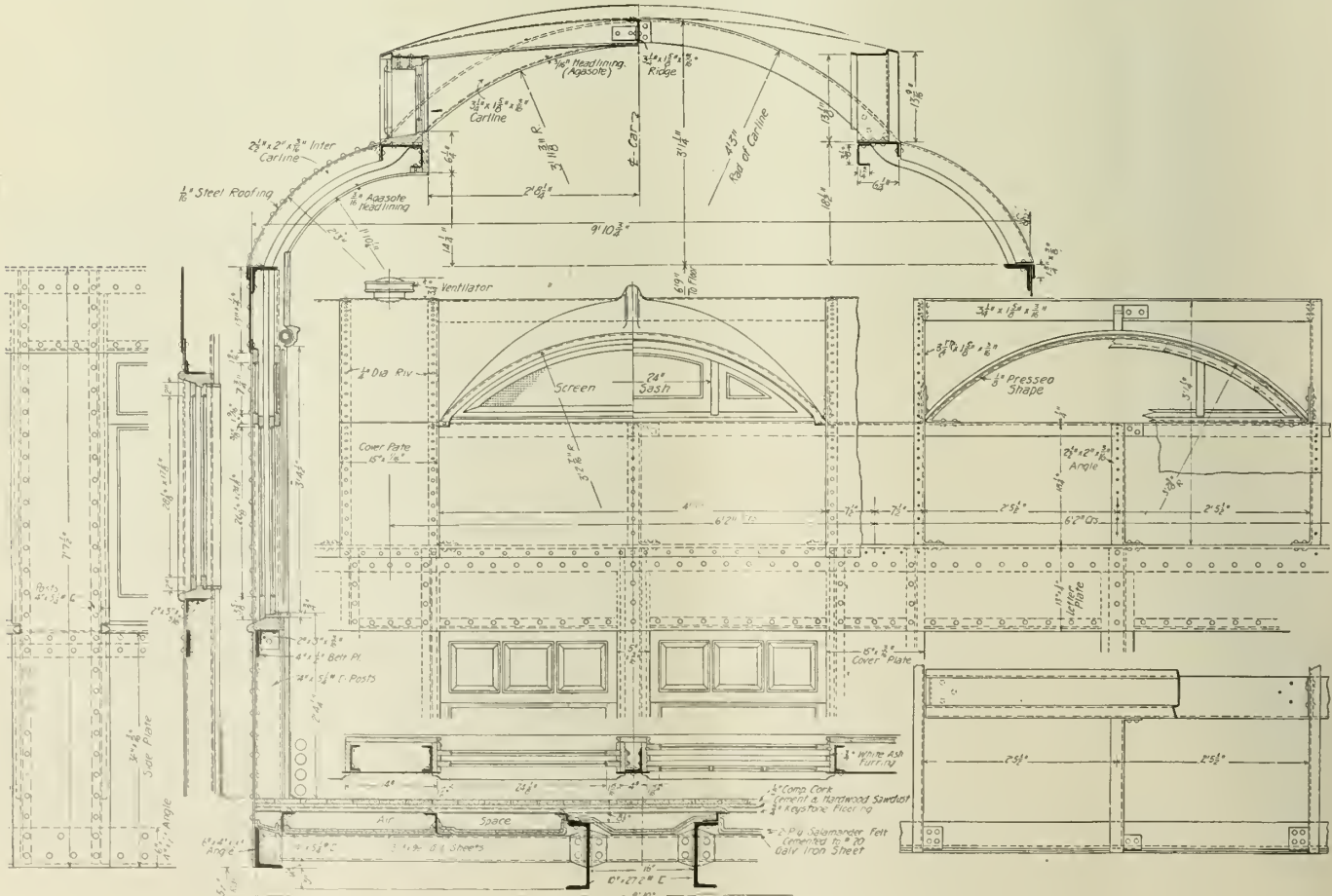
With the almost universal change in the type and arrangement of running gear and valve motion of the American locomotive that has taken place during the past few years, there has also developed a maintenance situation that calls for a considerable re-organization and re-arrangement of

many divisional shop forces. On some roads where it was considered that a locomotive should receive general overhauling once a year at least and one intermediate heavy repairing also, it will be found that the time between general repair shopings has been extended to two years, and that the intermediate repairs are being made in the roundhouse as running repairs. Where 75,000 miles was formerly the limit for giving a passenger locomotive general overhauling, many of them are now making 150,000 miles between shopings and similar results are being attained in the case of freight power. In fact in some "good" water districts the condition of the boiler is the controlling factor now in shopping rather than the condition of the machinery, as was formerly the case.

To meet this situation there naturally has resulted a tendency toward the spreading out of shop facilities rather than concentrating them all at one or a few points. Divisional shops have been provided with facilities for handling the naturally heavier power, and the local organizations have been prompt to make full use of such facilities, leaving for the "back shop" only such work as was beyond their capacity. This change may, in some cases, have come about so gradually as to be hardly noticed from day to day or month to month, but if the organization at many terminals be checked as to yearly or bi-yearly periods, it will generally be noticed that at the smaller terminal roundhouses there is much more of the "back shop" work being done as "running repairs" than was formerly the case with engines equipped with the Stevenson link motion.

A larger proportion of "general repair" engines is being turned into the shops under the present conditions than there was under the former, and this is as it should be, because by following up the small repairs to the running gear of a locomotive, the proverbial "nine stitches" to be taken in the back shop will be saved, the locomotive will be kept in serv-

*Supervisor of motive power and machinery, Chicago & Northwestern Ry., Winona, Minn.



Details of Superstructure and Roof Construction, Steel Passenger Car, Canadian Pacific Ry.

portance. As the amount of pressure per square inch is the principal controlling factor in the wear of the parts in contact, it is readily appreciated that up to a reasonable limit, as large a hub face and box face as possible is a very desirable detail. There are numerous cases of where this feature is fully appreciated and taken care of by large wheel hubs or wearing plates. In one instance, sixteen inches is used as a minimum hub face diameter instead of a maximum as is frequently the case. The recommended practices of the American Railway Master Mechanics' Association on this detail, have taken into some consideration the hub bearing face when they present optional hub face diameters of $13\frac{1}{2}$ to 15 inches.

In the case of the trailer trucks, the designer is not limited by any recommended or standard practices and can readily give full consideration to the subject of lateral wear. With the prevailing tendency, however, to reduce weight of steel castings, the hub face has usually come as a second consideration. Naturally, the strength of the hub to safely withstand the axle pressure fit is the primary consideration, and as a result, the hub face has been usually taken as a sequence to that consideration instead of being one of the primary details. A hub face on a trailer that is small will, the same as with engine truck wheels, result in excessive lateral wear in a very short time. In some instances under local conditions this lateral will require attention as often as once in six weeks or two months' time, whereas it would not be unreasonable to expect the locomotive to run six months without developing excessive lateral.

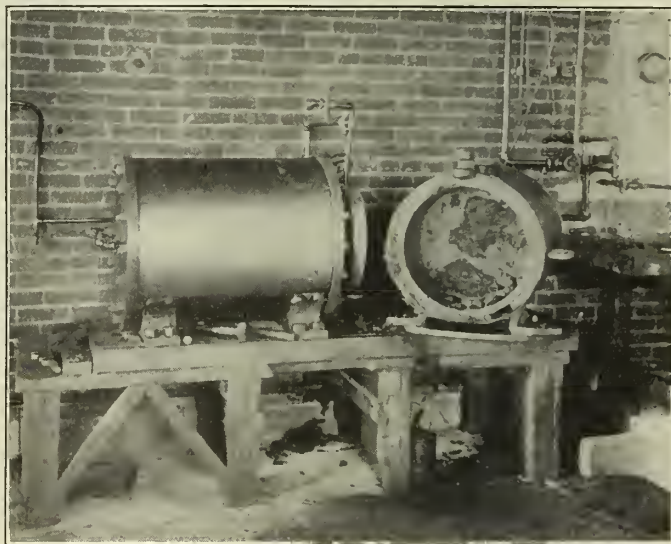
In addition to the consideration of bearing area and lateral play, there is the subject of readily maintaining this lateral within the desired limits, without sending the engine to the back shop. Removable or adjustable hub liners and box face liners for engine and trailer truck wheels and for drivers, have been schemed out with apparently indifferent success. In too many instances the poor results obtained were due to the light impractical construction of the parts, which soon broke, in service, and were lost out, making the resulting condition worse than the one which it was endeavoring to correct. A substantial liner, easily and firmly secured in place and capable of being prepared in advance to the proper thickness to take up lateral wear, can no doubt be adapted to all older power, as well as new power, providing the roundhouse man will make his wants known in a convincing way to the designer.

With all the driving axles on the modern outside valve geared engines free of obstructions between the frames, there is a strong inducement for having the driving box brasses held in position by means of keys or locks, rather than by means of pressed fits, so that new brasses can be applied to the boxes in the roundhouse without dropping the wheels or sending the engine to the shops. For other than main drivers, some roads are reported as having fitted up the brasses for rolling action only, using slip brasses with a crown fit of somewhat of the same type as in the usual engine truck box brasses. With generous main brass bearing and sufficient shoe and wedge surface, this plan would appear to be a perfectly feasible one and worthy of careful consideration. Knowing as we do that with the main boxes and brasses closely lined up, the other driving boxes and brasses can and should run with the wedges down somewhat and the journal brass fit a little loose, would it not be reasonable to start out with a design to suit that condition?

Few roads are retaining strap ended side rods, which were considered at one time an absolute necessity. The expensive and extensive strap and brass fits are now generally done away with and simple bushings are used instead,—particularly on both pairs of drivers in four coupled locomotives and on all but the main pins of multiple coupled locomotives. Some roads even find it desirable and advantageous to use a bush-

ing for the main pin also. It will also be found that solid end main rods are meeting with favor, where tried. The elimination of the strap bolts is no small gain to the roundhouse man, and the order to "file main rod brasses" does not mean so much of a job for him as it did when he had to knock out a lot of strap bolts, possibly destroying one or more in the operation, and at all times very uncertain as to when he could expect the job to be done.

The report "examine packing, both sides blow," often means a lot of work merely to find that lubrication has not been good or that some other minor defect has existed and



Grease Press in Position for Charging, Chicago & Northwestern Ry., Clinton, Iowa.

not that broken or worn-out packing rings were the cause of the trouble. A sufficient lengthening of the piston rod to allow the piston head to come outside the front end of the cylinder without disconnecting the piston and cross head fit, would help materially in such work and also avoid disturbing a connection that should be left alone as much as possible. Theoretically, the slightly shorter main rod resulting would cause bad steam distribution, but practically such a result would be hard to find. Any coal lost, due to poor steam distribution as shown on paper, will be more than saved in better packing conditions as the result of the ease with which the pistons could be examined.

Another feature of the piston rod and head detail is the use of a built-up type of head in which a bull ring is arranged so that it can be renewed to suit the wear or re-boring of the cylinder without the necessity of applying a new piston head and disturbing the piston rod-and-head fit. The roundhouse can thus readily keep the piston head true to the cylinder with minimum expenditure of time and labor. As the snap ring or any other type of cylinder packing can be adapted to this arrangement, it is readily suited to the requirements and views of practically all designers.

The bearing surfaces of cross heads are ordinarily made of such a shape and secured in such manner that the taking up of the wear usually means a dismantling of the cross head or disturbing the guides. The latter is a prolific cause of piston packing troubles, in that the guides are not always reset true to the cylinders. Being out of line, they cause the cross head and piston to run out of line also, and therefore the packing does not have a fair chance to perform its special duty. When the cross head is dismantled there is the usual number of fitted bolts to be loosened, with the customary result that one or more of them is damaged to such an extent that it cannot be used again. Often most of them will not have the proper draw when tried again and the result is a full or

nearly full set of new bolts to be made. With the numerous examples of substantial cross heads used in stationary practice that have ready and practical means of adjustment for wear, it would seem as though our locomotive designers should be able to develop a scheme for taking up the cross head wear that would be practical and satisfactory. There is no doubt but that the general adoption of some such scheme would save much of roundhouse labor and overcome many annoying steam leaks in piston packings.

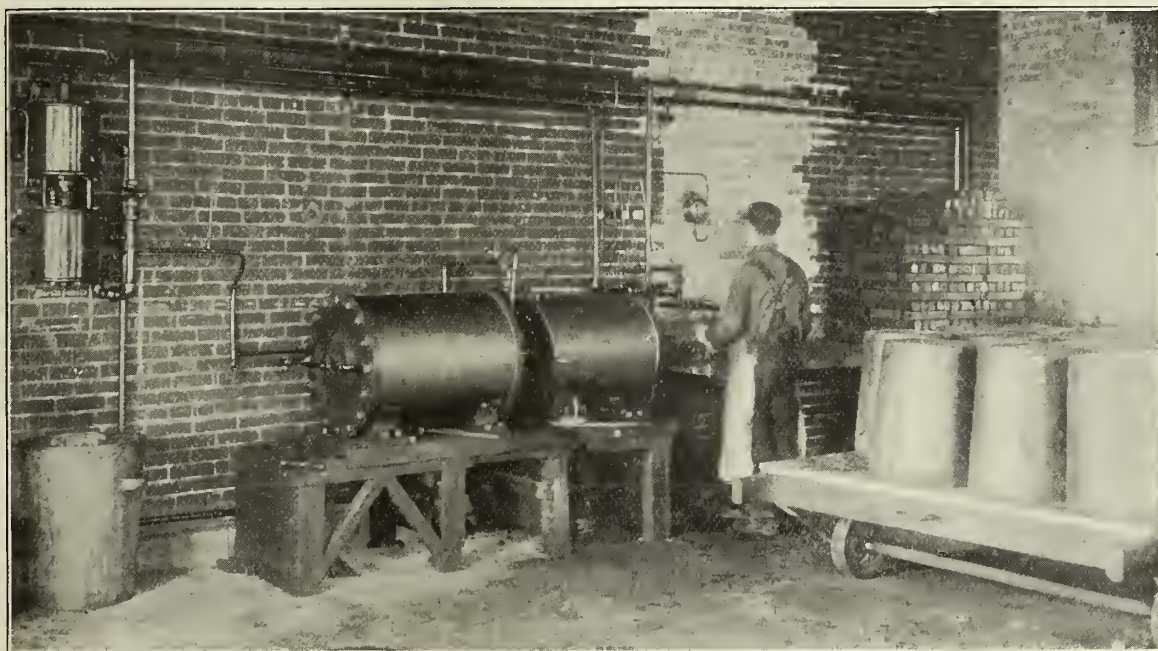
A study of these and similar conditions to be noted in the making of running repairs to locomotives, leads to the belief that if sufficient care and attention is given in advance to the details connected with the several parts of the locomotive that usually wear out of shape and proportion, there will result very appreciable returns in the lessening of delays incident to the making of such repairs.

Grease Manufacturing and Reclaiming Plant, Chicago & Northwestern Ry., Clinton, Iowa.

The Chicago & Northwestern Ry. maintains at its shops in Clinton, Iowa, a grease manufacturing and reclaiming plant from which the locomotives of the entire system are supplied with crank-pin grease, and to which all driving box grease removed from locomotives is returned for reno-

air cylinder and constitutes the motive element for forcing the grease through the forming nozzle. Both cylinders were improvised from locomotive steam cylinder linings or shells. The air end is rigidly mounted on a bench while the grease end is pivoted to swing in a horizontal plane to permit of refilling. When charged and swung into alignment with the air cylinder, it is held in position by means of three removable keys, one of these being inserted through lugs secured at the tops of the adjacent ends of the two cylinders and the remaining two, through registering holes in the base and in the supporting legs of the grease cylinder. Nozzles of the proper form serve to mould the grease as desired, whether for driving-box or rod purposes, while the attendant cuts the emerging stick into lengths suitable for storing and handling. A quantity of the finished rod grease can be seen stacked on the bench in the corner of the room to the right of the attendant.

The air from the shop lines not being under sufficient pressure ordinarily to force the grease through the forming nozzle, a Westinghouse compressor is provided with which to boost the shop line pressure a sufficient amount to secure the desired result. Ordinarily, about six tons of crank-pin grease per month are prepared at this point and with the apparatus described, at a cost amounting to about two-thirds the price required to secure a corresponding quality of



Interior of Grease Manufacturing Plant, Chicago & Northwestern Ry.

tion. This work is conducted in a lately-constructed addition to the oil-house made necessary by the recent enlargement of the local repair plant as described in the *Railway Review* for Feb. 7, 1914. In this room which is some thirty feet square, there has been provided a steam-heated cooking vat, and the molding and renovating apparatus shown in the half-tone illustrations herewith.

Tallow is secured from a local rendering plant and after passing through the cooking process, is drawn off and mixed with the other ingredients of the grease, in tapered galvanized iron tubs which hold between 175 and 200 pounds each. After solidifying and seasoning in these tubs for a sufficient length of time, the tubs are inverted on a storage platform mounted on wheels which makes possible the moving of an entire batch of grease across the floor of the plant to a position convenient to the moulding or forming machine. The mechanism and arrangement of this machine may be understood from the illustrations. It consists essentially of a pair of cylinders into one of which the charge of grease to be moulded is placed, while the other is an

grease in the open market. As respects the renovating of driving box grease, some two tons of this material is reclaimed per month. The process in the latter case consists of forcing the grease through a series of superimposed screens which serve the purpose of retaining the foreign particle of waste, sticks, etc., that otherwise make this grease unsuitable for remoulding and returning to service. The officials of the mechanical department having devised this equipment have demonstrated conclusively that a means of effecting very appreciable economies with respect to these commodities have been made. The operation of the plant comes under the direction of Mr. O. Rosenberg, foreman of the paint department at Clinton.

"Road building requires a great deal of study." "Yes," replied Farmer Corntossel; "out our way everybody got to studyin' how he could get a salary out of the fund before anybody was paid to get out an' work. The trouble with the study of road building, is that too much of it is mental arithmetic."

RAILWAY REVIEW

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WILLARD A. SMITH	- - - - -	President and Manager
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Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, MAY 2, 1914.

The anti-trust bill framed by the sub-committee of the U. S. Senate committee on interstate commerce contains a provision prohibiting interstate carriers from purchasing commodities manufactured or sold by concerns whose directors are also directors of the carrier company. It would be interesting to learn whether any proof has been brought out that any carrier has ever suffered from such condition in its directory. Probably the proposed legislation is based simply upon the allegation that directors of the United States Steel Corporation are also directors of many railway companies. The pernicious effects are mere matters of surmise rather than of fact.

Locomotive designers of late years have achieved some big things in the way of increased size and economy of motive power units. It has been the effort at other times in these columns, to call attention to the importance of paying close attention also to the matter of refinement in design whereby still greater economy could be made possible in first cost, in lessened machine friction, and in the matter of upkeep. Respecting the latter division of the question, there was read at the April meeting of the Western Railway

Club, a paper by W. E. Dunham, supervisor of motive power, Chicago & Northwestern Ry., Winona, Minn., dealing with certain phases of present-day running repairs, in which were suggested several highly practical features of design which, if generally introduced, should have a far-reaching effect, both in lessening the cost of making such repairs and in reducing operating costs by virtue of the greater promptness with which engines could be returned to service after arrival at terminals.

A conspicuous example of improvement in the facility with which maintenance is effected is found in the Walschaert form of valve gear, substituted, as it was, for the unwieldy Stevenson gear. With all our initiative and progressiveness it is doubtful that we can honestly claim that the substitution was made out of consideration of the most plausible of the various reasons justifying the change. We have a remembrance of having been *forced* into the step through lack of space between the frames in which to house a clumsy, overgrown, inaccessible, power-conserving fetish that survived only because we lacked the power of economic discrimination. True, a comparison of weights between the new and the old was set forth with reasonable promptness, but it required a quite extended experience to cause the fact to dawn that the lighter, more accessible and positively connected parts comprising the Walschaert gear were an agency toward lessened cost of upkeep, both from the time and money standpoint as well as a very appreciable measure of insurance against accident and detention out on the line.

In that instance we literally fell into something better than we knew. Mr. Dunham in his paper reproduced in abstract elsewhere in this issue, cites other possibilities for like improvement—none quite so startling perhaps, but such as collectively at least, give promise of returns that would more than justify the thought and care required in working them out.

Mr. Brandeis' Brief.

The hearings and argument in the rate increase investigation in the official classification territory, have closed if the program announced by the Interstate Commerce Commission early in the week has been followed. The case is now in the hands of the Commission for decision and it seems probable that this may be expected sometime in June. This does not conclude the collateral investigations instituted by the 78 questions propounded to the carriers, generally spoken of as the "Brandeis questions." The record is to be kept open in order that the investigations may be prosecuted to a conclusion. Hearings have been held only on the subjects included in Group B, "Revenues and the Conservation Thereof," which comprises the questions of free service and allowances to shippers, including the various subjects of switching,

spotting cars on private sidings, lighterage, storage, refrigeration, etc. On the subjects of the other groups of questions which include economy and efficiency, conflicting interests, sleeping car operations, etc., there have as yet been no hearings. The railways have not all sent in all of their answers as yet; notwithstanding they were required to be in some three months ago. The magnitude of the work involved was evidently underestimated. Mr. Brandeis in his brief treats somewhat of these subjects and states that hearings are to be held regarding them when all of the information practicable has been received and digested.

The only influence which these collateral investigations is to have on the present rate case appears to be in suggesting to the Commission ways in which railway revenue may possibly be improved in the future. With the exception of Group B, which has aroused widespread opposition and will involve a tremendous amount of future investigation, there is no real evidence offered by Mr. Brandeis. There is nothing which the Commission can consider any more seriously than they did his loose and general talk on efficiency in the previous rate hearing. Whatever facts he may be able to educe in support of his position in future hearings, there is nothing more than a lot of guesses now before the Commission. It is the loose opening talk of a lawyer stating what he expects to prove some time in the future; hoping that out of all his charges he may eventually make something stick.

The crowning absurdity of this farce is found in his citation of what Col. Goethals has accomplished on the Panama Railroad in the matters of economy in fuel and lubrication. By adopting the very methods used on our leading railways he has made improvement in these two records. There is nothing new in it all, and to hold up the Panama Railroad as an example to those whom it has simply imitated is coming pretty near to the height of the ridiculous. The relocation of this road has cost the Government \$200,000 a mile—about four times what the construction of such a road would cost in this country built by private owners. It charges about three times as much per passenger and ton mile as railway charges here at home. It is operated under a military regime with all of the advantages of such discipline. As far as it proves anything regarding government ownership, it is altogether against it. And to this school we are told our railway managers should go to learn efficiency and economy.

The road is forty miles long—easily supervised by one man who can go over it every day both ways and have plenty of time for other duties. Col. Goethals employed a traveling engineer to ride on the locomotives and instruct firemen how to fire. Of course he improved the fuel record, just as is being done at all times on our home roads by the same method. He also, by similar methods, reduced the consumption of lubricating oils. He substituted cheaper oils where they would do as well and gave to their use the same

kind of supervision which the oil men give on roads at home. Our railways pay for their service in the price of the oil they buy. The Panama Railroad pays for its oils and furnishes its own supervision under the direction of a man furnished by the oil manufacturer from whom it buys. A good record in cost of lubrication has been made, under very favorable conditions. It has no cold weather and no variations in temperature to contend with. It handles no foreign cars and all its own cars are on its own short tracks. It has a small well ballasted road, and all conditions of operation, including discipline, are favorable. It is decidedly funny to have the attention of American railway men called to the economy of buying oil in steel cases instead of ordinary barrels, held up to them; and the saving from using crude oil on the chains of dredges instead of expensive engine oil. If the management of the Panama Railroad has discovered or developed a single new fact of value in railway operation, it is not evident to a somewhat careful and competent observation.

Under "economy and efficiency" the brief says that investigations are not yet completed. Of "freight car efficiency" it quotes from railway men to show the room for improvement and proposes hearings "with a view to promoting greater efficiency in car movement." The same is true of "car loading" and "congestion at terminals." Of "fuel economy" and "supplies" (lubrication) we have spoken above. Hearings are proposed on these subjects also; as well as on "conflicting interests." To all of these subjects, except the last named, the railways individually and collectively have given continuous attention. The files of this and other technical journals abound in facts and discussions. If "hearings" at Washington can elicit any new truth, by all means let us have hearings! But the assumption that the railways have neglected these things is simply not true; and if after four months' of investigation all that Mr. Brandeis can do is to point to Panama, his case is weak indeed.

Mr. Brandeis does not seem to agree with Thorne. He admits that the railways need more revenue; and finds no fault with maintenance expenses. In fact, he says of the latter, "There seems no ground to expect that the ratio of expenditures for these purposes can be materially reduced in the near future if the properties are to be maintained at a desirably high standard." Of increased expense of labor, fuel, ties, taxes, legislative requirements, money, etc., he considers that the railways are in the same boat with other industries, some of which have reduced instead of increased selling prices. Some of the increased costs peculiar to railways have, he thinks, been offset by the abolition of rebates, passes, etc.

In economies in railway operation through increased power of locomotives, capacity of cars and elimination of grades, he admits that the railways have "made great strides." He thinks, however, that in cost

accounting, railroading is behind manufacturing. He does not go into the reasons for this, but suggests the desirability of better knowledge of what they are doing.

A new feature of his case is the charge that passenger rates are unremunerative and that losses made in that service are met out of freight revenue. As passenger rates are almost universally limited now by law, he does not offer any remedy except to say that Pullman sleeping car passengers are unduly favored as compared with day coach passengers; and that passes and hauling of private cars are expensive luxuries which should be practically eliminated.

A unique and interesting part of his brief is devoted to "Mail Service," which closes with the statement, "It seems clear that the railway mail service is at present unremunerative to the carriers."

The summary of his argument is "Though a general need of greater revenues be shown, it seems clear that it should be provided in ways other than through the tariffs filed," and "The investigations already made make it clear that by conservation net revenues may be largely and speedily increased and that the sources available would yield revenues far in excess of the \$50,000,000 which it is proposed to raise by the tariffs filed."

This conclusion has some basis in the facts as to free service allowances etc.; as for the other subjects which Mr. Brandeis has begun to investigate, the result is simply that perfection has not yet been reached in railway management and operation. Nobody denies this; improvement will continue in the future as in the past. But that the effect on revenues will be to entirely offset increasing costs and will be *speedy*, there is no reason to believe. Whether it is worth while to crush the carriers in order that they or the Government may build new on their ruins is the question.

Immediate rate relief will not hold back economies, but rather encourage them. The constant adjustment of individual rates for which the Commission exists will prevent excessive earnings. Prosperity for the weak lines will contribute to a general condition of strength under which all other industries as well as transportation will flourish.

Proposed National Bureau of Labor Exchange.

The United States Commission on Industrial Relations, which has been conducting a general investigation of labor conditions throughout the country, has drafted in connection with this work, proposals for national legislation, designed as the commission states, "to wipe out chronically chaotic conditions in the country's labor market and thus strike a blow at the annually-recurring evils of unemployment." This proposed legislation will be the subject of inquiry in a series of hearings of which the first will be held in

New York city, during the week beginning May 4, and which will subsequently include many of the large industrial centers of the country. Copies of the proposals have been sent to persons who will be summoned to testify at these hearings, with the explanation that the proposals are tentative, and that criticisms and suggestions are invited.

Legislation on the plan suggested would establish a national bureau of labor exchange in connection with the Department of Labor, with a central office in Washington, and branch offices in other cities, and with a clearing house for each of several districts into which the country would be divided. The bureau would have power to establish and conduct free public employment offices. It would have jurisdiction over all private employment offices doing an interstate business or accepting workmen for shipment to other states. State, municipal and private employment offices would be urged to co-operate with the national bureau and to adopt uniform methods and regulations.

The bureau's most important service would be to gather and distribute accurate information regarding the labor market in various localities. This information would be published in the form of bulletins, to be issued at frequent intervals and to be circulated in such a way that it would be available to every person in search of work and every employer seeking workmen.

One interesting feature of the plan is the proposal for the appointment of an advisory council for the national bureau and for each of the district clearing houses. It would be composed of an equal number of representatives of employers and of employees and would assist the director in all matters pertaining to the management, would aid in determining policies, and would see that the bureau was impartial in disputes between labor and capital, thus gaining for it the confidence of the whole public. The district advisory councils would be appointed by the United States secretary of labor.

The proposals have not been put in the form of a bill, but the plan as outlined above, with much additional detail, has been worked out so that a measure for presentation to congress could readily be drafted with the proposals as a basis. The commission has placed this part of its work under the direction of W. M. Leiserson, state superintendent of employment offices in Wisconsin, and author of the bills to establish similar offices recently enacted by the New York legislature. Frank P. Walsh, of Kansas City, Mo., is chairman of the commission, which has its headquarters at Washington, D. C.

What's the Matter With Iowa?

That there are some people, doubtless many, in Iowa who are not in sympathy with Senator Cummings and Railway

Commissioner Thorne, and that ilk, is well known. The following letter by the mayor of Fort Madison, Iowa, was written February 16, but is just as good and pertinent today as it was then, and is worth publishing. "More strength to the elbow" of Mayor Brown! and may others be encouraged by it to speak the truth and disown those who are misrepresenting them before the public:

The Greater Des Moines Association, Des Moines, Iowa.

Your communication of recent date requesting that our board of aldermen pass a resolution asking the railroad commissioners to prohibit the railroads from making low home-seekers' rates out of Iowa, was duly received. After careful consideration, the council voted unanimously to receive and file the communication without action, and requested the mayor to write you explaining the reason why.

In our judgment it is not the home-seekers' rates that is taking the people out of Iowa and causing our state to actually decrease in population in the face of general increase in the country at large. These rates provide for a round trip, bringing the people back, as well as taking them out, and putting blinders on farmers will not prevent their seeing things that are wrong in Iowa and seeing things that are right in Canada, any more than it would the hundreds of manufacturers that are taking millions of dollars out of the United States and investing in a country where the demagogues do not have full sway, and where property rights are respected and public utilities are not confiscated. Iowa has been injured by ill-advised agitation against all forms of business and manufacturing, and against the common carriers, who are the arteries of business, and whose prosperity as has recently been said by President Wilson, "is intimately related to the prosperity of all forms of business and of the country as a whole." This agitation has resulted in curtailing the efficiency of the transportation lines and preventing their expansion and thus deprived our industries of adequate transportation facilities so necessary to their growth. Think of it! Not a mile of railroad being built in the great state of Iowa, where thousands are in need of additional transportation. The main trunk lines of this state have been forced to a policy of retrenchment that will soon prove ruinous, and all of the minor railroads have been unable to pay operating expenses and have been forced into the hands of receivers. These lines include such large enterprises as Fort Dodge, Des Moines & Southern; Des Moines, Iowa Falls & Northern; the Atlantic North & South, and the Albia & Centerville.

Some years ago our railroads granted a reduction in the Iowa tariffs on live stock to packing houses within the state, thus helping our farmers and local industries. This was helpful to the whole state if it had stopped there, but within the year some so-called reformers, backed by certain commercial bodies, asked for a like reduction in live stock rates to Chicago, and forced the railroads to grant them, and the rates were made so low as to more than compete with the already low rates to Ottumwa, Cedar Rapids, Des Moines, Marshalltown and Fort Madison, thus helping the Chicago packing houses to the disadvantage of our own packing houses in the towns above named; and such achievements are pointed to with pride by our commerce experts (?). One railroad commissioner in his campaign literature, for example, calls attention to this wonderful achievement and succeeds in fooling the people, making them believe that he has benefited them, when in fact he has injured them all he possibly can. Now we find this same gentleman chasing up and down the country advocating all kinds of wild socialistic ideas, such as government ownership of railroads, and showing all kinds of statistics and compilation of figures. God knows where he gets them. Certainly not from anything that has ever transpired on earth, for neither figures nor his talk represents the true condition, either in this country or in foreign countries where government ownership has been tried and invariably been proven a failure and a heavy tax on the people. Again, bill after bill before our legislature, backed by these same reformers in order to gain the votes of the unthinking, is aimed at the prosperity of the manufacturers and the transportation lines in this state. Such bills as the "full-crew" bill, calculated to give a few brakemen additional jobs and to increase the cost of moving freight, is supported by them. Such a bill would render useless the work of years and expenditures of millions in the effort to reduce the cost of transportation by hauling longer and heavier trains, and the same agitators are all attempting at the same time to lower the income and improve the standards of our railroads. The result is the increase of the operating expenses and decreasing the net revenues, slowly forcing them into the inevitable result of bankruptcy.

The employers' liability bill, which came so nearly being

passed by our last legislature, would have put every employer of labor out of business in the state had it become a law. The bill that finally did pass was bad enough, for it more than doubled our liability insurance rates and still failed to relieve the working man from his worst trouble and worst enemy, the ambulance chasing shyster lawyer. The legislature could take millions of dollars of the tax-payers' money and waste it in capitol extension grounds, but we are too poor to pay a fair price for the competent services rendered by the railroads and other public utilities. Relegate to the rear the wild-eyed, hare-brained demagogue that is trying to bust the trusts and smash all the railroads. What Iowa needs is the reputation of fairness to the manufacturer and railroad owner, then the farmer will have a home market for his stuff, and it will not be necessary to put blinders on him to keep him from running away.

A. P. Brown,
Mayor, city of Fort Madison.

Statistics on Railway Accidents.

The Interstate Commerce Commission has issued the regular quarterly accident bulletin for the period ended September 30, 1913, covering collisions, derailments and other accidents resulting in injury to persons, equipment or road-bed, arising from the operation of railways used in interstate commerce. The number of persons killed in train accidents during the months of July, August and September, 1913, as shown in reports made by steam railway companies, was 211, and the number of persons injured 4011. The total number of casualties of all classes reported amounted to 3173 killed and 56,642 persons injured. This statement includes 2830 persons killed and 19,753 persons injured as the result of accidents sustained by employees while at work, by passengers getting on or off cars, by persons at highway crossings, by persons doing business at stations, as well as by trespassers and others; and also 132 persons killed and 32,878 persons injured in casualties reported as "industrial accidents" which term covers accidents not involved in train operation, but occurring to railway employees, other than trainmen, on railway premises. The total number of collisions and derailments reported for the quarter was 1634 collisions and 2219 derailments, of which 173 collisions and 223 derailments affected passenger trains. The damage to roadway and equipment and the cost of clearing wrecks resulting from these accidents amounted to \$3,239,159. Defective roadway and defective equipment is given as the cause of 67.6 per cent of all derailments reported for the quarter. Electric railroads reported 16 persons killed and 704 injured for the quarter in train accidents and 170 persons killed and 2052 injured in all accidents. Of these killed 31 were passengers and 1246 of those injured were passengers.

Interstate Commerce Commission Approves Financial Features of New York Central Consolidation.

The Interstate Commerce Commission transmitted to the United States senate, on April 27, its opinion on the bond issue proposed by the New York Central & Hudson River R. R., as a financial incident to the consolidation of the New York Central and its subsidiary lines. The proposal of the railroads is to issue \$167,102,400 of 4 per cent bonds to take up outstanding 3½ per cent bonds. The commission's opinion is rendered in a report prepared by Commissioner Judson C. Clements, in response to a resolution by the senate, directing the commission to investigate the transaction and report all facts and circumstances relating to it, particularly whether the issuing of the 4 per cent bonds for the 3½ per cent bonds "would not be an unwarranted and illegal capitalization of said railroads; whether the proposed consolidation of said railroads involved in the said proposed issue of 4 per cent bonds would not be unwarranted and unlawful, and whether the increase of the rate of interest thus pro-

posed is necessary, even though the consolidation of said railroads is unobjectionable.”

The commission has had the subject under consideration since July 10, 1913, and has held exhaustive hearings and arguments. The present report states that “it seems probable that, by the consolidation, a substantial saving can be effected”; that “from the standpoint of economy in operation and facility in the future financing of the two companies the consolidation is warranted,” and that “neither the consolidation itself nor the exchange of bonds on the basis of increased interest rate indicated, incident thereto, would, so far as we are advised, offend any federal statute.” Finally the commission’s report says: “We think that as a practical matter the exchange of the 3½ per cent Lake Shore collateral bonds for 4 per cent consolidation mortgage bonds is, under the circumstances, disclosed, a necessary step in carrying out of the proposed consolidation plan as outlined to us by the New York Central.”

As to the statement of minority stockholders of the New York Central that the consolidation would violate the Sherman anti-trust act, because, they aver, “the Michigan Central, the New York, Chicago & St. Louis Railroad, and these lake lines (the New York Central’s) are competing routes with the Lake Shore,” the commission expresses no opinion. “We think,” the report adds, “this question is one more properly to be passed upon by the Department of Justice. However, it would seem that if this ownership of stock in parallel lines by the New York Central and Lake Shore violates the anti-trust law, the offence is as complete now as it would be after the consolidation.”

American Type Locomotives for the Philadelphia & Reading Ry.

Some months ago there was brought out a consolidation locomotive of such size and capacity as to demonstrate the fact that the possibilities of the favored types of a few years ago are being overlooked, owing to the general popularity of more recent types. A similar example with respect to the possibilities of the American type is contained in the descriptive matter herewith, which pertains to a design that is unquestionably better adapted to the particular needs specified than could be any of the several available variations from this type.

The Philadelphia & Reading Ry. operates a large amount of local, suburban and express traffic on comparatively short divisions, where train loads are not excessive, but where schedules are most exacting. The greater part of this service is performed by four coupled locomotives. On the New York and seashore lines, where very high speeds must be maintained, Atlantic type locomotives are used; but a large part of the express traffic on other parts of the system is handled by locomotives of the American, or 4-4-0 type. On this road, where anthracite is the fuel generally used in passenger service, the heed for trailing-wheel locomotives is not as great as on lines where bituminous or high-volatile coal is burned. Firebox depth when using anthracite, is relatively unimportant, and a wide grate can therefore be placed above driving-wheels without raising the boiler to an excessive height.

The Baldwin Locomotive Works has recently supplied the Reading with ten American type locomotives, which represent the latest development of an interesting series of engines of this type. The accompanying table gives the comparative dimensions of American type locomotives built for this road since 1883.

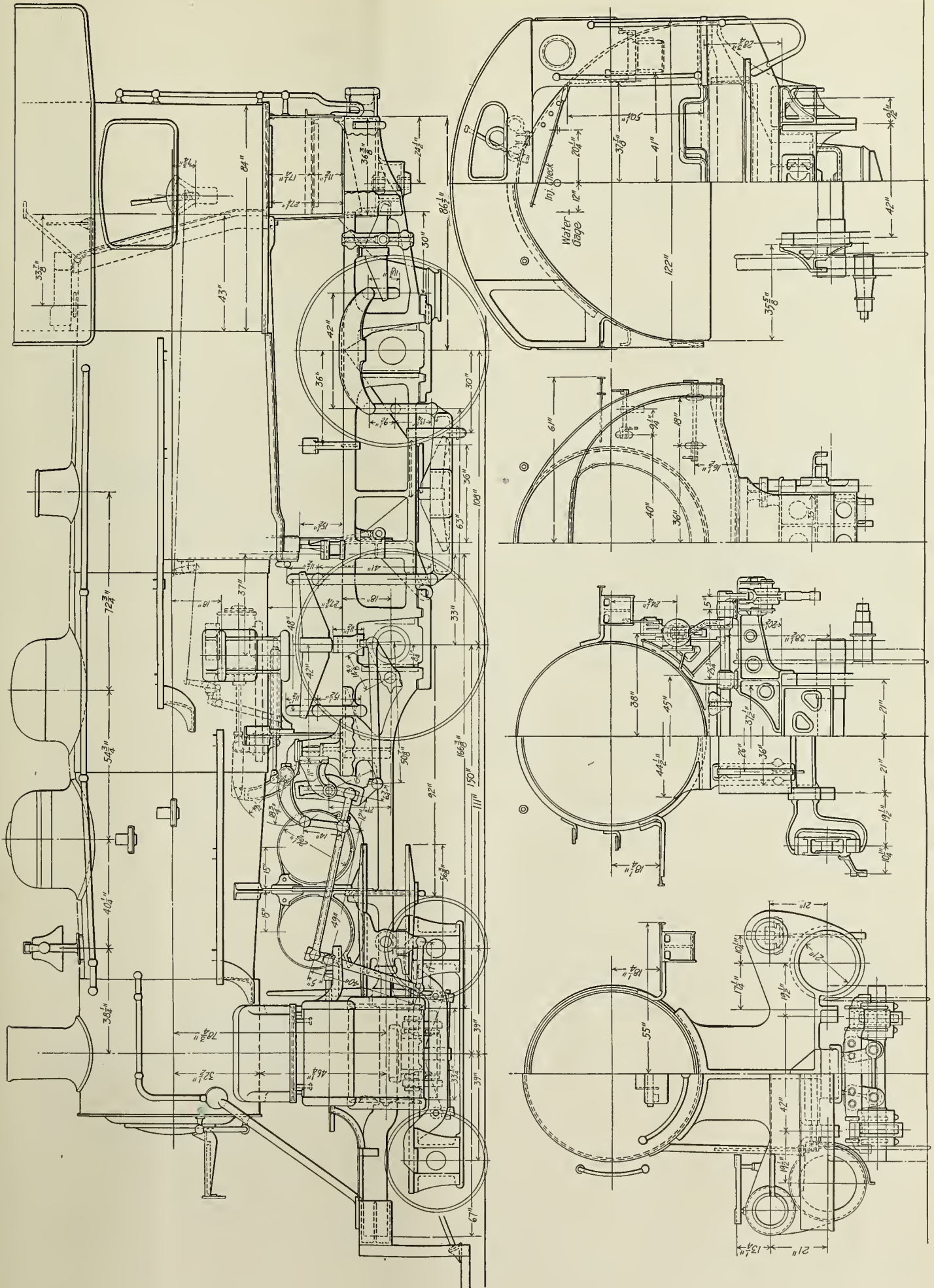
The new locomotives were built in accordance with drawings and specifications furnished by the railway company. Strict weight limitations were imposed, and the design was carefully worked out in order to secure the maximum hauling and steaming capacity without over-running the specified loads. The result is a locomotive which is well adapted to heavy local or express traffic, on divisions having moderate grades, and where train loads are within the capacity of a four-coupled engine.

The boiler has a Wooten firebox, with a combustion chamber 33 in. long. The center line of the barrel is 9 ft. 7 in. above the rail, which is sufficient to keep the grates well above the driving wheels are provided room for a conveniently designed ashpan with liberal draft openings under the mud-ring. The first boiler ring is conical, increasing the shell diameter from 62 in. to 70 in. This arrangement permits a satisfactory distribution of tubes in the front tube sheet, without cramping the water space under the combustion chamber. There are two fire-doors, each 13 by 18 inches, with their centers 30 inches apart. A brick wall is built across the throat of the combustion chamber, and the grate is of the rocking type.

Date	Cylinders	Driving wheels, diameter	Steam Pressure	Grate Area	Water heating surface	Super-heating surface	Weight on driving wheels	Weight, total engine	Tractive force
1883	18½ by 22 in.	61⅝ in.	140	68	1014	...	62,865	93,105	14,600
1889	21 by 22 in.	68½ in.	160	76	1325	...	69,540	105,470	19,250
1901	21 by 22 in.	68½ in.	200	76	1942	...	87,680	132,680	24,000
1914	21 by 24 in.	68½ in.	205	86	1517	257	120,528	173,490	27,580



American Type Locomotive, Philadelphia & Reading Ry.



Elevation and Cross-Sections of American Type Locomotive, Philadelphia & Reading Ry.

A Schmidt superheater, with 22 elements, is used in this design, and steam is delivered to the steam chests through outside pipes. The distribution is controlled by 11-inch piston valves which have a steam lap of 1¼ in. and an exhaust clearance of ¼ in. These valves are driven by Walschaert gear, and are set with a maximum travel of 7 in. in forward motion and a constant lead of ¼ in. Special attention has been given to the machinery and running gear. The valve motion details are of open-hearth, oil-treated steel, and are as light as is consistent with the required strength. The piston rods and crank pins are of "Nykrome" steel, the latter being hollow-bored. The driving-axles are of open-hearth, forged steel, and are also hollow bored. Reversing is controlled by the Ragonnet power mechanism, the gear being supported on the right hand side of the boiler just forward of the fire-box. This is a particularly convenient arrangement in the case of the present engines, because the cab is placed at the back end, instead of over the middle of the boiler; and it would be difficult to install a reverse lever of the usual type on account of the exceptional wide fire-box.

The frames are of open hearth steel, 4½ in. wide; and each is cast in one piece with a single front rail. The upper and lower frame sections combine to form the single rail just ahead of the leading driving wheels, and at this point is placed a strong transverse brace of cast steel. The brackets which support the link and reverse shaft bearing are seated on this brace, and are securely bolted to it and to the frames. A strong transverse brace is also placed under the front end of the fire-box, while the guide-yoke constitutes a substantial cross-tie for the front frame rails. The yoke and guide bearers are combined in a single casting, and this is bolted to knees which are cast in one piece with frames. The guide-yoke is braced to the boiler by an expansion plate. This plate serves as a support for two air drums having a combined capacity of 40,000 cu. in.

The equalization system is arranged with three half-elliptic springs on each side. One of these is placed behind the rear frame pedestals, and is connected to yokes which are supported on the rear driving-boxes. This arrangement of spring rigging provides easy riding qualities. It will be seen that this is a highly developed locomotive of its type, and it may be noted that, while it is of unusual capacity for a 4-4-0 engine, the wheel-loads are not as great as those carried by many other locomotives recently built. This suggests the fact that the ultimate capacity attainable with this wheel arrangement has not yet been reached.

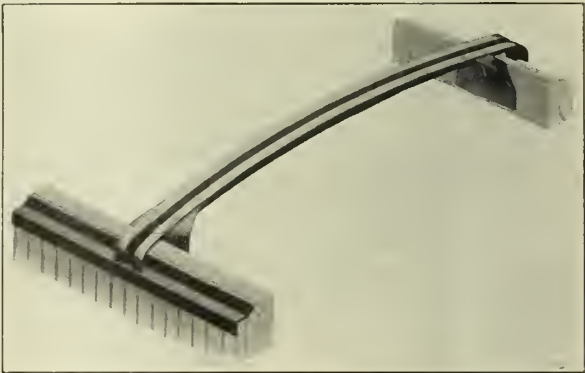
The leading features of these locomotives are indicated in the following table:

Type	4-4-0
Service	Passenger
Cylinders	21 by 24 ins.
Valves	11-in. piston
Valve gear	Walschaerts
Tractive power	27,580 lbs.
Boiler, type	Wooten, wagon top
Min. diameter .....	.62 ins.
Working pressure	210 lbs.
Fire-box, size	108 by 114 ins.
Grate area .....	.86 sq. ft.
Kind of fuel	Anthracite coal
Tubes, number and diameter	208-1¾ ins.
Flues, No. and diameter	22-5¼ ins.
Length	10 ft. 5 ins.
Heating surface, fire-box	178 sq. ft.
Tubes and flues	1297 sq. ft.
Arch tubes	None
Total	1517 sq. ft.
Superheating surface	257 sq. ft.
Driving wheels, diameter	68½ ins.
Journals	10 by 12 ins.
Truck wheels, front, diameter	36 ins.

Journals	6½ by 13 ins.
Weight, on driving wheels	120,528 lbs.
Total engine	173,490 lbs.
Total engine and tender	320,000 lbs.
Wheel base, driving	9 ft. 0 ins.
Total engine	24 ft. 9 ins.
Total engine and tender	56 ft. 11¾ ins.
Tender, wheels, diameter	36 ins.
Journals	5¾ by 10½ ins.
Capacity, water	7000 gals.
Capacity	10½ tons

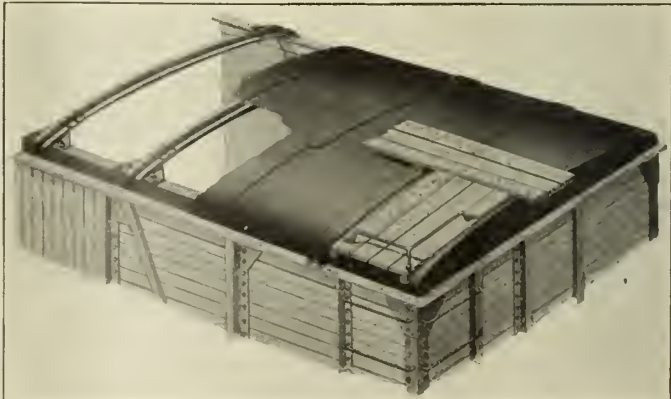
The Christy Car Roof.

The Christy car roof, illustrated herewith, is a notable example of lightness and simplicity in the design of flexible steel roofs, which modern box car construction seems to demand. The carlines used in this design are U-shaped and are pressed from sheet steel of suitable thickness. When placed in position, the ends of the carlines rest upon the side plates of the car frame, bending down over their exterior surfaces, and are attached thereto by means of gusset or anchor plates. The carlines, being disposed with their



Christy Carline and Side Plate Construction for Wooden Superstructure Box Cars.

concave sides upward, a trough is thereby formed which serves to deliver any water entering it safely over the side of the car. In wooden superstructure cars, a pressed Z-bar reinforcement is attached to the frame plate, protecting the upper ends of the car siding, supporting the ends of the carlines, and waterproofing the plate construction as illustrated. The knee braces conform to the under and adjacent lateral sides of the carline, is securely riveted to its horizontal flanges, thus obviating the necessity of passing bolts or rivets through the water carrying or channel portion of the carline. The braces are also bolted firmly to the inside faces of the frame plates by which means carlines



Christy Car Roof as Applied to Steel Superstructure Box Cars.

are utilized to prevent the spreading of the upper parts of the frame.

The roof sheets are of rolled steel and so shaped as to conform to the upper contours of the carlines after their ends have been secured as above described. The edges of the roof sheets are turned downward $\frac{3}{4}$ of an inch, so that the edges of two adjacent sheets hang freely in the trough of the carline by which they are supported throughout their whole length. Thus any water that passes through between the edges of the roof sheets must fall into the trough of a carline whence it is delivered safely over the side of the car. There being neither bolts nor rivets used for any purpose in connection with the recovering of these sheets, there is no opportunity for water to work its way through to the inside of the car.

For the purpose of holding roof sheets in place, cap strips or bands are provided. These consist of strips of rolled steel $4\frac{1}{2}$ ins. wide by $\frac{1}{8}$ -in. thick, and shaped to conform to the contour of the carlines and roof sheets after they have been fixed in position. They are applied directly over the junctures between the contiguous roof sheets, and consequently directly over the carlines. Their ends, extending over the sides of the car below the ends of the carlines, are secured by means of bolts which pass horizontally through the frame plates and likewise through the carline braces as previously described. By means of bolts inserted from underneath these strips, the running board saddles are held fast. One of the illustrations shows the roof applied to steel superstructure cars of the C. P. R. type to which it is readily adaptable without the use of the special Z-bar. With this method of attachment, there are the same waterproofing features as mentioned in the connection with wooden superstructure cars. The weight of the Christy roof for 40-ft. cars is given as 2570 lbs.

Annual Convention of the American Society of Civil Engineers.

The 40th annual convention of the American Society of Civil Engineers will be held at Baltimore, Md., June 2-5, 1914, with headquarters at the Belvedere hotel, corner of Charles and Chase streets. The following is the program of arrangements:

Monday, June 1, 1914—In the evening there will be an informal reception at the Belvedere hotel.

Tuesday, June 2—10 A. M.—First meeting of the convention. Address of welcome by Hon. James H. Preston, mayor of Baltimore. President McDonald will deliver the annual address.

Afternoon—There will be a golf tournament at the Baltimore Country club. Tea will be served on the club lawn.

8:30 P. M.—Second meeting of the convention. This is the business meeting. A proposed code of ethics, recommended by the board of direction, will be considered, and other business transacted.

Wednesday, June 3—10 A. M.—This day will be devoted to an excursion by steamer to Annapolis. This excursion will be made at the invitation of the secretary of the navy, and will be especially interesting in view of the fact that this is graduating week at the naval academy.

Thursday, June 4—10 A. M.—Third meeting of the convention. Brief addresses will be made on "City Planning and Paving," by Joseph W. Shirley, chief engineer, topographical survey; R. Keith Compton, chief engineer, paving commission; H. K. McCay, city engineer, and by F. W. McKinney, chief engineer, street opening, on "Drainage and Sewerage," by Calvin W. Hendrick, chief engineer, Baltimore Sewerage Commission; on "Harbor Work," by O. F. Lackey, harbor engineer; on "Water Supply and Filtration," by E. B. Whitman, water engineer and president, water board.

Afternoon—Excursions will be made to inspect the various engineering activities described at the meeting in the morning, separate parties being made up under the leadership of the gentlemen named.

Evening—By invitation of the Engineers' Club, of Baltimore, the members and guests will be entertained at the Belvedere hotel at a reception and ball.

Friday, June 5—By invitation of F. W. Wood, president, the party will visit by steamer the rolling mill and ship-building plant of the Maryland Steel Company, at Sparrows Point. It is expected also that a stop will be made at Fort Howard, by invitation of Gen. E. M. Weaver, chief of ordnance, U. S. A., to inspect modern coast defense guns, etc.

Evening—There will be an informal farewell smoker, to which the ladies in attendance are invited.

Southern Pacific's Answer to Federal Suit.

The Southern Pacific Co. filed, on April 30, in the United States District Court at Salt Lake City, Utah, its answer to the federal government's suit to divorce the Central Pacific from the former road. The answer, after specifically denying all allegations that the Sherman antitrust law has been violated, points out not only that the two lines were originally built, operated and developed as one road, but that as far back as 1898 the United States government itself practically recognized the combination as wholesome. It asserts that in the joint operation of these lines through trains have been run by the most direct route, without reference to their ownership, and that any separation of the Central Pacific from the Southern Pacific cannot now be had without detriment to both properties nor without impairing the public service. The answer asserts that, as the lines of the Southern Pacific railroad were completed they were directly leased to the Central Pacific, to be operated within its lines, and that on April 1, 1885, the Southern Pacific Co., to simplify the organization, took over, under lease for ninety-nine years, all the lines of both Central Pacific and Southern Pacific and has since managed and developed them as one property.

The document continues: "That relying on the terms under which the Central Pacific's debt to the government of \$58,000,000 was settled in 1898, the Southern Pacific Co. undertook heavy financial obligations, not only guaranteeing payment of this debt, but also guaranteeing the \$100,000,000 4 per cent mortgage bond issue of the Central Pacific. In this connection it is contended that the government could not consistently and with justice have accepted this settlement, of which it did have full knowledge as party thereto, if the arrangement involved a relation between the roads contrary to public policy.

"That even as late as 1912, in the recent so-called Harri-man unmerger suit, when the United States Supreme court ordered the dissolution of the Union Pacific and the Southern Pacific, the court, the highest tribunal in the land, found no reason to disturb the relations between the Central Pacific and the Southern Pacific. The Supreme court ordered the dissolution of the Union Pacific from the Southern Pacific, but as to the Central-Southern Pacific relations it said: 'We find no reason to disturb the action of the court below.' The court below had declined to disturb the Central-Southern Pacific relations, although the facts concerning them were at the time brought out."

Commenting on the fact that the lines were in one ownership and management and developed as one property, the early part of the answer points out that, because of this fact, little heed was given as to which corporation should hold the title to terminal properties and branch lines.

The Power Specialty Co., 111 Broadway, New York, has in course of preparation an attractive catalog showing by means

of line drawings and photographic reproductions the construction and application of the Foster locomotive superheater. An important feature of this superheater, which is of the fire-tube type, lies in the fact that a light cylindrical steam header is used, the ends of the units being expanded into holes in its walls in the same manner as in flue sheet construction. Provision also is made for the ready removal of the dry pipe without the necessity of removing either the header or any of the units connected therewith.

* * *

The Panama-Pacific and Panama-California expositions to be held in 1915, are described, the liberal excursion rates that have been made from eastern points to San Francisco, Los Angeles and San Diego are quoted, and the San Francisco and San Diego Bay districts are pictured in a folder just issued by the Denver & Rio Grande-Western Pacific Scenic Route. An interesting feature of the production is a large relief map showing the topographical characteristics of the Rocky and Sierra-Nevada mountains.

California Commission Rakes Pullman Company.

The state railroad commission of California has returned a report covering its findings in an investigation into the rules, regulations and practices of the Pullman Company, which has extended over six months and has occupied the attention of the entire commission. The commission directs the company to remedy within thirty days numerous conditions which it specifies and denounces. While there are ten separate subjects of complaint, the commission lays its greatest emphasis upon the inattention of employees to patrons of the company and the inadequacy of the present wage paid to porters, who are paid but \$27.50 a month, and who thereby

are compelled to look to the traveling public for their principal income. The report severely criticizes the Pullman Company for forcing its employees to rely upon the "tip system," and it says that unless reform steps are taken the commission will institute an investigation into the rates of the company with a view either of increasing the rates of the corporation to enable it to pay proper wages or of determining if the company has the earnings, but not the will, to pay a fair wage. "It may be all right," says the commission, "for persons to reward particularly good service with some gratuity—upon this, of course, we don't pass—but the Pullman Company forces its patrons to be generous or not get service. It is our opinion that the time has passed in this state and in this nation when institutions such as the Pullman Company can be, or should be, permitted by public authority an indulgence which require its employees to resort to whatever means they have in their power to secure the necessary amount which, added to their salary, will enable them to live." Other conditions which the company is asked to improve are the overheating of cars, the reported necessity of tipping conductors to secure lower berths, the making up of berths so early in the morning by the porters as to disturb passengers unnecessarily; the charge that hotel porters speculate as brokers in Pullman berth tickets, that porters neglect women passengers to dance in attendance upon the men, who are more liberal with tips, the neglect of tourist sleeper passengers because of the low ratio of tips, poor upkeep of sleeping cars and unsatisfactory sanitation.

The Railway Supply Man's Point of View

A Matter of Principle.

There is something about the act of eating that makes most men talk more freely at such times, and a business man will enter into a conversation with another business man across the lunch table with more freedom,—with less reservation, than across the desk in the business office. Possibly this is due to the fact that on one side of the office desk sits the man who has something to buy, and on the other side sits the man who has something to sell. This may explain the reason why many good salesmen attempt to substitute for the business desk, the lunch or dinner table. Possibly there is more of a feeling of equality as well as good-fellowship when a cloth, silver, and dishes cover the bare wood work.

This, however, is all by the way. It is simply suggested because of the actual conversation between a couple of supply men,—one on one side of the lunch table, and one on the other. It occurred only this week, and, as usual during the present lack of orders for the manufacturer of railway supplies, this subject was uppermost. As to when there would be business, and how much there would be when it did come,—this is of interest, but not just exactly what we want to bring out at this time.

One of the supply men had just taken on a new line,—taken it on to sell of course, but as a matter of principle with him, he wanted to know that that which he was going to sell would do that for which it was intended, and he told how he had been spending the forenoon in having an independent and unbiased test made of this particular equipment, in order that he might really know that the claims made by the manufacturers as to what could be expected by the user of the equipment were true.

"A matter of principle,"—is there a growing tendency on the part of railway supply manufacturers not to take another man's "say so," but to find out for themselves that what they sell is exactly that which they represent it to be? If this is the case,

has it come about because of an awakening of the business conscience of the nation, and a gradual rising to a higher plane of business dealing, and is there accordingly being established a moral code in business? Possibly this may be the answer,—or have wise, shrewd, far-seeing business men who manufacture railway supplies come to feel that the success of their business, not for today but for tomorrow, rests upon "delivering the goods"?

This is an interesting question,—interesting whatever the reason or reasons may be. We will not attempt to discuss it in these columns. The suggestion is for the reader. We are simply giving the incident. However, in these troublesome days of railway legislation, and lots of it, doesn't it speak well for the railway officer who buys that the railway supply manufacturer who sells is conducting his business in a high, broad and fair-minded way? In the very nature of things, a manufacturer of railway supplies, who is the seller, is reflecting very largely the attitude of the railway official, who is the buyer.

Letting Good Men Go in Dull Times.

One of the greatest achievements in the management of any great industry is the getting together of a high-grade staff of superintendents and salesmen. It is a work requiring experience, good judgment and time. The value of such a staff is not to be measured by salaries. Men who draw good salaries in such positions are generally worth the money—sometimes vastly more than the salaries paid. In a business which is subject to "ups and downs," and which is a feast or a famine, the manufacturer saves and makes from a high-grade staff, far more in good times than he loses by paying the same salaries in dull times.

It is, therefore, a duty to keep such men, even when they are unable to produce immediate results. It is, moreover, to his self-interest. In a business which swings like a pendulum from one extreme to another, preparedness is the

very essence of good management. You can't pick up the best men for the job on a moment's notice, even by bidding up on salaries. The efficient man will need extravagant inducements to lead him to desert a concern which stood by him when he wasn't earning all that he was getting.

"In the panic times of 1898," said to us the president of a large manufacturing corporation with many plants, "everybody had cold feet and was cutting off everything that could be cut off. I noticed that our competitors and those in allied industries were dropping their highest-priced and hence best men. I had the nerve to pick and take on a considerable number of such men and thus obtained a splendid force. Business turned and we got the benefit. Before others could get any kind of men into the field, we had a high grade staff 'right on the job,' and we received in immediate results much more than all it had cost us to carry them. And we have kept such a staff as we never had before, and could hardly have obtained at any time except for the nervous fear and lack of faith of our competitors."

Show this to your directors when they insist on crippling the future of your business because of their limited vision!

Sitting Around the Office.

When there is nothing doing and nobody in the market, the depressing atmosphere of business is aggravated by loafing around the office and waiting for something to turn up. The really efficient salesman can find something to do at all times. It's a good plan to repair your fences and extend your acquaintance and do good publicity work when railway people are not "on the jump," and giving out requisitions to be filled "yesterday." We know a salesman who didn't know where to go or whom to see, until reading an article in this column a while ago, he grabbed his hat and made for the first railway office, with a determination to keep everlastingly at it. He didn't pick up many orders right offhand, but he saw people he could never see before, he found a welcome somewhat unusual, and he sowed a lot of seed which is germinating and will bear fruit.

Even when obliged to stay part of the time in the office, it is generally possible to find better occupation than discussing base ball or reading war news. Clean up things; do the things you always reckoned on doing when you got time; post yourself on details of the business; get your files in shape; make up your memoranda for busier times; read the technical papers and find out what is being done by others in your line! The salesman who does this sort of thing when in the office, and keeps things alive and warm out on the road, too, will stand well with his employer even when the orders are not coming in. Every pair of cold feet starts others to shaking. Just now no one needs any particular help toward feeling blue. Cheerful courage is what is wanted; not the kind that is mere idiotic chatter; but that which sees the blue above the clouds and manifests itself in keeping busy.

Special Train to the June Conventions.

The "Master Car Builders" Special to the June conventions at Atlantic City will be run by the Pennsylvania Lines, leaving Chicago, union station, at 3 p. m., Monday, June 8, reaching Atlantic City about 2:00 o'clock the following afternoon. The train will be composed of Pullman, steel library, sleeping and compartment observation cars, with Pennsylvania diner service. The fare from Chicago to Atlantic City will be \$29.50 for the round trip, good to return within thirty days. Stop over privileges at the principal eastern cities may be arranged for without additional expense except in the case of New York city. Those who desire to go to New York after the convention, can purchase summer tourist tickets from Chicago to

that point for \$30.00 good to return within thirty days and deposit same for stop-over of ten days at Philadelphia, purchasing round trip tickets for \$2.50, Philadelphia to Atlantic City and return, date of deposit counting as one day.

Accommodations can now be reserved at the city ticket office of the Pennsylvania Co., 242 South Clark street, Chicago, Ill., and will be held until June 1st, at which time they must be claimed in order that the passenger department of the road may know for how many to provide. Reservations may also be made by letter to E. K. Bixby, 846 Insurance Exchange building, Chicago, who will also be glad to furnish any additional information desired.

Iron and Steel Industry.

With the railroads buying less than one-half of their usual quota of mill products, and working capacity reduced within a week or so from 70 to 63 per cent, and preparations for a further restriction in the output of raw and finished material, the outlook is less encouraging. But the mighty industry which has passed through a score of worse depressions within memory reposes in confidence. The hidden factors are an abnormal curtailment of demand, an unusual number of small and great steel consuming schemes and enterprises, and expanding necessities to cover ordinary wear and tear. Many small railway extensions are held up. Current car, locomotive and engine orders are for just what must be had to fetch and carry the pressing volume of freight.

Supply Trade Notes.

—J. B. Berry, who recently resigned as assistant to president of the Rock Island Lines, announces the opening of an office as consulting engineer. He will be associated with C. P. Howard, and S. S. Roberts, under the firm name of Berry, Howard & Roberts, with offices in the Transportation building, Chicago. They will make a specialty of railway engineering, investigations, estimates and reports of existing or proposed lines, also the savings in operation due to changes of line or gradients; railway location; yard and terminal plans, and valuations for state or federal use.

—Societe Suisse Pour la Construction de Locomotives & de Machines, Winterthur, 27 Rue de Chateaudun, Paris, would like to secure the European agency for American makes of railway mechanical department supplies and equipment, also pumps, blocks and tackle.

—At the special meeting of stockholders of the General Railway Signal Co., at Rochester, N. Y., April 28, the proposition to increase the capital of the company from \$5,000,000 to \$10,000,000 was ratified.

—J. E. Greiner, consulting engineer, announces that he has now associated with him, Ezra B. Whitman and will henceforth continue the practice of civil engineering under the firm name of Greiner & Whitman, consulting engineers, 1308-9-10 Fidelity building, Baltimore, Md. The firm having no commercial interest is prepared to supply disinterested counsel and services in connection with the design, construction and maintenance of all classes of engineering structures and work, and the investigation of projects and engineering problems.

—The general offices of the United States Light & Heating Co., 30 Church street, New York city, will be moved on May 20, 1914, and located thereafter at the company's plant, Niagara Falls, N. Y. This transfer, it is announced, will result in bringing together the administrative, sales, engineering and production departments and will insure the most effective conduct of all in the interests alike of patrons and stockholders.

—The Chicago-Cleveland Car Roofing Co. has removed its Chicago offices from the People's Gas building to 535 Railway Exchange.

RAILWAY NEWS.

Grand Trunk.—The Canadian legislature has passed a bill authorizing the combination of the Canadian Atlantic Ry. with the Grand Trunk Ry.

New York Central Lines.—The indorsement by the Interstate Commerce Commission to the plans of the New York Central & Hudson River R. R. for the consolidation of various New York Central lines, is reported on a previous page of this issue. The consolidation agreement, which has been authorized by the directors of the several companies, provides that the proposed new company shall take in the New York Central; Lake Shore & Michigan Southern; Dunkirk, Allegheny Valley & Fitchburg; Chicago, Indiana & Southern; Detroit & Chicago; Detroit, Mobile & Toledo; Kalamazoo & White Pigeon; Northern Central Michigan, and Swan Creek Railway. A statement authorized by directors contains the following:

"New York Central and Lake Shore are principal parties to the agreement, the other companies being their subsidiaries. The name of the consolidated company will be the New York Central Railroad Company and it will have capital stock of \$300,000,000, of which \$249,590,500 is to be issued to stockholders of the consolidating companies, and \$50,409,500 will be reserved for issue from time to time when authorized by directors with approval of public service commissions. New York Central stockholders will receive par for par in the consolidated stocks. Lake Shore stock owned by the Central and holdings in other subsidiaries are to be canceled. It will require \$23,534,500 of the consolidated company's stock to exchange for Lake Shore minority stock, on terms indicated."

Meetings of the stockholders of the various companies have been called for July 20, at which time the agreement will be submitted. Application will be made to public service commissions for their authorization, and when the agreement has been ratified by the stockholders and approved by the commissions the consolidation will have been effected.

Northern Pacific.—The Wisconsin railroad commission has granted permission to the Northern Pacific Ry. to issue \$1,500,000 in 4 per cent bonds to be sold at not less than 75 per cent of their face value and the proceeds to be used for extensions and betterments.

Pennsylvania.—An agreement has been reached between the city administration of Philadelphia and the Pennsylvania Railroad for an important series of improvements and changes in Overbrook, along the main line, requiring between two and a half and five years for completion. The plan will be placed before the city councils for approval. The changes, which are made necessary because of the electrification of the main line for some distance, include the establishment of a freight yard between Fifty-second street and Malvern avenue, in which the movement of trains will be effected for the most part by electrical power. Lancaster pike, which crosses under the railroad twice at a depressed grade, will be abandoned and two new routes will be established. Lines and grades throughout the section will be re-established generally in accordance with the plan. A new crossing above the tracks will be established from a point near Fifty-ninth street and Lancaster avenue, to a point near Fifty-seventh street and upland way. Malvern avenue will be carried over the railroad tracks. The plan provides also for the extension of the double-track low-grade line, which has already been built from the Allegheny mountains to Glen Loch, Chester county, to tidewater.

Pere Marquette.—Receivers of the Pere Marquette R. R. have filed a petition with the United States court at Detroit, Mich., asking permission to issue \$7,610,000 in receivers' certificates, to bear interest at 6 per cent. The court also is asked to permit the issuance of \$3,500,000 of additional certificates if they are found to be necessary to pay an issue due June 30, 1915, and also to permit the issuance of still other certificates to meet equipment obligations as mature after June 30, 1915. Judge Tuttle will hear arguments on the petition May 16.

St. Louis & San Francisco.—A dispatch from New York, under date of April 28, says: Receivers of the St. Louis & San Francisco R. R. as a result of opposition to the issue

of receivers' certificates, are unable to meet \$1,750,000 interest on the general lien bonds maturing May 1. In view of certain default on the general lien 5s, prominent bondholders are now said to be talking foreclosure. Foreclosure steps, it is understood, cannot be effective for at least ninety days.

PERSONALS.

J. I. Ferguson, general baggage agent of the Indianapolis Union Ry., has been appointed assistant paymaster, with office at Indianapolis, Ind.

J. M. Tomlinson, general auditor of the New York, New Haven & Hartford R. R., has been appointed vice-president, with headquarters at New Haven, Conn.

George Thompson has been appointed general attorney of the Texas & Pacific Ry., with office at Dallas, Tex., succeeding the late W. L. Hall.

F. H. Dowler has been appointed general agent and superintendent of terminals of the Nashville, Chattanooga & St. Louis Ry., with headquarters at Chattanooga, Tenn.

R. E. Kimbell, assistant general auditor of the St. Louis Southwestern Ry., has been appointed assistant to president, succeeding C. W. Nelson, whose election as vice-president of the company has been announced in these columns.

Frank G. Dillard, vice-president and general counsel of the Chicago, Rock Island & Pacific Ry. at Chicago, has resigned. **Marcus H. Bell**, general attorney, has been appointed general solicitor, succeeding Mr. Dillard, effective May 1.

J. J. Patton, terminal trainmaster of the Southern Railway at Knoxville, Tenn., has been appointed superintendent of terminals at Knoxville.

Santiago Mendez, consulting engineer of the National Railways of Mexico, Mexico, D. F., has been elected executive vice-president. The new office was created on account of the temporary absence of President E. N. Brown, from Mexico City. General Huerta had appointed Senor Mendez and had requested that the appointment be confirmed by the board of directors so that he might have charge of the property in the absence of President Brown, who is unable to return to Mexico under present conditions.

W. T. R. Hoddinott, assistant trainmaster of the Baltimore & Ohio R. R. at Philadelphia, Pa., has been appointed acting trainmaster, with headquarters at Philadelphia.

O. V. McQuilkin has been appointed storekeeper of the Baltimore & Ohio R. R. at Glenwood, Pa., to succeed E. W. Thornley, who was promoted recently to the position of district storekeeper. **F. A. Fitzgerald** has been appointed storekeeper at Washington, Ind., to succeed H. P. McQuilkin, promoted.



C. W. Nelson, Who Has Been Elected Vice-President of the St. Louis Southwestern Railway.

R. F. Carr, superintendent of the St. Louis, Brownsville & Mexico Ry. at Kingsville, Tex., has been appointed superintendent of the Southeastern division of the St. Louis & San Francisco R. R., with headquarters at Birmingham, Ala., succeeding J. H. Doughty, acting superintendent, assigned to former duties as general agent at Birmingham.

E. J. Roth, assistant general storekeeper of the Chicago, Burlington & Quincy R. R. at Chicago, has been appointed supply agent of the Chicago, Indianapolis & Louisville Ry., with headquarters at Lafayette, Ind.

F. S. Collins, whose appointment as superintendent of the Mobile division of the Southern Railway was announced in a previous issue of the Railway Review, was born at Moberly, Mo., June 8, 1880. He entered railway service in July, 1896, with the Missouri, Kansas & Texas Ry. In February, 1899, he resigned his position as telegraph operator with that company and accepted service with the Wabash Railroad in a similar capacity. Mr. Collins went with the Southern Railway in 1903, has subsequently held the following positions: Telegraph operator, Charleston division, May, 1903, to January, 1907, train dispatcher; January, 1907, to 1908, block inspector, Charlotte division; March, 1908, to 1910, chief dispatcher, Charleston division; October, 1910, to 1912, trainmaster, St. Louis-Louisville lines, and from then until April 1, 1914, when his recent promotion was received, trainmaster, Charlotte division, at Greenville, S. C.

H. H. Shepard, general superintendent of the Charlotte Harbor & Northern Ry. at Boca Grande, Fla., has been appointed superintendent of the Buffalo division of the Delaware, Lackawanna & Western R. R., with office at Buffalo, N. Y., vice L. J. Ferritor, resigned.

J. M. Rapelje, general superintendent of the Northern Pacific Ry. at Livingston, Mont., effective May 1, is appointed assistant general manager with headquarters at St. Paul, Minn. A. V. Brown, formerly superintendent at Duluth, Minn., is appointed general superintendent of the Central district, with headquarters at Livingston, vice Mr. Rapelje, promoted. W. H. Strachan, superintendent at Jamestown, N. D., is appointed superintendent of the Lake Superior division, vice Mr. Brown, and W. E. Berner, trainmaster at Livingston, is appointed superintendent of the Dakota division, vice Mr. Strachan, transferred.

William A. Winburn, whose election as president of the Central of Georgia Ry., has been announced, was born on October 19, 1863, at Gainesville, Ga. He began railway work in 1880 as clerk in the freight house of the Richmond & Danville R. R. (Southern Railway), at Gainesville. He was subsequently in the office of assistant general freight agent of same road until June, 1883; for three years clerk in office of assistant general freight and passenger agent of Western North Carolina R. R., and in June, 1886, left that road to return to service of Richmond & Danville in



W. A. Winburn, Who Was Recently Elected President of the Central of Georgia Railway.

the same capacity. In September, 1887, Mr. Winburn was appointed division freight and passenger agent of same road, and from January to April, 1892, was clerk in general manager's office of the Columbus Southern, now a part of the Seaboard Air Line Ry. From April to June, 1892, he was clerk in traffic manager's office of the Central Railroad & Banking Co., of Georgia, at Savannah, and to October, 1901, was general freight agent of the Central of Georgia Ry. October 1, 1901, he was promoted to traffic manager, and from July, 1902, to July, 1904, was vice-president and traffic manager of the same road. He was then elected second vice-president, and from October, 1908, to December, 1910, was vice-president in charge of traffic, and since that time has been vice-president in charge of traffic and operation, which position he held at the time of his recent election as president.

TRAFFIC.

Edward T. Campbell, traffic manager of the Erie Railroad at Chicago, has been appointed general traffic manager, with headquarters at Chicago.

J. D. Watson, vice-chairman of the Southwestern tariff committee has been appointed assistant freight traffic manager of the St. Louis Southwestern Ry., with office at St. Louis, Mo.

J. A. McTague has been appointed contracting freight agent of the Delaware, Lackawanna & Western R. R. at Minneapolis, Minn., vice D. J. Collins, deceased. H. G. E. Pensius succeeds Mr. McTague as contracting freight agent at New York city. Gordon E. Gaines is appointed contracting freight agent at New York, vice Mr. Pensius.

William M. Long has been appointed contracting freight agent of the Illinois Central R. R. at Peoria, Ill., vice W. F. Robinson, resigned.

S. M. Dickey has been appointed commercial agent of the St. Louis Southwestern Ry. at Pine Bluff, Ark.

Vivian G. Snell has been appointed commercial agent of the Grand Trunk Ry., with office at Moncton, N. B., succeeding W. J. P. McGregor, who has been appointed division freight agent of the Grand Trunk Pacific, at Edmonton, Alta.

W. G. Womble, division freight agent of the Norfolk Southern R. R. with office at Raleigh, N. C., has resigned to accept a position with the corporation commission of North Carolina.

C. E. Crane, general Eastern freight agent of the Lehigh Valley R. R., with office in New York, having resigned, the position has been abolished and the duties formerly performed by that office have been invested in the newly created position of city freight agent. J. S. McCrea, division freight agent, located at Ithaca, N. Y., has been named to fill that position, with offices at 299 Broadway. Oliver F. Johnson, traveling freight agent for New Jersey, with office in New York, has been promoted to division freight agent at Ithaca, succeeding Mr. McCrea and E. F. Neagle, soliciting freight agent in New York, is appointed traveling freight agent for New Jersey.

Frank M. Byrd, chief clerk in the office of superintendent of the Indianapolis Union Ry., has been appointed general baggage agent, with office at Indianapolis, Ind., succeeding J. I. Ferguson, promoted.

J. E. Fitzwilson, New England agent of the Southern Railway at Boston, Mass., has been appointed general agent, with office at New York City, succeeding W. C. Harrison, transferred. J. A. Werne, commercial agent at Pittsburgh, Pa., succeeds Mr. Fitzwilson at Boston, and Samuel M. Howard has been appointed freight soliciting agent, with office at Greenville, S. C.

ENGINEERING.

J. A. Rutledge has been appointed roadmaster of the Detroit, Toledo & Ironton R. R. at Napoleon, Ohio, succeeding P. O'Brien, resigned.

I. F. White, division engineer of the Cincinnati, Hamilton & Dayton Ry. at Dayton, Ohio, has been appointed engineer maintenance of way of the Chicago Great Western R. R., with headquarters at Chicago, succeeding C. G. Delo, promoted.

E. A. Frink, bridge engineer of the Seaboard Air Line Ry. at Norfolk, Va., has been appointed principal assistant engineer, succeeding E. C. Bagwell, promoted. L. Chevalier succeeds Mr. Frink as bridge engineer and W. L. Darden has been appointed engineer of buildings.

Charles Silliman was recently appointed engineer for the Southern group of the presidents' conference committee on

federal valuation, with office at 609 Munsey building, Washington, D. C.

A. K. Shurtleff, former office engineer of the Chicago, Rock Island & Pacific Ry., and lately engaged in valuation work for the Rock Island Lines, has resigned to accept appointment as group engineer for the president's conference committee on federal valuation. Mr. Shurtleff will have offices in the Burlington building, Chicago.

H. K. Lowry, principal assistant signal engineer of the Chicago, Rock Island & Pacific Ry., has been appointed signal engineer, with office at Chicago, succeeding A. G. Shaver, resigned. Mr. Shaver becomes secretary and treasurer of the Hollett Iron Works, Chicago.

E. G. Lane, who has been appointed district engineer maintenance of way of the Baltimore & Ohio Southwestern R. R., as previously noted in these columns, entered the service of the Cleveland Terminal & Valley R. R., now a part of the Cleveland division of the Baltimore & Ohio, in 1888. During the Spanish-American war in 1898 Mr. Lane was given a nine months' leave of absence during service as captain of the 5th Ohio Infantry. He was appointed division engineer of the Baltimore & Ohio at New Castle, Pa., in 1904, and two years later was made district engineer maintenance of way at Pittsburgh. From January 1, 1912, until his recent appointment at district engineer maintenance of way at Cincinnati, Mr. Lane has been assistant engineer, operating department, in the office of the vice-president at Baltimore.

MECHANICAL.

J. F. Dunn, superintendent of motive power and machinery of the Oregon Short Line R. R., with headquarters at Salt Lake City, Utah, has resigned, effective May 1. A. C. Hinckley, master mechanic of the Southern Pacific Co. at Oakland, Cal., succeeds Mr. Dunn.

T. M. Ramsdell, former master car builder of the Chicago & Alton R. R., has been appointed master car builder of the Oregon-Washington R. R. & Navigation Co., effective April 20, with headquarters at Albina shops, Portland, Ore.

C. A. Gill, formerly master mechanic of Cincinnati, Hamilton & Dayton Ry. at Ivorydale, Ohio, has been appointed assistant district superintendent of motive power of the Baltimore & Ohio R. R., with headquarters at Baltimore, Md., succeeding J. W. G. Brewer, resigned.

L. C. Ord has been appointed assistant master car builder of the Canadian Pacific Ry., Eastern lines, with office at Montreal, Que., succeeding P. A. Crysler, assigned to other duties.

OBITUARY.

Warder Cummings, formerly general superintendent of the

Texas & Pacific Ry. at Marshall, Tex., and recently terminal agent at Denison, Tex., died at his home in the latter city on April 9, aged 75 years.

Joseph Lomax, first president of the Grand Rapids & Indiana Railway, formerly newspaper publisher and lawyer, died recently at the home of his daughter in Indianapolis, Ind. He was 104 years old last December.

Daniel P. Sheehan, roadmaster of the Metropolitan West Side Elevated Ry., Chicago, died in that city April 27. He was crushed by a derrick on which he was sitting, when he leaned over to warn a track laborer who was in a dangerous spot. Mr. Sheehan did not note his own danger and was fatally injured.

George Frederick Baer, president of the Philadelphia & Reading Ry. and the Central R. R. of New Jersey, died at his home in Philadelphia, April 26. He was born at Lavansville, in Somerset county, Pa., September 26, 1842, and was educated in Franklin and Marshall college. Years before entering that institution, however, he worked as a boy, just in his 'teens, in the printing office of "The Somerset Democrat," of which paper he and his brother afterward became the owners and editors. In 1862 he organized a volunteer company, of which he was made captain, and with it he fought with the Army of the Potomac, at the second battle of Manassas, at Chancellorsville and elsewhere, rising to the rank of adjutant general of brigade. In 1864 he was admitted to the bar and settled at Reading, Pa. In 1870 he prosecuted an action for damages against the Reading railroad so ably and successfully that he was made counsel for the Philadelphia & Reading. As his law practice increased, he was able to extend the field of his operations, and so successfully did he embrace the opportunities offered to him, that he became an important factor in many industrial and financial enterprises, and especially in coal producing railroad so ably and successfully that he was made confidential advisers of J. Pierpont Morgan. He co-operated with him in the plan to unite under one management all the coal-carrying railroads with terminals in New York city. When the reorganization took place in 1901, Mr. Baer was elected president of the Reading company, the Philadelphia & Reading Railway Co., the Philadelphia & Reading Coal & Iron Co., and the Central Railroad Co. of New Jersey. When the great anthracite coal strike began on May 12, 1901, he conducted the fight against the United Mine Workers of America. It was a long and desperate fight, and a man of weaker and more yielding character would have succumbed under the strain. He remained on duty almost day and night, and, believing himself to be in the right, absolutely refused to yield a single point. Mr. Baer was always a hard worker. He was intensely religious, charitable and almost ascetic in



A. K. Shurtleff, Whose Appointment as Group Engineer, Presidents' Conference Committee, is Announced.



H. K. Lowry, Who Has Been Appointed Signal Engineer of the Chicago, Rock Island & Pacific Railway.



E. G. Lane, District Engineer Maintenance of Way of the Baltimore & Ohio S. W. R. R., Cincinnati.

Photo by Matzene, Chicago

habits. As one of the great captains of industry during a period remarkable for the conflict of big business with the Federal government, Mr. Baer will live in history. The Philadelphia Press, in commenting on his notable career, says: "Philadelphia and Pennsylvania have lost a useful and beloved citizen whose sincerity of purpose, integrity and honorable conduct have never been questioned by his most vigorous opponents."

NEW ROADS AND PROJECTS.

Alberta.—George H. Webster, Calgary, Alta., has been awarded the contract for the 25 mile extension of the Lethbridge-Stirling line of the Canadian Pacific Ry. The contract is for grading only and no steel will be laid this year. Work will commence at once, starting at mile 50 and ending at mile 75. After the completion of this contract there will be about 50 miles of a gap on this branch.

Arizona.—The Tucson, Phoenix & Tidewater R. R. is reported to have been granted permission to construct and maintain a single-track, standard gage, steam railroad in Jackson, Madison and other streets in Phoenix, Ariz. See Railway Review of April 11.

Arkansas.—Press reports state that plans for the construction of a railroad between Coffeyville, Kan., and Memphis, Tenn., were discussed at a meeting of promoters in Fayetteville, Ark., recently. Most of the time was spent in considering the route of the proposed lines, which will pass through Fayetteville. It is said surveyors will be put in the field at an early date. Among those interested are: E. D. N. Whitney of New York city; E. T. Chenoworth of McCrea, Kan.; S. E. Chinn of Rockport, Mo., and E. C. Reece of Caney, Kan.

Georgia.—The Waycross & Western R. R., which is now completing a six-mile extension from Sirmans to Milltown, Ga., is contemplating further extension. Construction of a line from Milltown through Hahira, Barney, Pavo and Coolidge, to Pelham, Ga., is being considered.

New York.—The Central New York Southern R. R. is reported incorporated with \$2,000,000 capital. The construction of a steam railroad is proposed. R. B. Williams, Jr., Ithaca, N. Y., is interested.

North Carolina.—The North Fork Lumber Co., Azalea, N. C., according to report, will build six miles of standard-gage railroad. George E. Lewis is president and vice-president and general manager.

Oklahoma.—Citizens of Cheyenne, Okla., have filed suit against the Clinton & Oklahoma Western Ry. to compel it to build to that town. The line now extends to Clinton, four miles from Cheyenne. The suit is filed under a state law which provides that a railroad when four miles from a county seat, must build to the place.

Quebec.—The proposition of building another transcontinental across Canada under the name of the All Red Line Ry. with a total projected length of 3270 miles, has been cut down by the Canadian railway commission to a line of but 1000 miles in length to run from Cape St. Charles, on the Labrador coast, to the city of Quebec. The name of the railway was changed to the Labrador, Quebec & Southern Ry., and the capital stock was reduced from \$100,000,000 to \$10,000,000. The line, as now authorized, will run west from Cape St. Charles to the Peribonka river, 600 miles; then through the valley of the Peribonka river to a point on Lake St. John, 200 miles further, and then on to Quebec.

Wisconsin.—The Minneapolis, Merrill & Marinette Ry. is preparing to award contracts for the construction of its line from Merrill to Athens, Wis., a distance of 30 miles.

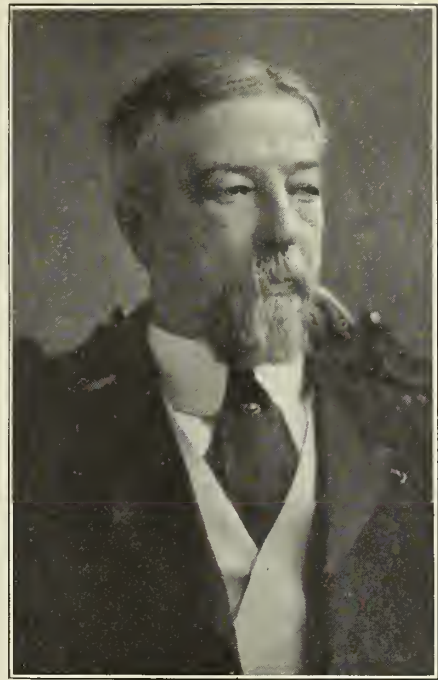
Electric Railways.

Contract is reported awarded by the Minnesota Northwestern R. R., Thief River Falls, Minn., for construction of 20 miles of railroad to John Moberg, of Bemidji, Minn.

Triangular Mono-Railroad Co., of Washington, D. C., has been chartered under the laws of Delaware; capital stock, \$1,000,000. The incorporators are Frank L. Peckham, 1421 M street N. W.; George L. Peckham, Riggs building, 15th and G streets N. W., Washington, and Thomas C. Shelling, of New York.

The Evansville & New Harmony Traction Co., capital stock \$100,000, has been incorporated at Indianapolis, Ind., and proposes to build a traction line from Evansville to New Harmony, Ind., a distance of 30 miles. A survey will be made of the proposed line in a short time.

Representatives of four border municipalities, Windsor,



GEORGE FREDERICK BAER
September 26, 1842—April 26, 1914

Walkerville, Sandwich and Ford City, Ont., have indicated their approval of a plan for a municipally owned street car system, and immediate steps will be taken to decide definitely upon the route.

The Joplin & Pittsburg Ry., which connects Joplin, Mo., with Pittsburg, Kan., and other points, will, it is reported, push construction immediately upon another electric inter-urban railway from Kansas City, Mo., to Lawrence, 34 miles, and Topeka, Kans., 62 miles. It is expected to have service as far as Bonner Springs, 16 miles, by June 1, and to Lawrence by December 1, and six months later to Topeka. Trolley wires have been erected from Kansas City to Bonner Springs, and the track is nearly finished.

Surveys have been completed by Ottawa, Rideau Lakes & Kingston Ry. Co., for 134-mile electric line from Ottawa to Kingston, Ont., with a branch to Lanark. The headquarters of the company are at Ottawa. N. M. Clougher, Ottawa, is president.

Application for charter has been made by Idaho-Pacific Ry. to build electric railway to connect the Twin Falls country with the Hagerman valley. The capital stock is \$250,000. M. J. Sweeley is president and Henry Schildauer treasurer.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Ocean Shore R. R. has ordered 2 mogul (2-6-0) type locomotives from the Baldwin Locomotive Works.

—The Rowland Lumber Co., Norfolk, Va., has ordered one prairie (2-6-2) type locomotive from the Baldwin Locomotive Works.

—The New Park & Fawn Grove R. R. has ordered one mogul (2-6-0) locomotive from the Baldwin Locomotive Works.

—The Texas Long Leaf Lumber Co., New Willard, Tex., has ordered one prairie (2-6-2) type locomotive from the Baldwin Locomotive Works.

—The St. Louis, Brownsville & Mexico Ry. has ordered 15 consolidation (2-8-0) type locomotives from the Baldwin Locomotive Works.

—The Butte, Anaconda & Pacific Ry. has ordered 4 electric locomotives from the General Electric Co.

—The Pekin-Mukden Ry. has ordered 2 consolidation (2-8-0) type locomotives from the Baldwin Locomotive Works.

—The Cuban Central Rys. are reported in the market for 13 ten-wheel (4-6-0) and 1 consolidation (2-8-0) locomotives.

—The Valley & Siletz R. R., Portland, Ore., has ordered

one (2-6-2 type) locomotive from the Baldwin Locomotive Works.

Freight Cars.

—The Solvay Process Co. has ordered 50 hopper cars from the American Car & Foundry Co.

—The New York Central Lines are expected to place orders within a few days for 500 automobile cars.

—The Atchison, Topeka & Santa Fe Ry. is reported in the market for freight cars. The report lacks confirmation.

—The Kansas City Southern Ry. is in the market for 100 ballast cars.

—The Louisville & Nashville R. R. has ordered 700 underframes from the Pressed Steel Car Co. and 700 from the Mt. Vernon Car Manufacturing Co.

—The Cuban Central Rys. are in the market for 20 30-ton box cars, 25 15-ton box, 15 15-ton flat, 220 22-ton flat cars and 40 caboose cars.

—The Great Northern Ry., according to report, has ordered 1000 refrigerator cars from the Haskell & Barker Car Co.

—The Southern Railway is reported as having ordered 1000 box cars from the American Car & Foundry Co., in addition to purchases recently reported.

Passenger Cars.

—The New York Central Lines are expected to place orders this week for 9 mail cars.

—The Electric Short Line Ry., Minneapolis, Minn., is about to place in operation two additional 70-ft. gas-electric motor cars recently ordered from the General Electric Co.

—The Great Northern Ry., according to report, has ordered 75 express refrigerator cars from the Barney & Smith Car Co.

—The Southern Ry., it is said, has ordered 4 baggage and 4 mail cars from the American Car & Foundry Co. in addition to purchases recently reported.

Signals and Interlocking.

—The Federal Signal Co. has been awarded contract for the installation of a 56-lever all-electric interlocking plant on the Louisville & Nashville R. R. at Athens, Ala. The signals will be Federal type "4-A," electrically lighted. Complete approach and route locking will be installed.

Bridges.

—The Southern Railway has ordered 1600 tons of bridge steel from the Virginia Bridge & Iron Co.

—The Texas & Pacific Ry. has ordered 175 tons of steel from the American Bridge Co.

—The Canadian Pacific Ry. has completed the substructure of the double-track bridge over the Pitt river and steel is being erected. This bridge, which is 1750 ft. in length, is one of the heaviest in British Columbia.

—The Chicago & North Western Ry. is building a new bridge over Silver street in Hurley, Wis.

—A contract has been awarded by the Pennsylvania Railroad for the erection of a double track concrete arch bridge to replace the present single track bridge across the Schuylkill River at Phoenixville, Pa.

—The Boston & Albany R. R. is reported as taking bids on 1200 tons of steel for 18 bridges.

—The Cumberland Valley R. R. has awarded a contract for the erection of an overhead bridge at Front and Second streets, Harrisburg, Pa., in connection with grade crossing elevation.

Buildings, Terminals, Etc.

—The Denver & Rio Grande R. R. has determined on a site for new freight terminal for Salt Lake City, Utah, and has authorized the expenditure of \$100,000 at Church farm, four miles from the city.

—The Louisville & Nashville R. R. will spend \$40,000 for a new shop building at Lexington, Ky.

—Ross & Macdonald and Hugh G. Jones, architects of Montreal, Que., have reported on complete plans for a new union station in Toronto, Ont. J. R. W. Ambrose is engineer of the Toronto Terminal Co., which is controlled by the Canadian Pacific and Grand Trunk railways.

—Additional land has been purchased by the Baltimore & Ohio Chicago Terminal R. R. for the purpose of enlarging its terminal in Chicago.

—The Seaboard Air Line Ry. and the Durham & Southern Ry., according to report will erect a \$22,000 freight and passenger station at Apex, N. C.

—See Railway News under Pennsylvania.

—Southern Railway will construct freight sheds and yards on the site of the present passenger station at Richmond, Va., and will also erect a passenger station in South Richmond, probably at Sixth and Perry streets.

—The Florida East Coast Ry. is contemplating the erection of a roundhouse and shops at Buena Vista, Fla.

—The Chicago, Milwaukee & St. Paul Ry. will build a 1,000,000-bu. grain elevator at Sheffield, Mo.

—Announcement has been made that the New York, New Haven & Hartford R. R. will restore the station at Hartford, Conn., that was recently burned. The estimated cost will be \$220,000.

—The Canadian Northern Ry. is laying out plans for very extensive terminal facilities at Port Mann, British Columbia, its Pacific freight terminus and ocean port. These plans, it is said, will call for yards with capacity for 10,000 freight cars and 1000 passenger coaches, also roundhouses and shops,

—The Baltimore & Ohio R. R. has prepared plans for a \$200,000 freight station on the north side, between Seventh and Ninth streets, Pittsburgh, Pa.

—The Atlantic Coast Line R. R. has prepared plans for a 40-stall brick roundhouse at Florence, S. C.

—Bids for construction of the new union depot at Dallas, Tex., will soon be asked by F. G. Pettibone, Galveston, Tex., president of the Union Terminal Co.

—The Atchison, Topeka & Santa Fe Ry., reported in a previous issue as preparing to erect new shop buildings at Richmond, Cal., is not contemplating such improvements at this time.

—The Connecting Terminal R. R., Buffalo, N. Y., will erect a 1,000,000 bu. grain elevator on the Blackwell canal, opposite the foot of Main street, to replace the one destroyed by fire on March 9. C. F. Strasmer is superintendent.

—The Lake Shore & Michigan Southern Ry. and the Pennsylvania Railroad have filed an application with the federal government for permission to make a 900-ft. fill into the lake and add seventy-two acres to their holdings for the purpose of building a freight terminal in connection with the plans for a union passenger station at Cleveland. Plans for the passenger terminal have been prepared by D. H. Burnham & Co., Chicago. They provide for a six-story building at the foot of the wall between the courthouse and the new city hall, 460 ft. by 205 ft. in area, with two stories below the street level. The five upper stories are to be used for office purposes. The plans have not been fully approved.

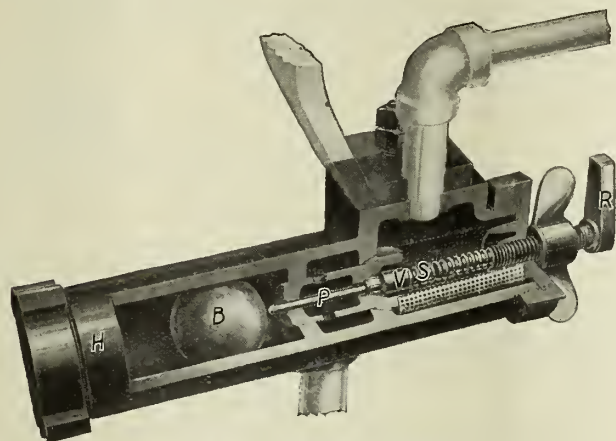
The Detroit Flange Lubricator.

After considerable study and experiment, the Detroit Lubricator Co., Detroit, Mich., has brought out a form of automatic flange lubricating apparatus which contains the novel and original feed control mechanism illustrated herewith.

The complete lubricator consists of an oil tank or reservoir mounted in any convenient position to permit a flow of oil by gravity to the flange; a feed nozzle suspended in proper relation to each of the two or more flanges to be lubricated; and between these parts the automatic control valve above referred to. This valve consists of the body H which contains a ball B and the plunger P, operating the valve V. The lubricator body is installed on road engines with the regulating screw pointing toward the boiler so that any swinging or rolling motion on curves or lateral motion of any kind will cause the ball B to roll against the plunger P, unseating the valve V momentarily and permitting oil to flow on the flange. The lift of the valve V and consequently the amount of oil fed are controlled by the tension of the spring S, which is regulated by the adjustment of the screw R. On switching locomotives the lubricator body is installed parallel to the boiler, instead of at right angles to it, so that the lubricator is operated by shocks at either end of the locomotive, such as are caused by quick stops or in coupling cars.

The notable advantage of a lubricator constructed and operating as above, are, in addition to the fact of its being

strictly automatic, that it will utilize any kind or grade of oil that will flow, it requires no drain on the engine either in the form of air or steam consumption; not requiring steam,



The Detroit Flange Lubricator.

is free from the freezing of condensation either in the lubricator parts or on the flanges, and not requiring pressure to deliver the oil, it is free from the danger of wasting the oil by spraying elsewhere than on the flanges where it is desired.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, APRIL 21, 1914.

Electric block signal apparatus, 1,093,596 and 1,093,597—Joseph Beaumont and Frederick G. White, Chicago, Ill.
Air-coupling device, 1,093,613—Rudolph Geiser, Toledo, O.
Extension car step, 1,093,617—Benjamin Gussette, Ward Springs, Minn.
Car lamp, 1,093,619—William S. Hamm, Hubbard Woods, Ill., assignor to The Adams & Westlake Company, Chicago, Ill.
Mail-bag catcher and deliverer, 1,093,624—August A. Herther, Indianapolis, Ind.
Car window, 1,093,644—Alfred H. Newpher, Chicago, Ill., assignor to The Adams & Westlake Company, Chicago, Ill.
Carline, 1,093,652—Thomas N. Russell, Chicago, Ill., assignor to Chicago-Cleveland Car Roofing Co., Chicago, Ill.
Carline, 1,093,657—Vinton E. Sisson, Chicago, Ill.
Pressure governor for pumps, 1,093,660—Walter V. Turner, Edgewood, Pa., assignor to The Westinghouse Air Brake Co., Pittsburgh, Pa.
Pipe-line coupling for Railway cars, 1,093,676—William H. Wyvill and John A. Talbott, Upper Marlboro, Md.
Machine for making railway ties, 1,093,680—Joseph W. Beck, Joseph W. Reid, and Raymond W. Skinner, El Rito, N. Mex.
Combination rail-joint and rail clamp, 1,093,682—James Henry Browder, McKenzie, Ala.
Brake mechanism, 1,093,683—Harry C. Buhoup, Chicago, Ill.
Rail joint, 1,093,727—William M. Pugh, Pocahontas, Va.
Dumping freight car, 1,093,734—Gustov C. Shaffer, Chicago, Ill.
Tank car, 1,093,737—Abram E. Smith, New York, N. Y.
Axle truck for railway vehicles, 1,093,755—Thomas Walter Barber, South Norwood, London, England.
Brake shoe, 1,093,776—Judson M. Griffin, Detroit, Mich.
Friction draft rigging, 1,093,778—Stacey B. Haseltine, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.
Car coupling, 1,093,781—Matthew C. Ironside, Kansas City, Kan.
Automatic train control, 1,093,782—William H. Johnson, Stamps, Ark.
Railroad crossing, 1,093,784—Charles F. Kelly, Philadelphia, Pa.
Draft rigging for single center-sill cars, 1,093,797—Charles J. Nash, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.
Rail anchor, 1,093,804—Benton C. Rowell, Chicago, Ill.
Railway rail and joint therefor, 1,093,805—Gustave Sande, Seattle, Wash.

Automatic emergency flagging machine, 1,093,824—Leonard L. Brown, Clifton Forge, Va.
Railway car, 1,093,828—William A. Caswell, Chicago, Ill., assignor to National Dump Car Co., Chicago, Ill.
Car side construction, 1,093,839—William E. Fowler, Sr., Chicago, Ill., assignor to The Fowler Car Co., Chicago, Ill.
Boltless car side, 1,093,840—William E. Fowler, Sr., Chicago, Ill., assignor to The Fowler Car Co., Chicago, Ill.
Brake beam, 1,093,851—William C. Hedgcock, Hammond, Ind., assignor to Simplex Railway Appliance Co., Chicago, Ill.
Safety attachment for railway cars, 1,093,854—Benjamin Hoover, Meridian, Miss.
Car coupling, 1,093,858—Robert E. L. Janney, Chicago, Ill., assignor to American Steel Foundries, New York, N. Y.
Switch frog, 1,093,860—William Keller, Decatur, Ill.
Spike puller, 1,093,863—Charles H. Kugler, Cozad, Neb.
Resilient brake hanger, 1,093,864—William G. Lamb and Orange S. Lamb, Waterloo, Iowa.
Car side, 1,093,876—Charles F. Murray, Evanston, Ill., assignor to The Fowler Car Co., Chicago, Ill.
Friction draft rigging, 1,093,879—Martin A. O'Connor, Buffalo, N. Y., assignor to W. H. Miner Co., Chicago, Ill.
Rail joint, 1,093,885—James Greene Royse, Staunton, Va.
Car, 1,093,886—Frederick Seaberg, Chicago, Ill., assignor to National Dump Co., Chicago, Ill.
Cinder deflector for passenger car windows, 1,093,890—David A. Sox, Carrollton, Ga.
Mail receiving and delivering apparatus, 1,093,908—Peter A. Blomberg, Jesse Lake, Minn.
Condenser for locomotives, 1,093,942—James M. McClellon, Everett, Mass.
Roller side bearing, 1,093,953—Arnold Stucki, Pittsburgh, Pa.
Steam superheater, 1,093,954—Max Toltz, St. Paul, Minn., assignor to Locomotive Superheater Co., Wilmington, Del.
Car replacer, 1,093,960—Edwin B. Wright, Hoxie, Ark.
Truck for railroad vehicles, 1,093,966—Herman F. Ball, New York, N. Y.
Supporting arrangement for cars, 1,093,977—Michael F. Schoenberger, Los Angeles, Cal.
Locomotive sand box arrangement, 1,093,989—Charles L. Heisler, Schenectady, N. Y.
Process for rolling rail-joint bars, 1,094,053—William J. Bradley, Troy, N. Y., assignor to The Rail Joint Co., New York, N. Y.
Piston ring, 1,094,057—Arthur Chevrolet, Jackson, Mich.
Mail-bag catcher and deliverer, 1,094,095—George W. Pomeroy, Butte, Mont.
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Appointments to the Federal Reserve Board.

President Wilson announced this week his appointments to the membership of the federal reserve board, which is to have direction of the monetary and banking system of the country under the new currency law. Richard Olney, of Boston, Mass., former secretary of state, was the President's choice for governor of the board; but Mr. Olney a few days later declined the office and another appointment will have to be substituted. The other four members as nominated by the President, are as follows. Paul Warburg, a prominent banker of New York city, connected with the house of Kuhn, Loeb & Co.; Harry A. Wheeler, vice-president of the Union Trust Co., of Chicago, and president of the National Association of Commerce; W. P. G. Harding, president of the First National Bank, Birmingham, Ala.; and Dr. A. C. Miller, Flood professor of economics and commerce in the University of California, San Francisco. Secretary of the Treasury McAdoo and John Skelton Williams, comptroller of the currency, are ex-officio members. The complete board will consist of seven members, at salaries of \$12,000 a year each. The appointees will serve ten years. The law stipulates that members must be appointed with reference to the "geographical, commercial and financial divisions of the country," and the selections now made are in accordance with that provision.

Express Companies' Income Cut by Parcel Post.

As a result of institution of the parcel post eleven express companies covering a total of 302,759 miles of line, sustained a loss of 53.8 per cent in net operating income during the first six months of the current fiscal year despite a gain in mileage of over 4000 miles, as shown by figures of the Interstate Commerce Commission, analyzed by the Bureau of Railway News and Statistics. The figures, giving earnings and expenses of the express companies from July 1 to December 31, 1913, afford the first official data from which the effect on express and railway revenues of the parcel post may be ascertained. Such a result, the cutting of operating income into less than one-half of the figure attained in six months of the previous year, even before the full expansion of the parcel post to its present weight limits and before reductions in both parcel and express rates, emphasizes the advantage which has been held by the post office department, free of the commercial necessity of meeting its legitimately increased expenses due to parcel post by adequate increase in mail pay to the railways hauling the traffic. Gross business of the express companies fell from \$91,422,020 in the six months to December 31, 1912, to \$86,281,863 in the half year to December 31, 1913, a loss of over \$5,000,000. In the same time gross revenues of all the railways rose some \$10,000,000. Over a period of ten years express receipts have displayed an advance approximately twice as rapid relatively as gross railway receipts so that naturally express receipts during the six months under review should have displayed a considerable gain instead of the loss reported, even had mileage remained stationary instead of increasing 4338 miles. Payments to the railways for the six months, as a result of the drop in business, showed a contraction of \$1,722,971. As the railways receive approximately 50 per cent of the express rate for their service of hauling, their revenues from express will show a correspondingly greater contraction in the second half

year, while expenses of mail haulage will be correspondingly increased through enlarged parcel post traffic without corresponding compensation.

The Forest Products Exposition in Chicago.

An exposition of forest products was held in Chicago, at the Coliseum, beginning on April 30 and closing on May 9. There were numerous exhibits covering all manner of products of the forest, from tooth picks to paper. The most numerous class of exhibits was lumber, in which all sections of the country were represented, including Douglas fir from Washington, redwood from California, cypress and pines from the south, and cedars and hardwoods from the north. The bureau of forestry had an extensive exhibit of forest products and of means and methods of caring for the national forests. The American Wood Preservers' Association was represented by a creditable display of treated and untreated woods, piles, railway ties, etc. The same exposition will be made in New York from May 21 to 30.

Cape Cod Canal.

The Cape Cod canal will be opened for general business next November, according to an announcement made by August Belmont, president of the canal company, in Boston, last week. Mr. Belmont said that while the canal would be navigable by mid-summer, two or three months would be required to clean it up for large vessels. "It is our purpose," said Mr. Belmont, "to make the canal practically a river, furnishing a water-front where industries can develop and grow. It is doubtful whether the canal would have paid twenty years ago because of the large proportion of sailing vessels at that time. Eighty-eight per cent of the tonnage today is under its own power and can go through the canal without assistance. The toll rates for the use of the canal will be announced within a short time."

Locomotive Firebox Patent Invalidated.

The suit of John B. Tate vs. the Baltimore & Ohio R. R., which was brought for alleged infringement of the Tate Patent No. 643,560, dated Feb. 13, 1900, for a firebox expansion pad, was tried before Judge Rose and a jury in the United States District court, Baltimore, Md., on April 20, and a verdict for the defendant was rendered, under the instruction of the court, on the ground of the invalidity of the patent sued on. This suit is of importance to railroad companies generally, as it was an attempt to cover the well-known attachment of the firebox to the frames through the mud-ring instead of through the side sheets, and if it had been decided adversely to the B. & O. R. R., other of the numerous roads using this arrangement would doubtless have been attacked. It was, however, shown that such constructions had been known and in use since 1862, and the precise arrangement of the Tate patent was shown in the Sharp British patent No. 3558 of 1879. Messrs. J. L. Levy and O. E. Edwards, Jr., of New York, argued the case for the plaintiff, and Messrs. W. R. Redding and J. Snowden Bell, of New York, for the defendant.

Illinois Headlight Law Ordered Enforced.

After a series of hearings this week at which representatives of the railroads affected were allowed to present their views in the matter, the Illinois public utilities commission issued an order, on May 7, obliging all steam railroads within the state to comply by July 1 with the new electric headlight law. The statute makes requisite a light for passenger engines which will render an object clearly distinguishable 800 ft. away, and 450 ft. for freight engines. Railroad employees' organizations petitioned for enforcement of the law. The railroads had stated that they had delayed complying with the law awaiting the decision of the United States Supreme court in the Georgia headlight case. The commission says it need not be concerned about

the action the United States Supreme court may take in that decision, as the Illinois order applies to intrastate traffic.

Carelessness of the Public at Railroad Crossings.

In order to ascertain to what extent contributory negligence is responsible for accidents at railroad crossings of the public highways, a series of observations was conducted recently by the Baltimore & Ohio system which showed a reckless disregard on the part of the public for personal safety, and practically complete failure to heed the warning of watchmen, signals or crossing regulations. A record was kept at several of the busiest crossings on the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton lines, and out of a total of 32,079 instances of the railroad tracks being crossed by motor vehicles, teams and pedestrians, only 298 were received where the rule of stopping, looking and listening, or stopping to receive a signal from the watchman before proceeding were observed. This shows less than 1 per cent efficiency by the public. Of the inefficient, 18,335 persons failed to get signals and kept moving over the crossing without looking in either direction; while 8776 persons, failing to stop, looked in but one direction and 4680 other persons failed to stop and depended only upon sight to insure their safety. The observations were made at three street crossings in Cincinnati, also at North Vernon, Seymour, Vincennes and Rushville, Ind., East St. Louis, Springfield and Tuscola, Ill., and at Hamilton, Dayton and Celina, Ohio. At most of these crossings there are two or more tracks and in the larger cities an average of from 10 to 35 trains move over the crossings each hour of the day. In Cincinnati 184 motor vehicles crossed the railroad tracks without one strict observance of the rules. There were but 60 observances by teamsters of a total of 1743 vehicles that crossed the tracks, and of the 7010 pedestrians only 376 took the proper precaution against accident. About the same ratio of efficiency was displayed by people who used the crossings in the other cities and towns, although in Vincennes, 115 motor vehicles complied strictly with traffic regulations, out of a total of 135 that crossed the tracks. On the other hand, Springfield not one observance of the crossing regulations was noted out of 245 motor vehicles that passed over the railroad tracks. The best record of pedestrians was made by the citizens of North Vernon, 3176 of whom crossed the tracks with 806 instances of full observance of the rules.

Government Crop Report Very Favorable.

The crop report issued by the United States Department of Agriculture, May 7, forecasts for the coming season the largest crop of winter wheat every produced in the United States: a yield of 630,000,000 bushels. The acreage abandoned during the year was only 3.1 per cent, or 1,119,000 acres, of the area planted. This means that winter wheat will be harvested on 35,387,000 acres, 3,688,000 acres more than 31,699,000, the number of acres on which wheat was cut last year. This sets a new record. The crop as indicated for this year is one-fifth larger than that of 1913 and one-half larger than that of 1912. The indicated yield this year is 17.8 bushels an acre. The condition of the winter wheat crop as of the first of May this year is given as 95.9, compared with 95.6 on April 1 this year. The average condition of rye on May 1 was 93.4, compared with 91.3 on April 1, 91.0 on May 1, 1910, and 89.4 the average for the last ten years on May 1. The average condition of meadow (hay) lands on May 1 was 90.9, compared with 88.5 on May 1, 1913, and a ten-year average on May 1 of 88.1. Stocks of hay on farms May 1 are estimated as 7,832,000 tons (12.2 per cent of crop), as against 10,828,000 tons (14.9 per cent) on May 1, 1913, and a ten-year average on May 1 of 85.6. Of spring plowing 70.9 per cent was completed up to May 1, compared with 67.2 per cent on May 1, 1913, and a ten-year average on

May 1 of 66.6. Of spring planting 56.4 per cent was completed up to May 1, as compared with 57.0 per cent on May 1, 1913, and an eight-year average on May 1, of 54.6.

Decision on Rates to Southern and Southeastern Points.

The Interstate Commerce Commission rendered a decision, on May 7, reducing all rates from Chicago and other Illinois and middle western points to points south of the Ohio and Potomac rivers and east of the Mississippi. The ruling is that the railroads had made discriminatory rates against certain cities in order to meet water competition at other places. They were ordered to reduce the rates from Chicago to points on the Yazoo & Mississippi Valley R. R. because of undue discrimination. The rates from Chicago to intermediate points in the South, which are higher than the rates from Chicago to Gulf ports, where water competition has caused a reduction, also were ruled discriminatory and ordered reduced. The decision was handed down on an application of the carriers to maintain lower rates to the points where they faced water competition than to the intermediate points where there is not water competition. It is estimated the order will cause a decrease in revenue to the carriers involved of approximately \$16,000,000 a year.

Coal Waste for Central Station Fuel.

What is said to be the largest central-power plant in any coal field in the country is now being constructed by the Lehigh Navigation Electric Co., at Hauto, Pa. As is well known, the fine sizes of anthracite, such as buckwheat No. 3 and smaller, although containing a high content, possess but little present value at the mines. "The fundamental idea in building this power plant at Hauto," says Coal Age, "is to convert this low-priced, and, from the monetary standpoint, comparatively worthless, fuel into commercially valuable electric energy. A considerable proportion of the fuel mined in the country today is used in the generation of electricity. Particularly during the past few years the idea has been gaining force that it is cheaper to manufacture power at the mine and transmit it to the point of application than it is to ship coal over an equal distance and there convert it into electric energy in a small and isolated plant. One of the unique features of the plant is the fact that the ashes from the furnaces can be discharged direct into air-dump ash cars of standard gage that run into the building below the boiler room floor. The expense of ash disposal is thus greatly reduced."

The Mining Experiment Station at Pittsburgh.

Plans for the proposed \$500,000 experiment station of the United States Bureau of Mines, to be located in Pittsburgh, Pa., have been approved by the commission appointed by congress for that purpose. The federal government now owns the property upon which will be erected a group of buildings, especially designed and adapted for the carrying on the mine safety work and other investigations in which the Bureau of Mines is interested. The group will consist of three main buildings facing Forbes Street and the several street car lines from the uptown district. The central building of the group, the mining building, will be three stories in height, flanked by two main buildings, one the mechanical and the other chemical building. In the rear of these and inclosing a court will be the service building. Beyond the service building and spanning what is known as Panther hollow, and thus connecting the Bureau of Mines buildings with the Carnegie schools, will be two buildings over the roofs of which will pass the roadway from Forbes Street to the Carnegie School buildings and Schenley Park. Between the main group and the power and fuel group will be the entrance to a series of mine shafts. One of these will be

used as an elevator to carry heavy material and passengers from the lower level to the upper; another will be for tests of hoisting ropes and similar mining appliances; another will be an entrance to tunnels extending under the buildings and in which mining experiments, such as fighting mine fires, will be conducted. The portion of Panther hollow above the Power buildings will be arranged as a Miners' Field, the slopes of the ravine being utilized as an amphitheatre which will accommodate 20,000 spectators who may assemble

here to witness demonstrations and tests in mine rescue and first-aid. The main or Mining building will contain the administrative offices, and those of the mining force. In it will be an assembly and lecture hall, a library and smoke and other rooms for demonstrations and training in mine rescue and first-aid. The mechanical building will be for experiments and tests of mining machinery and appliances and the chemical building for investigation and analyses of fuels, explosives and various mineral substances.

Revision for Grade Reduction Between Nashville and Birmingham, L. & N. R. R.—I.

Description of an extensive project involving relocation and revision of line for reduction of grade and curvature by which the Louisville & Nashville R. R. is just completing the improvement of its main line between Nashville, Tenn., and Birmingham, Ala. The work gives practically a double-track line between these points and will result in greatly increased capacity and improved operating efficiency. The undertaking was entered upon in anticipation of increased traffic with the opening of the Panama canal, and general growth in business.

The Louisville & Nashville R. R. is completing the final portions of an extensive undertaking which involved relocation and revision for grade reduction throughout the entire 200-mile

section of its system, between Nashville, Tenn., and Birmingham, Ala. The line between these two cities has been the most congested part of the system. North of Nashville the road has a number of widely divergent lines, and south of Birmingham branches extend in various directions; but between these two points there has been but the one single-track line, with curves as sharp as six degrees and grades as heavy as 1.25 per cent, uncompensated, to carry all the traffic between northern and southern parts of the system. With a material increase of traffic in prospect due to the opening of the Panama canal, and the natural growth of business throughout this and other parts of the South, increased operating capacity

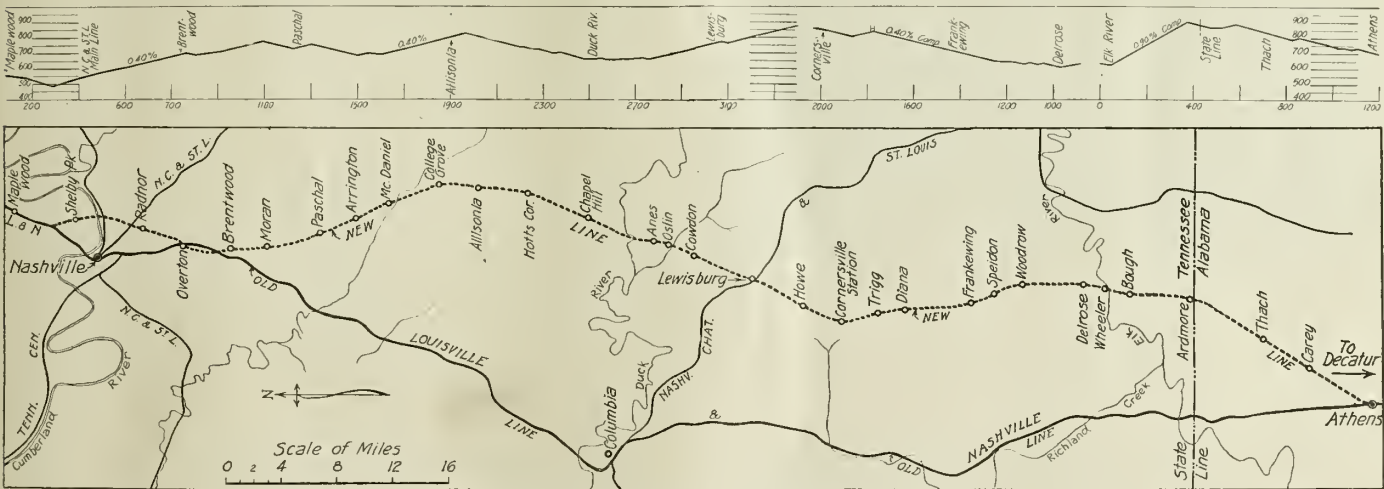


Fig. 1—Map of Louisville & Nashville R. R., Between Nashville and Athens, Tenn., Showing Old and New Locations and Profile Obtained by Improvements.

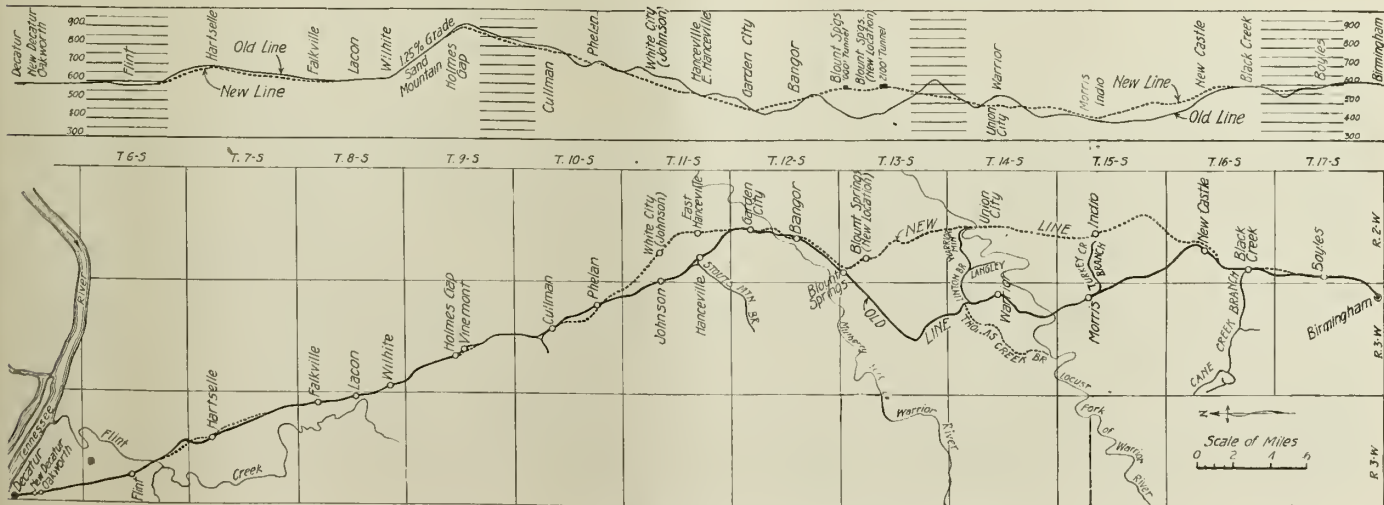


Fig. 2—Map of Louisville & Nashville R. R., Between Decatur and Birmingham, Ala., Showing Old and New Locations and Comparative Profile.



Fig. 3—Heavy Rock Cut Near Vinemont, Sand Mountain Pusher Grade, Louisville & Nashville R. R.

and improved efficiency on this part of the road were greatly to be desired; and the work now approaching completion was undertaken accordingly.

The project was separated into two parts corresponding to the two operating divisions of the line. The first comprised the division from Nashville, Tenn., south to Decatur, Ala., on the Tennessee river, a distance of 121 miles; and the second in-

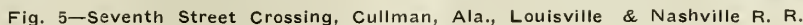
cluded the division from Decatur south to Birmingham, 86 miles. The accompanying maps, Fig. 1 and Fig. 2, respectively, show the line divided in this manner; and the profile given with each map shows the grades obtained by the improvements. The new ruling grade is 0.4 per cent in each direction for the operating division between Nashville and Decatur; and 0.5 per cent in each direction between Decatur and Birmingham. In each division there is one short pusher grade, southbound, which could not well be avoided. The maximum curvature is four degrees, although but few of the curves are sharper than three degrees. The ruling grades were made the same in each direction, for although the traffic in the two directions does not exactly balance in a year, both northbound and southbound traffic are subject to frequent fluctuations resulting from the movements of steamships at the various gulf ports.

One of the most important features of this improvement project was comprised in the work in the immediate vicinity of Nashville. A double-track cut-off line was built around this city, with three objects in view: To afford a means of detouring through freight around the congested tracks of the city; to eliminate some of the sag in the grade at the present crossing of the Cumberland river, and to provide one modern and spacious yard in place of the several small ones which were previously cramped by the demands made upon them. The new cut-off leaves the main line at Maplewood, 6.3 miles north of Nashville, and crosses the Cumberland river east of that city, on a new steel bridge. At Overtons, 6.7 miles south of Nashville, the new line joins the old one; and between this junction and the river, Radnor yard is being constructed. This will be a complete and modern divisional yard, with receiving, hump classification and advance yards in each direction; complete locomotive terminal facilities, and all other up-to-date accessories. It will include initially 52 miles of track, with space provided for a future addition of 13 miles.

The new bridge over the Cumberland river is approximately 3000 ft. long, and is comprised of a viaduct approach at each end, one 300-ft. and three 200-ft. through truss river spans, and three 135-ft. deck truss spans. The 300-ft. span is pin connected, but all the others have riveted connections. The piers are of concrete, and contain a total of about 17,500 cubic yards of material. The foundations were carried down to bed rock at a depth of 130 ft. below the base of the rail. The work was done in cofferdams of interlocking sheet steel piling under an average head of about 16 ft. of water. The concrete was mixed in plants on each bank of the river and was hauled to the various piers. The truss spans were erected on false work built with an overhead traveling stiff-leg derrick. The erection, as well as the building of the substructure was done



Fig. 4—Cut Through the City of Cullman, Ala., on Old Location, Louisville & Nashville R. R.



The contractor for this excavation was the Walton-McDowell Co., of Nashville. The material was almost entirely solid rock, and was handled with two Bucyrus, 70-ton steam shovels, with narrow gage dinkeys and side dump cars. It was necessary to maintain two overhead highway crossings during the construction of the cut. One of these afforded access to the station at

Brentwood, and in it temporary timber bents were used, which were shifted back and forth as the steam shovels advanced. The other highway already crossed by an overhead bridge, and as it could not be shifted from its location, a temporary structure was improvised from two plate girders long enough to span the whole cut, which were intended for ultimate use in one of the bridges further south along the line. The material excavated from the cut was utilized in making a fill about a mile long, south of the cut; but north of the cut there was no grading heavy enough to utilize the material and a spur was built on a trestle along the hillside, and a large amount of material wasted. A portion of this wasted material, which was rock, was used, however, by installing a crusher plant and preparing it for ballast.

From the point near Brentwood where the new line diverges from the old, it follows its independent location all the way to Athens, Ala., a distance of about 93 miles, saving a distance of

being an 80-ft. arch over Richland creek. It is built for two tracks and is 60 ft. long, with the creek channel at right angles, the bed of the water course having been changed in this respect. The arch is mass concrete, three centered, the middle and end inside radii being respectively 37 and 56 ft. The ring is $4\frac{1}{2}$ ft. thick at the top and 10 ft. at the springing line. There are no footings, the thrust being directly on the solid rock; and there are thin reinforced and buttressed end and wing walls.

South of Athens, Ala., the new location again follows the old line, and in consequence the work here consisted only in double tracking and revision of grade. This section, about 12 miles in length, extending to the junction with the Southern Ry., just north of Decatur, was selected for an interesting departure in the Louisville & Nashville's methods of handling construction work; namely, by company forces. The country here is rolling and the material was mostly earth; but the cuts

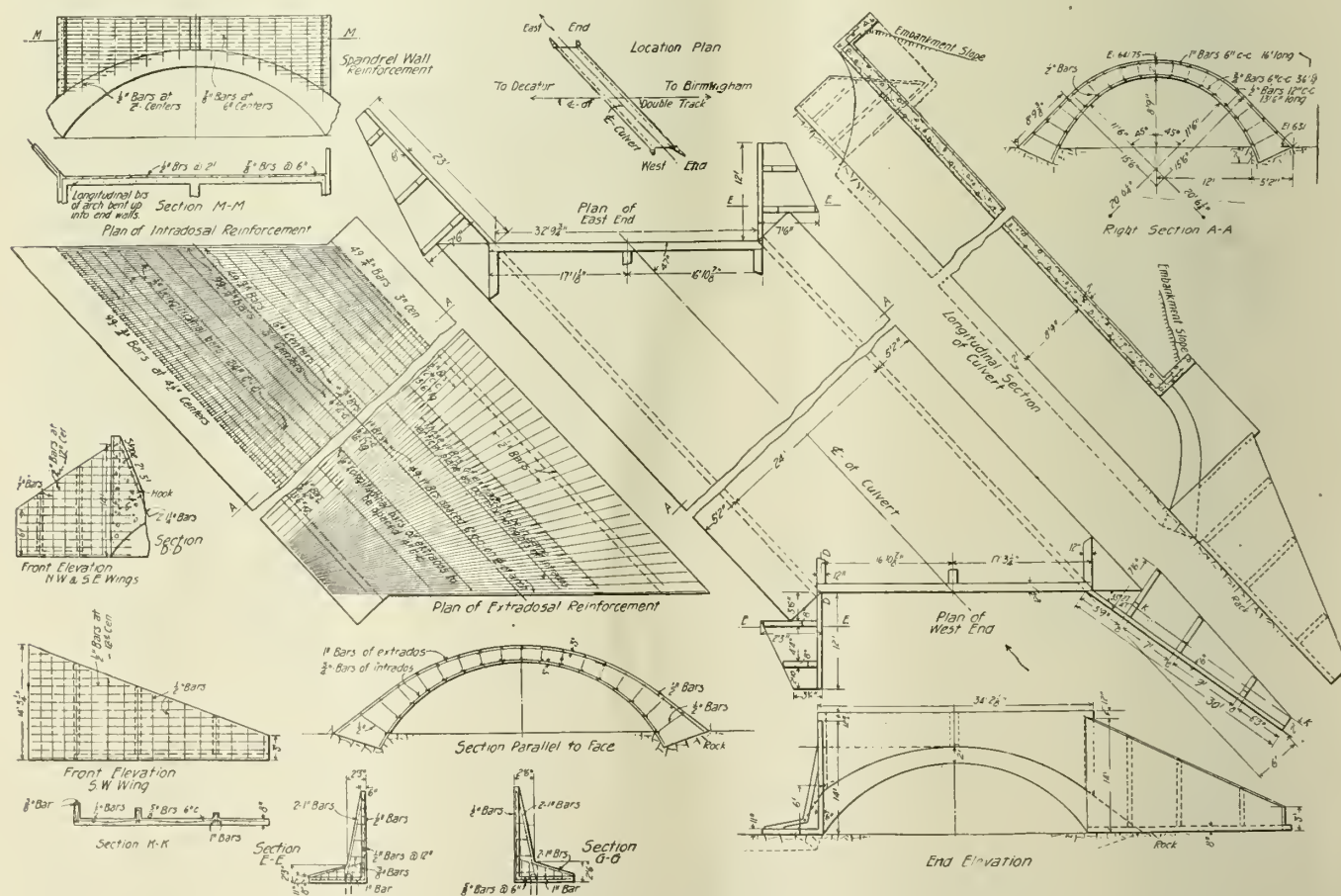


Fig. 6—Twenty-Four Foot Reinforced Concrete Arch at Hiram Creek, Louisville & Nashville R. R.

about 5 miles over the old line. The work was not excessively heavy with the exception of a few short reaches, notably a 0.9 per cent pusher grade 7 miles in length, south from the Elk river. With the foregoing exception the ruling grade here is 0.4 per cent. The maximum curvature is four degrees, and there are tangents up to six miles in length. There are two tunnels in this piece of road, in neither of which, however, were any special difficulties encountered. The longer one is located 11 miles south of Lewisburg. It is 1400 ft. long, and has an approach cut at the south end which contained 195,000 cubic yards, some of which excavated material was carried to fills as far as $1\frac{1}{2}$ miles.

There are ten open bridges between Brentwood and Athens, the principal one being that over Duck river, which is composed of three spans making a total length of 380 ft. There are a number of plain and reinforced concrete arches of various sizes, one of the largest of this type of structures

and fills were long and the quantities large, affording good opportunity for economy in using efficient methods. There was some advantage also in the use of company forces, in assuring the minimum interference with the operation of regular traffic on the old line, which, as stated above, coincided with new location. The railroad operated the following equipment in this work: One 90-ton, $4\frac{1}{2}$ -yd. Atlantic steam shovel; one Bucyrus steam pile driver; one Jordan spreader; three work trains each consisting of ten Kilbourne & Jacobs 16-yd. air operated, side dump cars; and a concreting outfit.

On this part of the work the old grade was revised and a second track added for a distance of $8\frac{1}{2}$ miles. A point $1\frac{1}{4}$ miles south of Athens is the beginning of a cut containing 75,000 cubic yards, which established the new grade 8 ft. below the old line, at the summit. What is called the Tanner cut begins $3\frac{1}{2}$ miles south of Athens. This piece of excavation extended nearly two miles and lowered the old grade a maximum of

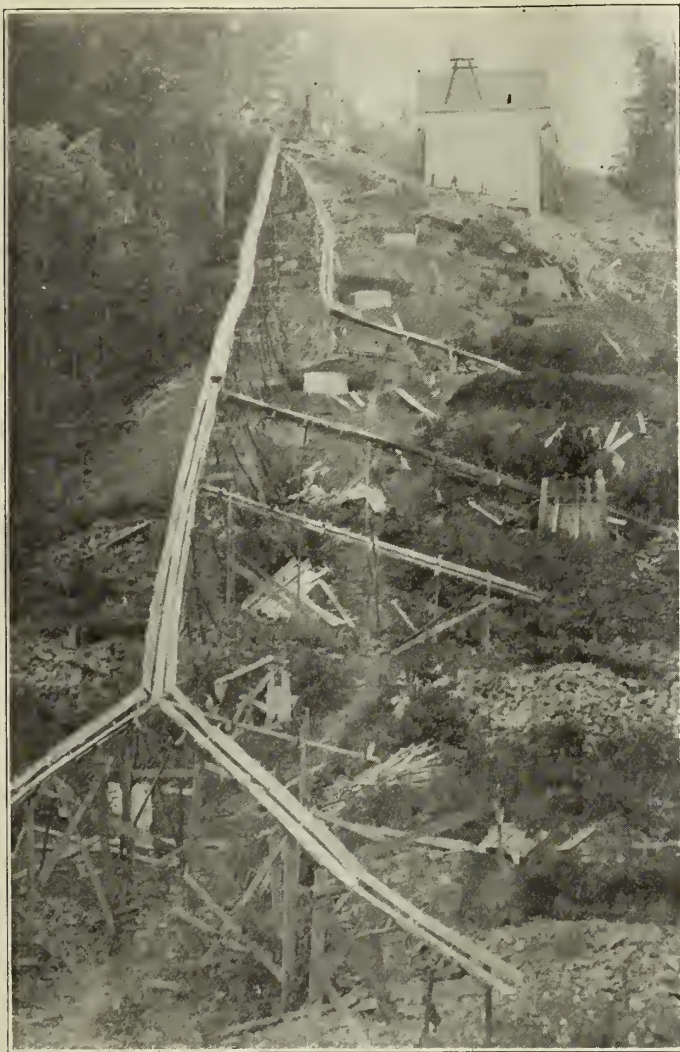


Fig. 7—Arrangement of Plant for Mixing and Distributing Concrete. 24 ft.; and as a part of the old track was located in a 6-ft. cut, the new cut was 30 ft. at the point of greatest depth, and involved 300,000 cubic yards of material. Only a comparatively small amount of concrete was required on this work.

In the vicinity of Decatur, Ala., the Louisville & Nashville has no line of its own, but uses the single track line of the Southern Ry., from a point two miles north of Decatur, including the single track bridge over the Tennessee river. The improvements at this place include a short double track cut-off which will establish a new junction point about one mile south of the old one, and reduce the length of single track to about one mile.

The work south of Decatur was done in the name of the subsidiary, the South & North Alabama R. R. The double tracking continues all the way to Cullman, with a few intermediate deviations from the main line ranging in distance from a few hundred feet to eight miles of track. Where the new alignment coincides with the old there is a difference in grade at times amounting to as much as 20 ft. Figure 2 gives the comparative profiles of the old and new locations on this part of the line.

There is at Hartselle, some 12 miles south of Decatur, a 40-ft. cut in hard rock, which contained 142,000 cubic yards. the material from which was hauled one mile north to a fill of 250,000 cubic yards. The contractor for this work and some adjacent sections was the C. G. Kershaw Contracting Co., of Birmingham, Ala.

From Wilhite to Holmes Gap, a distance of five miles, the old location followed the narrow ravines of Big Flint and Billy Flint creeks, up Sand mountain, on a grade of about 1.25 per cent. and with many curves, uncompensated. In the revision of line, about one-half the curvature is being taken out and the grades compensated on the balance; but no attempt is being made at this time to establish a lighter grade than 1.25 per cent. This will be negotiated as a pusher grade, and it is calculated will balance well with 0.5 per cent ruling grade which will prevail from Decatur south; for two ordinary road engines will be able to move up Sand mountain grade, any train that one of the engines can haul over the remainder of the division.

The old line crossed Big Flint creek once and Billy Flint creek twelve times in the immediate vicinity of Sand mountain, for the most part on open bridges. Concrete arches and heavy fills have been substituted for these bridges. The largest of the new structures are a 40-ft. three-centered arch 280 ft. long, at bridge 19, and a 20-ft. arch, 310 ft. long, at bridge 20. Bridge 19 is one mile south of Wilhite, and the new cut just south of this structure is 115 ft. deep on the center line and 145



Fig. 8—Construction of Concrete Arch and Fill Near Newcastle, Ala.

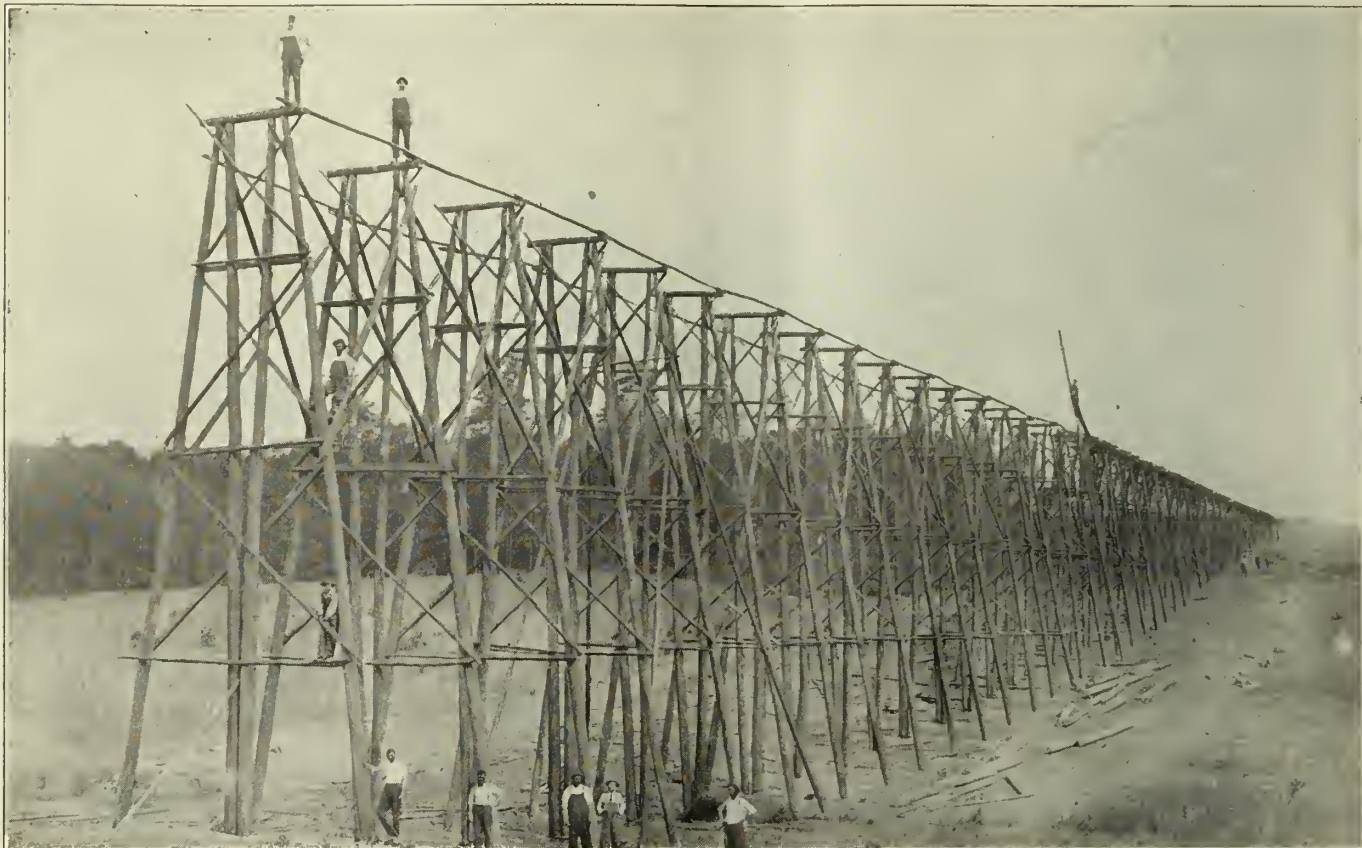


Fig. 9—Typical Temporary Trestle Used in Making Heavy Fills, Louisville & Nashville Revision for Grade Reduction.

ft. deep on the upper side. The material from this cut was used to make the fill over the concrete arch at bridge 20, which is about 3500 ft. further south. An interesting feature of the relocation at the head of the ravine was encountered where the new location was directly on the bed of the creek and three or four feet below the old track level. A new channel for the creek was excavated ten feet wide, through solid rock for several hundred feet.

The work from Wilhite to Vinemont, which embraces the Sand mountain grade, was in the general contract of Hough & Spradlin, of Knoxville, Tenn. Subcontractors for grading were M. Jones & Co., of Vinemont, Ala., and Watson Contracting Co., of Birmingham, Ala.; and for the concrete work, the J. S. Lusk Construction Co., of Knoxville, Tenn. On the work between Vinemont and Holmes Gap, E. K. Langhorn & Co., of Manteo, Va., were general contractors.

The summit of the pusher grade is at Holmes Gap, and this place is also the highest point on the line between Cincinnati and New Orleans. There is a cut here 70 ft. deep and 1900 ft. long. The material from the north end of this cut was wasted, but that from the south end was used in a fill 1000 ft. south of the cut, and a larger fill, further distant, which made an embankment 2000 ft. long and a maximum of 40 ft. high.

Through the city of Cullman, Ala., the alignment was not changed in the improvement work, but the grade of the new line is lower than the old by about five feet at the north end of the village and 20 ft. in the heart of the town. Of the seven street intersections, the most northerly was cut down and retained as a grade crossing; the next one was closed for the sake of maintaining intact a side track to an industrial plant on the high level; and the five remaining streets were carried over the tracks on 3-span reinforced concrete bridges. By these



Fig. 10—View Showing Filling from Cableway Dump and Arrangement of Plant for Mixing and Depositing Material for Concrete Arch.

bridges 22 ft. clearance over the top of the rail was obtained with only slight changes in the existing street grades. The old frame combination station at Cullman was replaced with separate brick passenger and freight stations, the latter structure being 400 by 40 ft. in dimensions.

The bridge at Seventh street, in Cullman, of which drawings are reproduced herewith, Fig. 5, is typical of all five of the structures at this place. It consists of three spans of 33 ft. each, the middle of which is occupied by the double tracks of the Louisville & Nashville, located on 13-ft. centers. The bridge carries one roadway 16 ft. wide, paved with macadam, and one sidewalk 6 ft. in width. The intermediate supports consist of reinforced concrete columns 22 ins. square, placed two in each bent. The footings for these columns are 7 ft. 3 ins. square and carried to a minimum depth of 6 ft., except where solid rock is encountered at a shallower depth. The end supports consist of reinforced columns 17 ins. square, with footing 5 ft. 3 ins. square. The floor consists of a reinforced slab of a general thickness of 13½ ins. The rails at each side of the roadway form two longitudinal girders 12 ins. thick, and of a general depth of 6 ft. 8 ins. Transverse girders are located at each bent, and with one intermediate in each span. The former girders are 3 ft. in depth at the center and the latter 3 ft. 6 ins. All of these are extended on one side to form a support for the sidewalk, which consists of a slab floor 9 ins. in thickness and an ornamental rail. The reinforcement throughout the structure consists of cold twisted steel squares. Those in the floor are generally ⅞-in. bars, those in the longitudinal girders 1¼-in. and those in the transverse girders 1-in. The in Figs. 15 and 18, respectively.

The work between Cullman and Newcastle constituted the heaviest of the whole undertaking, and there are many interesting features in the concrete arches, the bridges, tunnels and grading. The 24-ft. reinforced concrete arch at Hiram creek, a short distance south of Phelan, is a typical structure of this type. The design is shown in the accompanying illustration, Fig. 6. The channel is at an angle of 47 degrees with the track, and the arch is at the bottom of a 65-ft. fill. The inside and outside radii of the ring are 11 ft. 6 ins., and 15 ft. 6 ins., respectively, and the ring is 2 ft. thick at the top and 5 ft. 2 ins. thick at the bottom. It rests on solid rock, and the height inside is 8 ft. 9 ins. In all these structures class A concrete, of which the proportions were 1:2:4, was used for the thin reinforced sections, and for the floating box culverts entire. For the more massive reinforced parts, class B, a 1:2½:5 mix-



Fig. 11—Fill Under Construction by Means of Cableway Dump, Near Warrior River, Louisville & Nashville R. R.

ture, was used; and for foundations and mass concrete, class C mixture was used, being in the proportion of 1:3:6.

(To be continued.)

President A. C. Dinkey of the Carnegie Steel Company has affixed his signature to the following statement that is

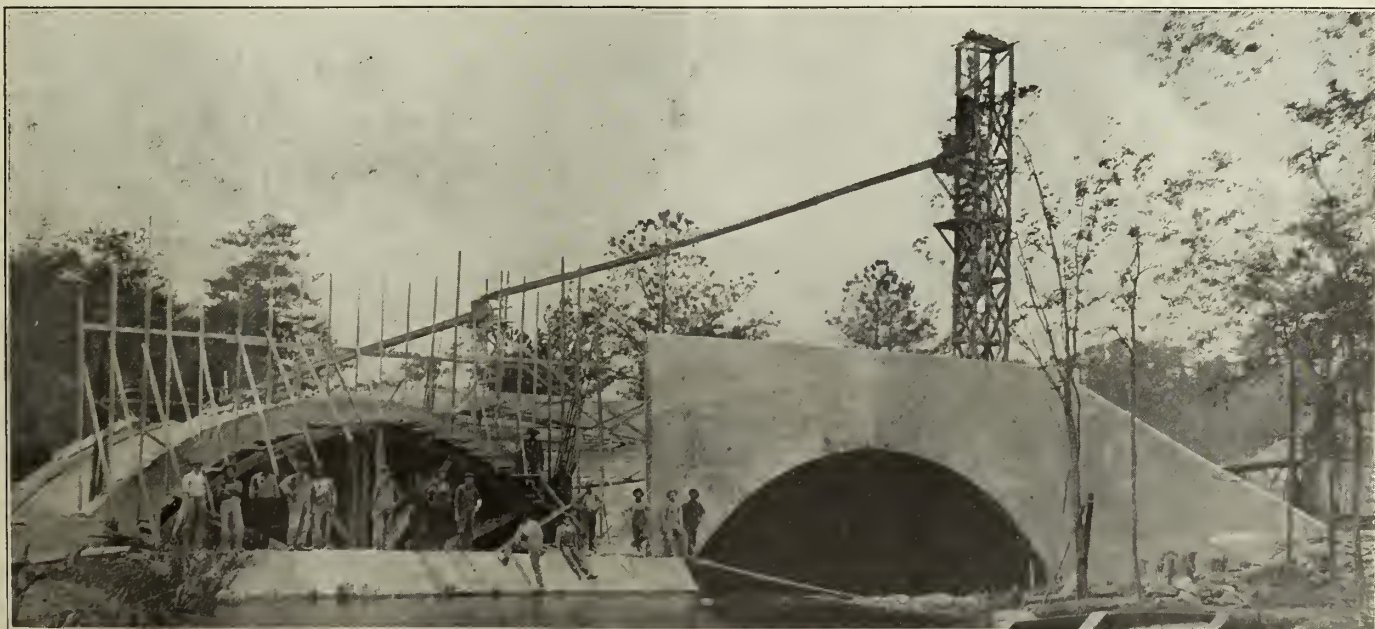


Fig. 12—Double Concrete Arch at Gurley Creek, Under Construction, Louisville & Nashville R. R.

posted in all the mills in the Pittsburgh and Youngstown (Pa.) districts: "Hereafter all promotions of whatever character will be made only from the ranks of those who do not indulge in intoxicating drink. The heads of departments and their foremen will be expected to observe this rule in advancing their men."

Important European Locomotive Development.

By F. C. COLEMAN

The photograph illustrates one of several Mallet articulated 0-8-8-0 engines, recently put to service on the Bavarian State Railways, and which are the heaviest and most powerful tank locomotives in service on any European railway system. These engines, built by Messrs. Maffei, of Munich, Bavaria, are required for pushing heavy passenger and freight trains on the severe gradients encountered on the sections between Laufach and Heigenbrücken (Würzburg-Aschaffenburg line) and Probstzella and Rothenkirchen (Bamberg-Halle), where the maximum gradient of both lines is no less than $2\frac{1}{2}$ per cent. Passenger service on these grades requires a speed of 20.5 miles per hour with a coincident tractive power of 27,000 lbs.

The weight of each of these engines is $122\frac{1}{2}$ tons, which is distributed between two groups of eight coupled driving wheels, each 3 ft. $11\frac{1}{8}$ in. diameter, and the wheelbase of

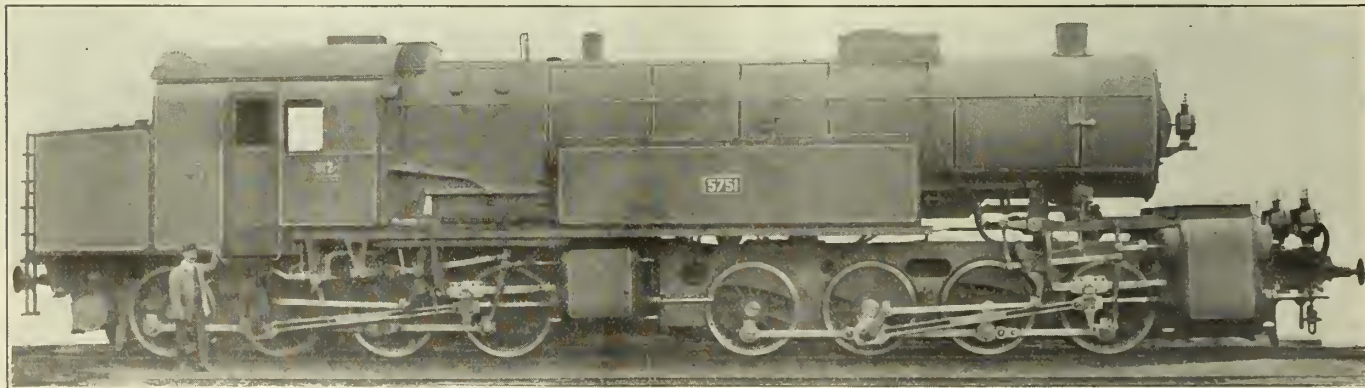
at the Bellinzona depot of the Gothard line. A great number of Mallet articulated engines have since been built in Europe for mountain lines of Switzerland, Bavaria, etc., long before the first was built by an American locomotive works in 1904, and it was two years later before the Mallet type was employed to any extent on the railways of the United States. Although the modern American types surpass the European engines in size and weight, to suit quite different premises and requirements, it is worth mentioning that the development of the Mallet articulated locomotive is the work of the Old World.

Program of the Railway Fuel Convention.

The sixth annual meeting of the International Railway Fuel Association will be held at Hotel La Salle, Chicago, May 18 to 21, inclusive. The Red room, on the 19th floor, is reserved for the convention. The large ball room adjoining has been reserved for exhibitors of locomotive appliances and supplies, mining machinery and coal handling devices. The program for the sessions is as follows:

Monday, May 18.

Morning session, 9:30 a. m. to 12:00 noon—Invocation by Dr. T. F. Dornblaser. Address of president. Address by Dr. W. F. M. Goss, chief engineer, Chicago Association of Commerce Committee on Investigation of Smoke Abatement and Electrifi-



A Continental Design of Mallet Compound Locomotive.

each group is 14 ft. 9 in. The second axle of each group has a lateral play of $\frac{5}{8}$ in. to allow the engine to adjust itself on curves of 590-ft. radius; the total wheelbase being 40 ft. The low pressure cylinders are carried on the forward flexible truck and drive on the third pair of wheels. Piston valves are provided to both sets of cylinders actuated by Heusinger (Walschaert's) valve gear. The low pressure piston valves are of special design giving double admission to the steam. The working pressure is 212 lbs. per sq. in. A Schmidt superheater supplies a steam temperature of 570 deg. F. The total heating surface is 3083 sq. ft.

The axis of the boiler is placed 9 ft. $8\frac{1}{2}$ in. above the rails, the diameter of the boiler barrel being 5 ft. $9\frac{1}{2}$ in. and its length 16 ft. $8\frac{1}{2}$ in. The smokebox, 9 ft. 6 in. in length, has a diameter of 5 ft. 11 in., and is provided with a spark arrester and an adjustable blast pipe. The commodious cab has steel sheets and windows on all sides to protect the enginemen from the weather. The tractive force exerted by the engine is 42,000 lbs., calculated with an adhesive factor of 1:16 and mean adhesion weight of 115 tons.

It is of interest to note that the Maffei Works constructed in 1890 the first Mallet articulated locomotive for the Gothard Railway, with two groups of six-coupled wheels, and this engine is still at work. This remarkable engine was thoroughly examined and studied by American engineers

cation of Railway Terminals. Report of secretary-treasurer. Appointment of committees and association business. Paper, "Honey-combing and Clinker Formation," by S. W. Parr, professor of applied chemistry, University of Illinois.

Afternoon session, 1:00 p. m. to 4:30 p. m.—Paper: "Relation of Front End Design and Air Openings of Grates and Ash Pans to Fuel Consumption and Sparks," by M. C. Hatch, superintendent of fuel service, Delaware, Lackawanna & Western R. R. Paper, "Uniform Method of Computing Locomotive Fuel Consumption for Office Statistics and Trip Performances," by C. F. Ludington, chief fuel supervisor, Atchison, Topeka & Santa Fe Ry.

Tuesday, May 19.

Morning Session, 9:30 a. m. to 1:00 p. m.—Paper, "Storage of Coal, Its Feasibility and Advantages to Producer, Carrier and Consumer," by C. C. Hall, fuel agent, Chicago & Eastern Illinois R. R. Paper, "Sizing of Coal for Locomotive Use," by Alonzo G. Kinyon, locomotive fuel engineer, Clinchfield Fuel Co.

No afternoon session.

Wednesday, May 20.

Morning session, 9:30 a. m. to 12:00 noon.—"Fuel Stations," report of standing committee, chairman, H. J. Slifer, consulting civil engineer. "Firing Practice," report of standing committee, chairman, D. C. Buell, director, railway educational bureau, Harriman Lines.

Afternoon session, 1:00 p. m. to 4:30 p. m.—Paper, "Coal

Kerr Sectional Flue Expander.

RAILWAY REVIEW

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HAROLD A. SMITH	- - - - -	Assistant Manager
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CLYDE F. BURNS	- - - - -	} Assistant Editors
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SATURDAY, MAY 9, 1914.

Col. Goethals is again embarrassed by fatuous admirers who seek to credit him with what he does not claim and does not belong to him. He is used as an argument for government ownership of railways; because he dug a ditch successfully on plans that others laid out. On the little but costly railway which he has completely under his eye, he has improved the previous extravagant fuel and lubrication records by the simple every day processes used by all roads, or practically all, at home. But "distance lends enchantment" and government lends glory to the slightest most ordinary matters of every day experience. It is so unusual for any government employee to pay any attention to economy, that when one does, a thousand sycophants fall down in adulation. He has stopped the firemen from throwing coal at monkeys along the line. He has substituted crude petroleum for watch oil on dredge chains. Let all railway men go and look and ponder and do likewise!

According to Brandeis, we now have a model school of railroading at Panama. Given forty miles of railway, \$200,000 a mile to rebuild it, six cents a mile passenger fare and the highest freight rates in the world, and what wonders have not been accomplished. Enough saving is effected in fuel and oil consumption

to pay for the special supervision required to bring it about. Actually railway men in government employ had the sense to do on the Isthmus what they had been taught to do at home. *Mirabile dictu.* Manifestly the thing to do is to starve our railways until they come to the Brandeis frame of mind and learn to pick up pins. It is a fair inference that where they have done this Mr. Brandeis would favor allowing them six cents a mile passenger fare and per ton of freight. It would be interesting to learn whether Col. Goethals himself believes that he can teach railway managers how to operate their properties more economically.

The United States senate committee on interstate commerce reported out, on May 6, the latest draft of the bill embodying the administration's views on means for the regulation of interstate trade. The bill is a comprehensive measure and more drastic than the legislation proposed by the house. It bears the title "Interstate Trade Commission bill," but prescribes legislation for the regulation of holding companies, interlocking directors, and capitalization; as well as authorization for a trade commission to be composed of five members, not more than three of whom shall be of the same political party. The members of the trade commission are to be appointed by the President and confirmed by the senate and are to hold their offices for seven years.

The text of the measure heretofore proposed upon the same subject, has been entirely redrafted and it is the understanding that the powers of the Interstate Trade Commission have been broadened considerably in the new bill. The commission is authorized to investigate the "Organization, business, financial condition, conduct, management and its relation to other corporations" of any corporation engaged in interstate commerce. Such corporations are required to furnish the commission with information, statements and records and report its financial condition, conduct, management, relation to other companies and to produce correspondence, contracts, memoranda, and other details of its business to the commission when requested to do so.

An important feature of the bill in its latest form is the provisions that no action, civil or criminal, shall be instituted against any corporation on account of an interlocking directorate or based on the charge that it is a holding company unless the corporation proceeded against has been unable to prove to the satisfaction of the Interstate Trade Commission, if it be not a common carrier, or the Interstate Commerce Commission if it be a common carrier, that it is not open to the charge. The effect of these provisos is to make every suit to be instituted against corporations under either the holding company section or the interlocking directorate section dependent primarily on the findings of the Interstate Commerce Commission or the Interstate Trade Commission. Absence

of condemnation from either of these commissions will give immunity from suit. The bill provides, however, that the finding of the commission in any case shall have "No force or effect in any suit, civil or criminal" actually brought under the Sherman law.

Construction and Maintenance in Railway Engineering.

The chief engineer of a railroad system of considerable mileage, who has been busily engaged with construction of new railroad for the past three or four years, recently made the remark that while, for many years during his early experience as a railroad engineer, he had been engaged almost exclusively with construction problems, yet not until after he had taken charge of maintenance work did he fully appreciate the real scope of the engineering questions that are involved in building a railroad. This observation is suggestive of the trend of things in engineering education at the present day, for, in reality, it would be difficult for one to discriminate precisely in the application of these two terms, or, in other words, to show where the one leaves off and the other begins.

At all times in railroad construction there has been a demand for men trained as surveyors, especially in topography, and such qualifications, combined with some knowledge of the principles of masonry and bridge construction, were, in the earlier years of railroading, considered good equipment for an engineer in charge of laying out and building a railroad. It is not unfair to say that the principal study of these early engineers was largely one of surveying; and by this no disparagement is intended, for surveying is a broad art or science involving many questions of mathematics and economics, and presenting every opportunity for the exercise of fine judgment. But railroad engineering has been a science of wonderful development, and much growth has come with the three generations that have passed since the railroad became an instrument of transportation. So far as economic questions enter into the problem of railroad construction, it is very largely the experience which comes only with the operation and maintenance of railroads which must determine the general character of the work to be laid out.

In this connection it is instructive to take into view the work of that association of railway engineering here discussed. The American Railway Engineering Association was founded on the idea of combining the engineering knowledge to be gained from the whole field of railroading, covering construction, operation and maintenance. The name given to this organization at the start was the "American Railway Engineering and Maintenance of Way Association," but at no time have any sharp distinctions been drawn be-

tween the scope of construction, on the one hand, and of maintenance on the other; and in course of time it was found desirable to even drop the words "Maintenance of Way" from the title, the single term "Engineering" having come to be understood to be sufficiently broad to cover the whole field of civil engineering work pertaining to railroads. Those who have followed the course of progress during the fourteen years of existence of this association, or any who will take the pains to look back over the published proceedings for those years, will appreciate the great fund of information which has been made available by investigations and discussions which have arisen from the intermingled thought of the men experienced in the different lines of railway engineering work. In all this there has been much consolidation of useful data and knowledge, and many conclusions have been arrived at concerning questions which long remained open or debatable for want of men experienced in the various lines to get together and assimilate the facts within the knowledge of the individuals. A great deal of knowledge has been brought to light concerning lines of engineering work or questions which were not even hinted at in the text books of fifteen years ago, and many of the conclusions which were to be found in those text books or which were disposed of by brief data or comment have been opened up anew, or materially changed or elaborated upon as the result of the work of this association.

Just a superficial glance at the program of committee work laid down for the present year in this association will reveal how incompletely the best available authorities on railway engineering covered the field before this association had gotten into working order. One of the questions assigned the committee on roadway is to "recommend means for the prevention or cure, as the case may be, of water pockets in roadbed." In former years any method of piling up earth was considered to be good enough in construction, but the engineer experienced with maintenance of a railroad has found that pockets which retain water do exist in roadbed, and means for the prevention thereof, if recommended by this committee, will be information for the benefit of engineers on construction. The committee on ballast will continue the study of the use of two kinds of material, for sub and top ballast, respectively. If it can be found that coarse material or even material of such character as would be undesirable in contact with the ties, can, for reasons of efficiency or economy, be used to advantage as a bottom layer, next the sub-grade, with material of a better or different class on top, then this also will be information which will be wanted at the time of construction.

The committee on rail has been asked to recommend standard rail sections. In former years rail sections were designed largely on theoretical considerations, mathematical as well as metallurgical, but the design

of sections for the future will be determined almost wholly as the result of observations of the engineers concerned with maintenance. The question as to the most efficient design of rail section is now perhaps as far from settlement as it was twenty years ago, and some principles of design which were then considered indispensable have lost prominence. In the years that have passed changes have come about in the magnitude of the rolling loads, in the quality of available iron ores and in processes of manufacture of rails, so that studies have to be pursued on lines somewhat different from those of former times; and the experience of the maintenance engineer and his observations on the serviceability of rails under modern conditions of traffic are now conceded to be almost the sole guide in the redesigning of rail sections.

In such manner one might go through the whole list of subjects assigned the committees of this association, and in nearly every one of them it would appear that the questions which seem to have particular applica-

tion to railroad construction will have to be studied largely from the standpoint of the maintenance engineer. While it is recognized that there is nothing in this statement that will strike railroad engineers as having anything more than the force of common knowledge, we believe it does illustrate, by way of contrast, in ways above pointed out, the general tendency in the progress of engineering education. In former times chief engineers looked principally after new construction, while division superintendents maintained the railroads. In the largest practice this has always been the policy or plan of organization of our railroads. It has long been evident, however, that the maintenance men reporting to the superintendents have been engaged in real engineering work to no smaller extent than those reporting to the chief engineer; and that which has happened in the realm of railway engineering is that the two classes of engineers have been getting together and harmonizing ideas.

Convention of the Air Brake Association

INTRODUCTORY PROGRAM.

The Air Brake Association met for its twenty-first annual convention at the Hotel Pontchartrain, Detroit, Mich., on Tuesday, May 5, 1914. The opening session was called to order at 10:00 a. m. by the president, W. J. Hatch, of the Canadian Pacific Ry., who, after the invocation and the formal welcome to the city had been delivered, proceeded with his address. As was very fitting to the occasion, Mr. Hatch availed himself of the opportunity to eulogize the late George Westinghouse, whose memory is particularly to be revered by the members of this organization. Dealing more directly with the work of the association, Mr. Hatch reviewed the various details and practices that are requiring closest attention at the present time and cited American railway statistics in comparison with those of foreign countries, to emphasize the importance of the work of the association in its relation to the world's traffic. One of the more important specific recommendations made had to do with the matter of inspection and maintenance as factors in brake efficiency, the practice of the Atchison, Topeka & Santa Fe in checking up on the condition of the brake apparatus of newly made trains, being particularly commended.

At the conclusion of the president's address, H. H. Vaughn, assistant to the vice-president of the Canadian Pacific Ry., addressed the convention informally and reminiscently as regards the history, progress, and the growing importance of the air brake art as observed by himself since becoming identified with American railway interests. W. A. Garrett, general executive officer of the Pere Marquette R. R., next addressed the convention, dwelling especially on the unfavorable situation as regards restrictive legislation and inadequate rates. The present situation, if continued, according to Mr. Garrett, will inevitably lead to government ownership of transportation utilities. To avoid this he considers three steps, either singly or in combination, immediately necessary, these being: First, an increase in rates; second, a reduction in wages; or third, assistance from the public treasury. The present unfortunate circumstances in which the Pere Marquette R. R. finds itself was accounted for by a brief outline of the factors governing the density of traffic in the territory which the road serves,

these conditions being contrasted with those existing in the more favorable territories served by such lines as those of the Pennsylvania and the New York Central Systems. The inadequate compensation for handling mail was also cited as a factor in the road's diminishing returns. Mr. Garrett also commented on the splendid results attained through the safety-first agitation, commending the Air Brake Association for its close relation thereto.

In accordance with action taken at a previous convention, the association has provided badges indicating the rank of its past presidents, and occasion was taken at this juncture to make official presentation of these badges to each of the past presidents attending the convention, C. W. Martin, Pennsylvania R. R., officiating. Nine of the past presidents were present to receive these honors, their names being in the order of their incumbency: C. C. Farmer, C. P. Cass, E. G. Desoe, J. W. Hume, L. M. Carleton, P. J. Langan, J. R. Alexander, T. L. Burton and H. A. Walther. The introductory program was concluded with the reading of the reports of the secretary and of the treasurer, these showing a present membership of something like 1200, with a cash balance in the treasury of \$1324.58.

THE CABOOSE AIR GAGE AND CONDUCTOR'S VALVE.

The first of the technical papers to be read before the convention was based on the above subject and was presented by Mark Purcell, Northern Pacific Ry. Mr. Purcell's paper follows:

"Not many years ago, the control of trains required the use of hand brakes, causing the work of operating trains to be both arduous and attended with danger. The advent and improvement of air brakes have, to a very great extent, relieved trainmen of the drudgery of former years, and shifted the responsibility for controlling trains to the engineer. Train speed is regulated more effectively, and stops can be made in much shorter distances, with air brakes, than is possible with any other practicable means yet devised; and as their almost universal use has led to their being implicitly relied upon to control trains, cases of failure are attended by correspondingly greater hazard. As trainmen are now relieved of the work of controlling speed of trains and making stops with hand brakes, it is reasonable to expect

them to exercise the necessary care and vigilance to prevent accidents or damage from possible failure of the air brakes while in their charge, and by systematically reporting defects found, insure, as far as possible, the proper operation of the appliances that afford such relief. On trains controlled with air brakes, one of the chief essentials is to know that the brake pipe is properly coupled up and charged the entire length of the train, and that the pressure is under full control by the engineer.

"The Air Gage: This points directly to the importance of having all cabooses equipped with reliable air gages, so the trainmen, when in the caboose, may at all times know the amount of pressure had in the brake pipe, and have a means of noting the variations when brakes are applied and released, and from this, together with the knowledge gained from the car-to-car inspections made in the standing tests required by the rules, be enabled to make a very close approximate of the efficiency of the brakes. The rate of rise in pressure at the rear end of the train when charging up after the brake pipe has been cut for any cause and recoupled, and when releasing brakes after ordinary applications, failure to maintain brake pipe pressure without variation while brakes are not being operated, any considerable decrease in pressure while en route without a corresponding effect of the brakes being felt, etc., are conditions that may be promptly noted; and from the knowledge that they indicate, possible or imminent danger from sliding or overheating wheels, or from the engineer not being able to properly operate the brakes throughout the entire length of the train, the trainmen are warned in time so that measures can be taken to prevent serious consequences. In fact the caboose gage places the men at the rear end of the train on an equal footing with the engineer, as to knowledge of what is taking place in the air brake system. That this is not only desirable, but necessary, for safe and economical operation, I think will not be questioned.

"The caboose gage, to give the best results, should be accurate, and not be smaller than five inches in diameter of dial, have figures of sufficient size to be easily distinguished from a distance of several feet, of good, serviceable quality of material and workmanship in all its parts, and have a tested capacity of not less than 50 per cent in excess of the maximum pressure to be put upon it in service. There are many cheap gages on the market, but they seldom render satisfactory service, and the added first cost to procure a reliable article is fully justified by the longer and better service secured. The gage should be located in the cupola, and so it can be seen from the floor in the passageway and by those occupying the cupola seats. It must be well lighted. A lamp, having a shade with an opening in it just large enough to allow the light to strike the face of the gage without interfering with the view of objects to be seen from the cupola windows, and held in place by a substantial bracket, should be provided for that purpose. A cut-out cock, having a tee handle, with a plugged pipe tee between it and the gage, should be placed in the pipe about 20 inches from the gage, to permit of removal and replacement or repairs when necessary, while the brakes are charged. The tee for the purpose of attaching a pressure recorder or a test gage. The caboose gage should be tested and repairs made sufficiently often to prevent it becoming inaccurate.

"The Conductor's Valve: Provision should be made on all cabooses for easily and quickly applying brakes at times when impending danger to life or property makes it necessary to apply them from the rear, on account of inability to make known to the engineer, the need of a prompt application. The most important features in connection with this are: that the valve be of sufficient capacity to cause quick action, and that it be located in an accessible place. Some authorities suggest providing a combination valve for

this purpose, which, when the handle is moved one way, a quick opening will be made to cause an emergency application, and when moved in the opposite direction, will cause a slow reduction and make a service application of the brakes. The writer of this paper is not in favor of using a device of that kind, on the ground that when an emergency application is desired, the operator is liable to become confused and move the handle in the wrong direction, and not become aware of his mistake until the possibility of getting quick action has been destroyed, and for the further reason that providing the service application feature would quite naturally be looked upon by trainmen as an endorsement of the practice of making stops applying brakes from the rear to avoid the inconvenience of transmitting signals to the engineer, and having the application made by means of the brake valve on the engine, which automatically provides for making the reduction at the right rate, to insure the least liability of causing undesired quick action and damage to the train. The subject of the proper use and the abuse of this device is worthy of more lengthy discussion than can be given it in this paper. However, it should be pointed out that, the fact of unwarranted damage to equipment invariably resulting from the promiscuous use of the conductor's valve, does not permit of any excuse for using it in any other than cases of emergency.

"It is our opinion that the best practical device for this purpose is a valve that can be opened quickly, and will provide a sufficient opening to insure quick action of the brakes the entire length of the train, or can be opened gradually, and a small amount, to produce a slow reduction to cause a service application, in cases of an immediate stop being necessary, and yet sufficient time available to permit of exercising care to avoid quick action of the brakes, which might, and often does, cause serious damage to the train, particularly when the quick action starts from the rear. When it is found necessary to open the conductor's valve, to apply brakes on a freight train, it should be left open until the train stops. The standard conductor's valve of the taper plug type, having a long handle and positive stops to prevent moving beyond open and closed positions, is the best for this purpose. It should be located in the cupola at the same end as the air gage. The handle to move down against the stop to close, upward to open, and point outward toward the passageway so it can be reached easily either from the passageway, or from the cupola, and yet so located that it may not be opened accidentally by being brushed against by those passing through the car. With the handle down against the stop to close, there is less liability of the valve being opened accidentally when trainmen are climbing to and from the cupola."

In the discussion of the foregoing paper, the opinions expressed were very generally favorable to the use of both the caboose air gage and the conductor's brake valve. Contrary views, however, were taken in two instances, it being charged in one case that with trainmen employed in the duties usually expected of them, they would have neither time nor occasion to observe and to manipulate these devices, and in the other, that a large percentage of the difficulty as regards break-in-twos and damage to draft apparatus which the speaker had had occasion to investigate, was traceable to ill-advised use of the brake valve by trainmen or to tampering therewith by irresponsible individuals having, in one way or another, gained access to the cabooses. On the other hand, a majority of the speakers were able to cite instances wherein the timely use of the conductor's valve had saved damage to life and equipment more than sufficient to offset the cost of installation on each of the various roads represented. These came about in various ways, such as the derailment of a car, which would be observed by the conductor, the breaking of a rail after the engine had passed over, the backing of long trains

against signals not observable by the engineer, etc. At the conclusion of this discussion, a member made the very important point that the conductor's valve is primarily a safety device and when manipulated under proper instructions, can be depended on to act as such. Further, that in view of a series of passenger wrecks during the past three years, over 2000 patents have been issued on would-be automatic train stops, some one or more of which the roads will eventually be required by law to adopt unless they avail themselves intelligently of just such devices as the conductor's valve and thereby allay the public notion that they are not of themselves capable of safeguarding the lives and property of the individuals entrusted to their care.

After the conclusion of the discussion of Mr. Purcell's paper, which was carried over into the Wednesday morning session, the secretary read the report of the meeting of the executive committee which had been held on Monday evening prior to the opening of the convention. One of the important steps taken at that meeting was the appointment of a subsidiary committee to draft resolutions on the death of George Westinghouse. L. H. Albers, New York Central & Hudson River R. R., representing this latter committee read before the convention the very fitting resolutions that had been prepared, the convention, out of respect to the memory of Mr. Westinghouse, standing during the reading of the resolution.

CLASP TYPE OF FOUNDATION BRAKE GEAR FOR HEAVY PASSENGER EQUIPMENT CARS.

Resuming the technical program, T. L. Burton delivered a discussion on the clasp type of foundation brake gear, considering the subject from the standpoint of its desirability, which he regarded as having been very thoroughly established before the Richmond convention in 1912 as well as by developments subsequent to that time, and from the standpoint of the methods of executing designs for this type of gear. The results of the exhaustive tests made by the Pennsylvania R. R. last year were cited to show the very great importance of close attention to details in the arrangement of foundation brake gear, such seemingly unimportant matters as the angularity of the brake rods and minor interferences of the rods with the car framing or other parts having been found to be of such consequence as to completely nullify the advantages to be gained by the clasp type of rigging if these discrepancies be not eliminated. In amplifying Mr. Burton's remarks, C. W. Martin mentioned some of the very essential points to be considered in the laying out of foundation gears, these including; first, absolute precaution against the possibility of brake parts dropping to the ground; second, provision for maximum braking effect with the power available; third, uniform distribution of forces among the various shoes; and fourth, uniform braking power during the life of the shoe. Mr. Burton took occasion, in closing, to emphasize the fact, as developed by his close study of the clasp-brake situation, that each individual case of foundation for clasp brakes demands attention on its own merits, as the widely varying conditions in different designs of cars are such as to preclude the general application of any one arrangement indiscriminately.

At the conclusion of the above discussion committees on nominations, constitution and by-laws and on thanks, were appointed. S. B. Hutchins, a past president of the association not present at the previous day's session, was called to the platform and formally presented with the past-president's badge. In responding, Mr. Hutchins recalled his connection with the founding of the organization and outlined for the benefit of the members present, the scope of his present interests,—air brake methods and methods and appliances for electric interurban service. His account of the amazing proportions to which this department of the work has grown proved highly interesting.

AIR HOSE.

The subject of Air Hose was presented in a paper read before the convention by T. W. Daw, Erie R. R., who reported mainly on the situation which has been developed by the Mas-

ter Car Builders' Association with their newly revised specifications which are scheduled to go into effect Oct. 1, 1914. In the general discussion of the subject, the comparative merits of hand and machine mounting methods were argued, it appearing from the remarks of several members that machine mounting is free from objections if the practice of mounting each end separately be followed. This presupposes clamps of generous proportions, and in order to be doubly assured of freedom of injury to the hose, Mr. Daw announced that the practice on his road is to mount the hose over a mandrel extending not only through the hose but into the nipple as well. The advisability of removing hose after a reasonable length of service, irrespective of its apparent ability to yield a further period of usefulness was discussed, though no definite conclusion appeared to have been reached. It was argued that many accidents chargeable to hose failures were the result of failures to hose that have already served a long period of usefulness, and which may be avoided by the removal of the hose before ultimate failure takes place. One of the roads following this practice with satisfactory results in the Duluth, Missabe & Northern, the period of service for hose on that line having been established at two years.

Before closing Wednesday's forenoon session, an interval was given over to the receiving of suggestions from members on the floor, for subjects to be given consideration at next year's convention. In the Wednesday afternoon session, Walter V. Turner, Westinghouse Air Brake Co., gave an illustrated lecture on the progressive steps and modifications whereby the present day electro-pneumatic apparatus with its sixty functions was evolved from the old straight air apparatus having but five functions. This lecture was presented with Mr. Turner's characteristic thoroughness and served as the means of conveying much enlightenment to the members respecting the characteristics of the several forms of equipment and the means whereby best results are to be obtained in their use.

(To be continued.)

Bulletin on the Locomotive Headlight Situation.

The special committee on relations of railway operation to legislation in its bulletin No. 58, issued April 23, 1914, gives a digest of the three bills at present pending in congress, having to do with the locomotive headlight situation. There is also given Mr. D. F. Crawford's testimony at the public hearing on this subject, before the house committee to which two of the three bills pending had been referred. Mr. Crawford's remarks are based both on the results of his long experience with the headlight question and on the results of the extensive investigation made some months ago by the committee on headlights for the Ameri-

Character of Headlight	Locomotives Operated			
	Passenger	Freight	Switch	Total
Electric—Arc.....	8,923	13,076	121	22,120
Electric—Incandescent.....	176	142	314	632
Acetylene.....	908	1,585	411	2,904
Oil.....	7,206	24,471	10,536	42,213
TOTAL.....	17,213	39,274	11,382	67,869

can Railway Master Mechanics' Association. This report is now ready for distribution by Mr. J. W. Taylor, secretary of the association, and members should receive copies of same within a few days.

An interesting feature of bulletin No. 58 by the special committee on relations of railway operation to legislation, is the tabulation of returns on a recent canvas of the headlight situation from which to determine the number and kinds of headlights now employed by the various roads on locomotives in the different classes of service. The re-

sults of this inquiry are as shown in the accompanying table.

Lubricating Properties of Used Oil.

The following is an account of some remarkable tests in which it was shown that if properly filtered, oil can apparently be used indefinitely without losing its lubricating properties. The physical changes undergone by used oil are commented on and are found to be such as to have no serious effect upon its value as a lubricant.

One frequently hears engineers speak of oil "wearing out" some even going so far as to maintain that after oil has been in use for a certain length of time, it should be discarded and replaced by new oil. In order to determine exactly what deterioration oil suffers when in constant use, an elaborate series of tests was made recently on different samples of oil at the laboratories of Cornell University. The sample of used oil tested was secured at the power plant of the Hotel McAlpine, New York city, which is equipped with a Richardson central oiling and filtering system, supplying flooded lubrication to a total of one hundred and thirty-four points of lubrication on the various pumps and engines in the plant. As this plant operates twenty-four hours per day, three hundred and sixty-five days per year, and the average temperature in the engine room is 100° F, the work imposed on the lubricating system is prob-

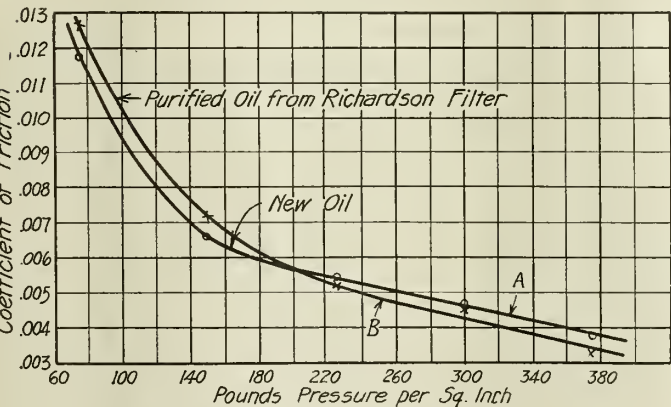


Fig. 1—Coefficient of Friction Curves, New vs. Purified Lubricating Oil.

ably as severe as can be found in any power plant. The oil used is a good grade of mineral oil, known as "Extra Brand Engine Oil."

To determine the changes undergone by the oil, a sample of the new oil as received in barrels from the manufacturers was secured and also a sample of the oil drawn off from the clean oil compartment of the filter. These samples were sealed in the engine room and shipped to the testing department at Cornell University, where without any further purification or filtration, a series of tests were made under the supervision of Professors Carpenter and Sawdon. The results of these tests are given in the accompanying tables and curves and serve to demonstrate that a modern oiling system is a very essential adjunct in any scheme of power plant equipment.

A series of friction tests were made on a Thurston railroad lubricant tester, having a hardened steel journal and bronze bearings with a total area of twenty square inches. In all tests the testing machine was run at a constant speed of about 360 r. p. m., the load being applied in increments of 1500 pounds total pressure, or 75 pounds per square inch. The test at each load was continued until the friction and temperature of the bearings had become constant. The oil was fed upon the side of the bearing through a sight feed oiler and the feed maintained as nearly constant as possible throughout all the tests. Readings were made at ten minute intervals and a large

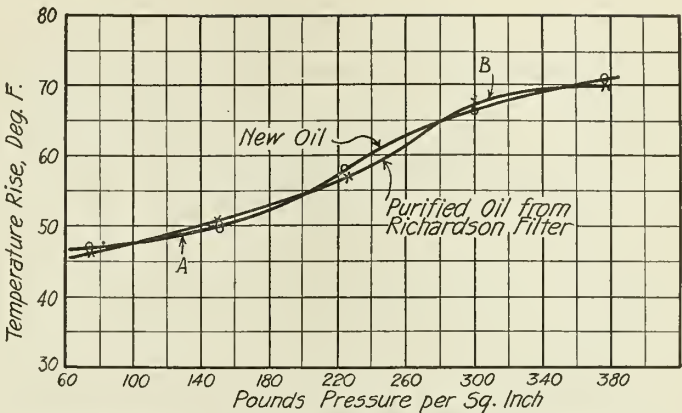


Fig. 2—Temperature Curves, New vs. Purified Lubricating Oil.

amount of interesting data secured. The summary of these tests is shown in the following tables:

Sample "A"—New Oil.					
Press., total lbs.....	1500	3000	4500	6000	7500
Press., lbs. sq. in....	75	150	225	300	375
Dur. of test, mins..	120	50	60	60	50
Temp. of bearing, max.	114.5	120.0	129.5	139.0	143.5
Temp. of room, avg..	68.2	70.7	71.5	72.5	73.0
Diff. in temp.....	46.3	49.3	58.0	66.5	70.5
Feed, drops per min..	34.8	38.4	33.6	37.0	38.2
Speed, r. p. m.....	362	361	361	361	359
Speed, ft. per min....	355	354	354	354	352
Min. coeff. of friction	.01166	.00666	.00533	.00458	.00373

Sample "B"—Oil from Filter.					
Press., total lbs.....	1500	3000	4500	6000	7500
Press., lbs. per sq. in.	75	150	225	300	375
Dur. of test, mins..	150	60	60	80	50
Temp. of bearing, max.	120	125.5	132.5	144.5	147.2
Temp. of room, avg..	74	74.8	75.3	77.0	77.5
Diff. in temp.....	46	50.7	57.2	67.5	69.7
Feed, drops per min..	38.9	40.3	37.4	40.5	41.4
Speed, r. p. m.....	363	363	360	361	358
Speed, ft. per min....	356	356	353	354	351
Min. coeff. of friction	.01265	.00717	.00522	.00458	.00367

The coefficient of friction in the above table represents the lowest value found for each load, that is as soon as a given load is applied, the coefficient is of course high at first, gradually falling off until it becomes practically constant. This latter figure is the one shown in the table and represents the value that would obtain in ordinary practice where engines operate continuously for more than an hour. The temperature readings given in the table are the highest temperature reached for each load, that is, as each new load is applied, the bearing gradually heats up until the temperature becomes practically constant. Curves showing the coefficient of friction of the new and filtered oil are shown in Fig. 1. The differences in tempera-

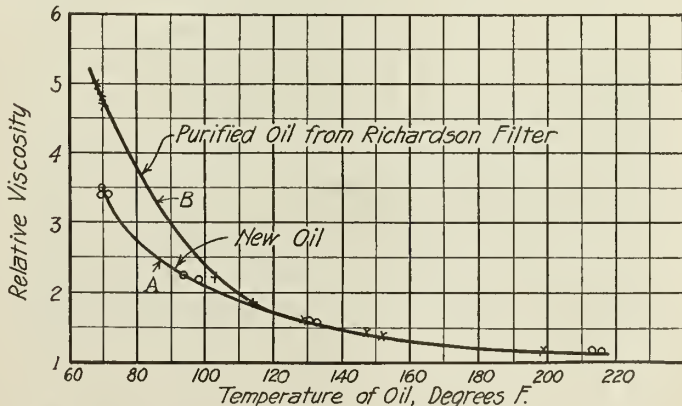


Fig. 3—Viscosity Curves, New vs. Purified Lubricating Oil.

ture between the bearings and the room have been plotted in the curves shown in Fig. 2.

The oiling system at the Hotel McAlpine plant as a whole, has been in operation for over a year and a half, and about three barrels of new oil are added to this system per month. The results of tests made to determine what physical changes, the oil may have undergone during this period are given in the following tables:

Sample "A"—New Oil.

Color: medium red, translucent.

Flash point: 410° (open cup).

Burning point: 460° F. (open cup).

Specific gravity at 60° F. water as 1=.895.

Viscosity (with Olsen viscosimeter).

Water as 1 at 60° F. Time 27.9 secs. for 100 cc.

Temperature F.	Time 100cc. secs.	Relative viscosity
70	97.0	3.48
70	96.6	3.46
71	96.2	3.45
97	59.8	2.14
94	61.8	2.21
130	45.6	1.63
132	43.8	1.57
214	34.0	1.22
215	34.2	1.225

Sample "B"—Oil from Filter.

Color: very dark red, opaque.

Flash point: 410° F. (open cup).

Burning point: 440° F. (open cup).

Specific gravity at 60° F. water as 1=.903.

Viscosity (with Olsen viscosimeter).

Water as 1 at 60° F. time 27.9 secs. for 100 cc.

Temperature F.	Time 100cc. secs.	Relative viscosity
68.0	138.0	4.94
69.0	134.0	4.80
70.0	130.2	4.66
103.0	60.4	2.16
114.0	50.6	1.81
130.0	45.0	1.62
152.0	39.0	1.40
147.5	40.2	1.44
218.0	33.2	1.19

The viscosity readings have been plotted in the form of curves as shown in Fig. 3.

From the above it is evident that the oil gained in specific gravity through constant use. This is what one would naturally expect inasmuch as the oil, in passing through the bearings, has had some of its more volatile constituents driven off, also a small quantity of cylinder oil used for lubricating the piston rods and stuffing boxes naturally finds its way into the oiling system. The viscosity curves also confirm this hypothesis as the tests show that the used oil has a higher viscosity than the new, clearly demonstrating that as oil is used over and over again in an oiling system, it actually gains in body, provided, of course, the filter thoroughly removes the water entrained.

The results of the friction tests as shown in Fig. 1 are also consistent with these physical changes. It will be noted that the new oil has a slightly lower coefficient of friction on low bearing pressures while the purified oil shows a lower coefficient on higher bearing pressures. This is due to the fact just noted, that is, the old oil, having more body, is better able to maintain a lubricating film when subjected to higher pressures. Of course, the difference between these two curves is so slight that without any fear of contradiction, one can say that for all practical purposes, properly filtered oil is as good a lubricant as new oil under all operating conditions. The curves shown in Fig. 2 are probably the ones that will be most inter-

esting to the operating engineer, as it is usually by the temperature of the bearings that he determines the quality of lubrication. As will be noted, these curves are practically superimposed and in no case is the variation more than a few degrees so that here again it is proven that filtered oil is as good as new oil.

Tests made at the McAlpine power plant to determine how much oil was circulated through the oiling system, showed that the average amount of oil handled by the system was one hundred and fifty (150) gallons per hour, or thirty-six hundred (3600) gallons of oil per day. This is an equivalent of 1800 barrels per month. It is interesting to note that although this amount of oil is supplied continuously to the bearings, it is only necessary for this plant to add to the system three barrels of oil per month. Even these three barrels, however, cannot be charged to natural shrinkage in the system, for large quantities of oil are drawn off from the filters and used in cans for the hand-oiling of small pumps, valve-gears and other bearings not connected to the oiling system. But even charging three barrels against the system it is evident that this plant pays for less than two-tenths of one per cent of the oil circulating through any given cycle and used for lubrication.

The above data were furnished by the engineering department of The Richardson-Phenix Co., lubrication engineers and manufacturers, Milwaukee, Wis.

The Turner Brazing Apparatus.

The Turner brazing apparatus consists of a seamless steel tank of 8 gals. capacity, fitted with pumps and gage, connected by hose with two oil burners, which can be used separately or concentrated on a single point. Either gasoline or kerosene can be used for fuel, and the burners can be used five hours with one filling of the tank. The burners have a powerful blast and can be operated in a hard wind without being blown out.

The outfit is used in car repair shops, roundhouses and other machine shops, and has also been found to be especially effective in clearing snow and ice from switches. The deep snow in the East this past winter made it difficult to keep switches clear at interlockings and other points, and in some of these situations the use of the Turner apparatus was found particularly advantageous. By placing the reservoir outside the tracks, as shown in the accompanying illustration, two men were able to operate



Turner Brazing Apparatus Used to Remove Snow and Ice From Switches.



Fig. 1—Front View of Hammond (La.) Coaling Station, Illinois Central R. R., with Ordinary and Extension Spouts.

the burners simultaneously, quickly thawing ice from the flange-ways of switches, frogs and guard rails.

An Extension Spout for Coaling Stations.

The usual arrangement for serving more than one main track at a coaling station is to run one or more of the tracks under the station. In the case of double track the piers, columns or other supports for the station usually come between the tracks, requiring spreading of the tracks or increased spacing at the point. There is then the objectionable feature that the station forms an obstruction to a clear view along one of the tracks, and this objection has sometimes been raised by signal engineers, who have felt obliged to make a special arrangement in the location of block signals in deference to the obstructed vision.

The T. W. Snow Construction Co., of Chicago, is now using an extension spout, which makes it practicable to build the station outside of both tracks, thus leaving the view along both tracks unobstructed, and still be able to coal a locomotive on either track. The arrangement is simple, spouts of ordinary length serving the track lying adjacent to the station, while the second track is reached by the extension spout, which spans the first track. The arrangement is shown in the accompanying photographic illustrations of a station of 500 tons' capacity recently built by the Snow company for the Illinois Central R. R. at Hammond, La., to replace an old station. The extension spout for the second track leads from an interior pocket, which is in the form of a division of the main bin. This consists of an apron or inverted "V," which divides the coal as it falls from the elevator, part going into the upper pocket, for the extension spout, and the remainder falling to the inclined bottom of the main bin, which leads to the lower spouts or those which serve the first track. The station is of the balanced bucket type, operated by an electrical plant in the small building shown in the rear view, Fig. 2.

Forest officers in Washington and Oregon plan to discontinue the use of barbed wire on their forests. This will affect their

own pastures and public drift fences. They say barbed wire has no advantage over smooth wire, that it injures stock, and that it is more likely to be borne down by soft snow. Stockmen on the Ochoco forest, in Oregon, recently constructed drift fences of smooth wire, though with some misgivings; now they say they will never use barbed wire again.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES, AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The spring session of the American Railway Association will be held at the Biltmore, Madison and Vanderbilt avenues, 43d and 44th streets, New York city, on Wednesday, May 20, at 11:00 o'clock a. m. Reports will be presented by the following committees: Executive committee, committee on transportation, committee on maintenance, joint committee on automatic train stops, committee on relations between railroads, committee on the safe transportation of explosives and other dangerous articles, committee on electrical working, and committee on nominations. The election of a president and a first vice-president will take place at this meeting. Two members of the executive committee, three members of the committee on transportation, three members of the committee on maintenance, three members of the committee on relations between railroads and three members of the committee on nominations are to be elected. Presidents, vice-presidents, general managers, general superintendents and other officials connected with companies that are members of the association are invited to be present, and may order copies of the proceedings, which are furnished them at 50 cents per copy. W. F. Allen is general secretary of the association, at 75 Church street, New York city.

The National Foreign Trade Convention will be held at Hotel Raleigh, Washington, D. C., May 27 and 28. The gathering will



Fig. 2—Rear View of Hammond (La.) Coaling Station, Illinois Central R. R., with Ordinary and Extension Spouts.

be held under the auspices of the American Manufacturers' Export Association, American Asiatic Association and the Pan American Society of the United States, and other leading commercial organizations throughout the country interested in the promotion and development of foreign trade. The purpose of the convention is to give expression to the views of men representing the productive activities of the country in regard to the more effective promotion of American commerce in the markets of the world. The papers to be presented will be prepared by men identified with the conduct of practical affairs, and will be issued in advance so as to be in the hands of delegates before the sessions at which they will be discussed. A full and free expression of sentiment from the collective membership of the convention is anticipated. Railroad equipment interests are well represented in the organization. E. V. Douglass is secretary, 66 Broadway, New York city.

At a meeting of the bridge and structural section of the Western Society of Engineers on Monday, May 11, Mr. A. T. North will present a paper on "Grading Yellow Pine Timber for Structural Purposes."

The annual convention of the Railway Development Association will be held in St. Louis, Mo., May 12 and 13. The organization contains the industrial commissioners of important roads and has 110 members. Headquarters will be at Hotel Jefferson. Among those who will speak are: C. N. Whitehead, vice-president of the Missouri, Kansas & Texas; George W. Simmons of the Simmons Hardware Co., St. Louis; W. C. Nixon, Frisco receiver in charge of operation, and A. F. Versen, industrial commissioner of the Business Men's League.

By courtesy of the McConway & Torley Co., Pittsburgh, Pa., the members of the Railway Club of Pittsburgh and their lady friends will be tendered a complimentary concert Thursday evening, May 14, at Carnegie Music Hall, Schenley Park, by the Pittsburgh Male Chorus, James Stephen Martin, director, assisted by Mrs. Elsie Gundling Duga, soprano.

At the banquet of the Transportation Club of Peoria at the Jefferson hotel, Peoria, Ill., April 30, Edward N. Hurley, vice-president of the Illinois Manufacturers' Association, spoke on trade conditions and American relations with the South American republics, lauding their efforts to settle the present difficulty between this country and Mexico. Judge John B. Cockrum, general counsel for the Lake Erie & Western Ry., spoke upon the subject "Railroads and the Public." About 200 men sat down at the banquet, at which President Dan Mowat presided.

The program for the last meeting of the summer season of the St. Louis Railway Club, Friday evening, May 7, included papers by Patrick Nelson, section foreman for the St. Louis & San Francisco R. R., and J. H. Bryan of the Westinghouse Electric & Mfg. Co.

New Plan of Railway Mail Pay Suggested.

The Committee on Railway Mail Pay has issued a pamphlet which presents a formal recommendation that has been laid before congress, as to a definite system to be followed in paying the railroads for carrying United States mail. The committee represents 264 railroads carrying mails on over 218,000 miles of line, and the pamphlet is issued by the chairman, Ralph Peters, president of the Long Island R. R. The plan suggested embodies these four main principles:

1. That the mails should be weighed annually (instead of quadrennially, as at present), and payment made for the weight and distance carried.

2. That mail apartments in railroad cars fitted up as traveling postoffices should be paid for.

3. That side and terminal messenger service between railroad stations and postoffices and other special services should be paid for.

4. That all rates of pay and conditions of service should be definite and not subject to the discretion of employees of the postoffice department.

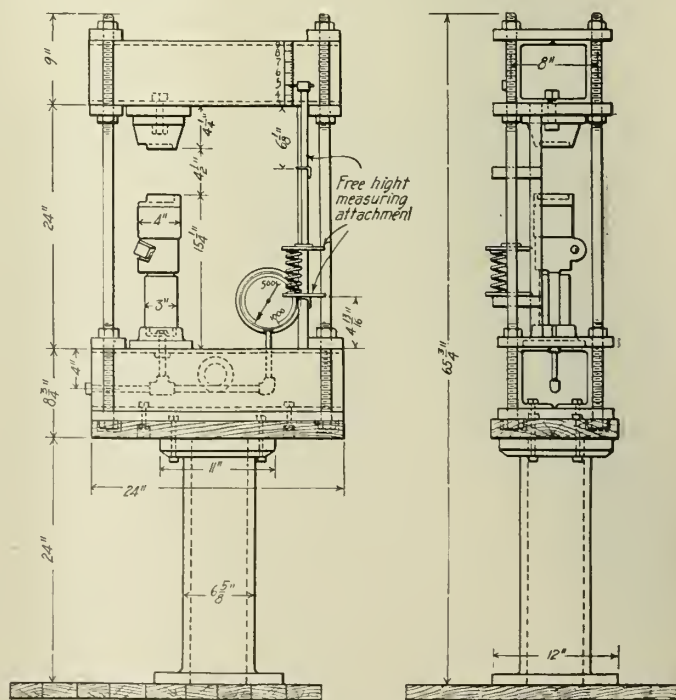
"It is the belief of railroad managers," Mr. Peters states, "that the adoption of these general principles and establishing fair units of pay will remove this complicated subject from public controversy. It would also result in payment for carrying the parcel post. The present situation is unjust and ought to be corrected. Carrying the mails has always been an important detail of railroading. The great development of the country has increased the volume and tonnage of the mails enormously, and has correspondingly intensified the burdens and responsibilities. It is the feeling of railroad managers that as soon as the American people realize the anomalous and inequitable conditions under which the railroads now carry the mails, prompt action will be forthcoming from congress to provide adequate compensation for the services performed."

Safety Valve Spring Testing Machine.

By T. F. EATON.

There was recently devised at the Mt. Clare shops of the Baltimore & Ohio R. R., at Baltimore, Md., a simple and effective device for calibrating the springs of safety valves. Its construction is such that it can be made in any shop where the simpler machine tool operations are feasible, and the fact that most of the details involved may be gathered up from among discarded parts, makes it a device that can be readily and cheaply improvised at any point where there may be use for a contrivance of this nature.

The stand on which the machine rests is made of a scrap piece of 6-in. pipe, 24 ins. long, with flanges on both ends. There are four uprights 1 in. in diameter, 40½ ins. long and threaded 11½ ins. on each end. The head and base are made from four pieces of 3½ by 6-in. channel iron 24 ins. long, held together by eight 3 by 8-in. bands of 1-in. wrought iron. A



Safety Valve Spring Testing Apparatus, Mt. Clare Shops, Baltimore & Ohio R. R.

May 9, 1914

Watson-Stillman 7-ton jack, 12 ins. high, is used by means of which to load the springs. A thread is chased on the cap of the jack which is provided with a cup to hold the spring in place. The top cap is bolted to the head and insures safety in operation by having a cup, which prevents the spring from buckling or shipping out sidewise. The cups are bored $\frac{1}{2}$ in. deep and $3\frac{1}{2}$ ins. in diameter.

The load imposed on the springs is registered on a pressure gage attached to the frame of the machine and with its pipe connection tapped into the fluid chamber of the jack. The free height measuring device is made of 1-in. angle iron, having a $\frac{1}{2}$ -in. brass rod running lengthwise through the two top arms. In measuring the springs are placed between two brass disks, one stationary, the other attached to the rod. An indicator at the top of this latter rod passes over a graduated scale on the top frame and gives the height of the spring direct.

The Pennsylvania Railroad has closed the bars in its passenger stations at Pittsburgh, Pa., and the same action will be taken at Harrisburg, and at Philadelphia, Pa., and in fact at all stations on the road. The policy hereafter will be against the sale of liquor at any place under control of the system, and is merely an extension of the policy formulated when the company stopped the sale of liquor on dining cars, and issued orders requiring employees to abstain entirely from the use of intoxicants.

Some Ideas in Track Maintenance.

Opinions of Mr. F. H. Buffmire, roadmaster Chicago, Milwaukee & St. Paul Ry., in the February, 1914, issue of the Employees' Magazine, C. M. & St. P. Ry. Importance of the labor problem, method of relaying rail, length of joint bolts, quality of ties and other questions.

In comparing the old conditions with the new I am inclined to believe that in the present day our greatest handicap is in the labor problem, in the securing of a sufficient number of men who feel that the interest to be taken in the performance of their labor should also accompany their desire for employment. I do not mean to convey the impression that in the track department to-day there are not good, industrious, conscientious, competent employees, but what I do contend is, that, taking the men in the aggregate, compared with the men of olden days, the balance scale of equality tips in favor of the old school.

One of the reasons I can advance for the fact is that in the earlier period nearly all work was performed in the nature of a challenge, one employee to the other, and the practice became one of mere physical strength and skill and a resolution not to be outdone by his fellow employee in the amount of work accomplished in a given period of time. Another reason is that many of our track laborers to-day are recruited from a foreign race, who, while their intentions and desires may be of the best, the results obtained are not as satisfactory as were those obtained from the crews manned by the men of German and Celtic descent, who were able to understand and be understood, while those of the races to-day must be communicated with and instructed through an interpreter, a very unsatisfactory and unprofitable practice for the results obtained. I will never forget the retort of the foreman of a section in the old days, of Celtic descent, who, on being complimented on the condition of his section made reply, "Yes and more trains run over my section than any other section on the division." In this belief he harbored an honest delusion, regardless of the fact that the joining sections on both ends of his section, carried the same amount of traffic with the same number of trains; yet so interested was he in his work and so wrapped in the good results he was showing, he believed his assertion to be true.

To the many faithful employees of the track department, who gave the best years of their lives, from youth until in-

capacitated by age, we must give credit for such success as we have obtained. A roadmaster's berth is no bed of roses. As a company representative he serves as a buttress for the complaints of the inhabitants tributary to the company's right of way, and the longer his period of service becomes in a fixed location and assignment of territory, the more it seems to me he loses favor, for in endeavoring to secure for his employer a just and amicable settlement of disputes, claims and controversies, in the performance of his duties, the more he is considered arbitrary, unreasonable, antagonistic to every principle of fairness, and withal a man of narrow, bigoted, sour disposition, for the only reason that he has his own views and dictates of his honest judgment to preserve.

While the position of roadmaster carries with it no overabundance of pleasures, yet there is much satisfaction and some recompense that, with all the difficulties he has to contend with, he may be producing results; and this is obtained only through the faithful, competent, energetic men in the track department, subordinate only in position, not lacking one whit in loyalty in which the roadmaster has been fortunately favored with their service and assistance. Some little credit may come to a roadmaster for the success of his administration, due perhaps to ability for organization and supervision, but the real results are accomplished by the faithful foremen and their laborers who, from day to day, year to year, and in many instances through the period of life, give their all in the performance of their duties. To these men must be given the lion's share of the credit, for without their assistance, their superior's ability counts for naught.

In the severest trial I have ever had in my position as a roadmaster, at a time when my services were taxed to the utmost, requiring a daily and almost nightly attention to the work, I think also the most difficult and largest construction over which I ever had supervision, was brought to a successful conclusion without assistance in supervision, without assistance in way of clerical duties, because the men subordinate to me worked willingly, of their own initiative, without expectancy of reward, happy in that, in the culmination of the work, their efforts and energy contributed to its success.

After these many years in the maintenance and way department, where experience has been largely my tutor and practicability issued out of its schooling, I may be pardoned perhaps, for entertaining some positive ideas concerning track maintenance and construction. I like to this day in the relaying of rail to couple up the lengths with the fastenings, bolting them into position and when the opportunity comes for placing in track, shift in an entire section, instead of placing in one rail at a time, following with fastenings and bolting. I know for a certainty, a greater number of rails can be laid in track under the former practice with the work as near perfection as under the single rail plan now generally in vogue.

I believe that the track spike for the divisions carrying the heavier locomotives and trains should be standardized to 6 $\frac{3}{4}$ -in. length. We received a consignment of such some weeks ago for trial. I believe our track bolts for certain makes of fastenings can be diminished in length and in no way affect the safety of the joint. It appears to me that a bolt that will fit through the bars and rail just long enough to permit the nut to be tightened on to it, the thickness of the nut being sufficient in length for all purposes. When necessary to remove bolt for any cause, the nut can then be removed by wrench instead of knocking off with a hammer on account of the thread end of bolt extending beyond the nut becoming corroded by the elements, preventing a removal in any other manner, reducing many bolts to a scrap value that, were it possible to remove by wrench, would be fit for replacing in the joint.

I favor a hardwood tie for its wearing qualities and the se-

curity in which the spikes remain in position after driven into this tie. We have at Pewaukee, near the freight depot, cedar ties that were placed in main track in the year 1888 fitted with plates. Twenty per cent of the original number are still in service; between Rio and East Rio we have some untreated yellow pine without plates that were placed in track in the year 1902, fifty per cent of the original number being still in service with indications of lasting a few years more before it will be necessary to replace them. While these facts are a good showing for the longevity of the softwood tie, my experience has been that the hardwood tie far surpasses the softwood in the economy of maintenance of track.

I am in hope that in the near future our push cars will be changed to a lighter type, the car of to-day weighing, on an average 810 lbs. being too heavy and cumbersome to admit of an economical handling of the work performed in connection with the car service.

I am patiently awaiting the day when our section of rail

will be changed to one of wider base and decreased height, when the material now entering into its height shall be expended in the width of the base and strengthening of the web. I presume this may be termed a hallucination and the direct opposite of scientific and theoretic argument, but to me, from a practical standpoint and for a serviceable rail, the base and web must be strengthened.

Condron Company, Monadnock bldg., Chicago, has issued Bulletin No. 4, entitled "Akme Designs as Used in Warehouses and Factories." This bulletin illustrates and describes sixteen buildings of reinforced concrete construction built on the Akme designs. The "Akme" system floors consist of a concrete slab carried on columns with flaring heads, with rectangular belts of reinforcing bars extending in two directions only. The main belts of bars between the columns are bent up into the top part of the slab over the columns and the secondary or enclosed belts are bent similarly so as to reinforce the upper part of the slab over the main belts and the bottom of slab between the latter. The bars are held in position by concrete raising blocks and supporting bars.

The Railway Supply Man's Point of View

Are the Clouds Breaking?

We know that it is darkest just before dawn, but, at the same time, when it gets so terrifically dark, it is hard to convince ourselves that it will ever get light again.

This is about the feeling just at present in the railway supply trade. Every man questions every other man whom he meets. He wants to know if there are any signs of promise. He examines every straw with a microscope to see if there is any wind blowing it, and to see if he can discover the direction of the wind.

Last week there was a little rift in the clouds, and a ray of sunshine shot through in the shape of an authentic report that one of the big railroads had released over two hundred orders which had been held up for some months past. These orders covered supplies and equipment of various kinds. The same road was also figuring on freight cars. Of course there are a few roads figuring, and that part of the authentic report is not so interesting as the fact that the large number of orders was positively released. With this comes the rumor that orders are going to be placed now by many of the roads, and the equipment which is specified will be bought to be paid for after the end of the fiscal year, June 30th.

Not that we would intimate by any manner of means that railway supply manufacturers are going to be swamped by a number of orders that are to be placed in the near future. Far be it from us to suggest a feast like that following a famine of many months. We have not been optimistic in these columns, and we have not been optimistic with ourselves, simply for the very good reason that we could see nothing to be optimistic about. However, we have reserved the right to become optimistic at the slightest indication that business was to pick up.

There is evidently every good reason to believe, from the way a number of straws are blowing, that there is to be a reasonable resumption in the purchasing on the part of railroads. We do not feel it within our province to go into all the many reasons of causes that are leading up to what we believe is a resumption of railway purchases. We are simply stating how we feel. We want to make more special reference to the attitude which we should take as railway supply men toward the slowing up of business, and the apparent prospect that it is to swing back again to more normal condition. Many manufacturers are running their plants at half their output and less. They are figuring on every possible way of economizing, and that we should

do so is only good business. Whether we are right in thinking that the pendulum has come to a stop on one side and is returning, or whether it has not yet reached its limit, is something that can only be guessed at, and while we speculate as to conditions and as to the future, there is no reason why we should allow all of our time and energy, or even a part of it, to be consumed in watching for the first small break in the dark clouds which overhang the business of the railway supply manufacturer.

Business sometimes comes back, with the return of the pendulum, with terrific force and in large quantities. The question of capacity and delivery may within the next year amount to a great deal in the securing of orders from railroads. The railroads need new equipment; they are frank in acknowledging this, and they are equally frank in admitting that they cannot afford to spend the money just at present. When they get the money, or when they know where they can get the money, it is not going to be buying in dribbles, but buying in large quantities. This necessarily must be so, because their needs even now are large. The granting of the five per cent rate increase, or the settling of the spotting charges, mean the possibility for the railroads of paying more adequate returns to their stockholders, and an opportunity for them to borrow money safely, and as money can then be obtained in large quantities, the buying is apt to be equally great.

Is it not therefore wisdom on the part of the railway supply manufacturer to "set his house in order"—in other words, clean up his manufacturing plant—go over it very carefully, look into every corner, and see that it is being operated to a maximum of efficiency, so that when orders do come, he may be prepared to get from his plant the maximum output, and take every advantage of better business conditions?

A Plea for Co-Operation in the Proposed Regulation of Business.

By ARTHUR WYMAN, ASSISTANT TO THE PRESIDENT, CHICAGO RAILWAY EQUIPMENT CO.

The question of perhaps the greatest interest among the large business problems of the past few years, has been that of how far co-operation in the conduct of business should be legalized, and how it can be applied and regulated. The legislative measures now the subject of deliberation at Washington will result in a crystallization of sentiment of one kind or another, upon

this subject. The author here gives a very careful, studious and well-balanced contribution to the thought upon the problem.

That trade agreements, under proper governmental regulation, for the stabilizing of prices, volume of output, and the equitable distribution of the fruits of production should be legalized in the public interest seems more than apparent to the close observer of business conditions. The Chamber of Commerce of the United States, comprising more than 500 constituent bodies representing an individual membership of over 200,000, had for the most striking feature of its Annual Convention in January, 1914, an address by President Charles R. Van Hise of the University of Wisconsin, who advocated the German system of permitting "restraint of trade" when not against the public interest. Likewise, the Chamber of Commerce of the State of New York, in a report adopted February 19, 1914, urged upon congress a careful study of the Canadian combines investigation act, in the form of the following resolution:

"Resolved, That the Chamber of Commerce recommends to the careful consideration of congress, as a constructive measure, a study of the Canadian combines investigation act, which furnishes a prompt, inexpensive and efficient procedure open at all times to all who believe themselves aggrieved, for their protection as producers or consumers and for the protection of the public at large from those evils which are generally associated in the public mind as connected with the modern development of trusts and monopolies, and which form the basis of what is called the trust problem; this act having proved thoroughly efficient and satisfactory in the Dominion of Canada since its enactment in May, 1910."

Perhaps no more important or serious question, at least in the business world, is now occupying the public mind or engaging the attention of congress than that of the proposed legislation looking toward control or regulation of the conduct of business. Primarily, this involves either some radical changes in the Sherman anti-trust act, its broader interpretation in the light of the more recent decisions of the United States Supreme court, or its modification in terms so clear that business men may know with a reasonable measure of certainty what they can and what they cannot do, how far they may be guided by the force of the natural laws of co-operation in industry and commerce, yet more specifically, what limitations the law would place upon them.

The manifest purposes of the Sherman law, briefly stated, are to prevent by combination, in any form, so-called "restraint of trade" or "monopoly" in commerce among the several states, for the protection of the public, and with a provision for the punishment of offenders. Passed in 1890, the first really important decision under the Sherman law was handed down by the United States Supreme court in the Knight case, in January, 1895. This decision sanctioned the acquisition (and consequent monopoly of manufacture) of the control of four independent sugar refining companies in Philadelphia by the American Sugar Refining Co., by issuing shares of its own stock in exchange for the stock of the several independent companies.

In this decision, the court drew a clean-cut distinction between the acquisition of control of manufacture, and the consequent control of the sale of the product resulting therefrom in interstate commerce. The former was held to be lawful. As to the latter, the court held that "commerce succeeds to manufacture, and is not a part of it." The defendants were not enjoined.

Subsequent decisions by the Supreme court, notably that of the Trans-Missouri Freight Association case, and the Northern Securities Co. case in 1904, seemed decidedly at variance with the doctrine sustained in the Knight case in 1895, although the latter was not reversed: This decision (Northern Securities), however, was the first to throw any real cloud of doubt upon the common belief by the business world that acquisition by an

industrial corporation of the control of its competitors stood fully approved by the Supreme court of the United States.

During the period 1895 to 1904, most of the large industrial companies and combinations were formed, in evident good faith, and based upon what the Supreme court had decided as lawful. The Knight case has never been formally reversed, although virtually and finally so in the decisions rendered in the American Tobacco and Standard Oil cases in 1911. These latter decisions have apparently broadened the interpretation of the prohibitions of the statute as to what may constitute "restraint of trade," yet modifying their effect by the adoption of the "rule of reason," which takes cognizance of degree, accompanying circumstances, etc. While some of the leading lawyers in the country hold to the belief that the Sherman law in its present status, and as it has been interpreted to date, is a better measure than any which in all probability could be substituted for it; it must be manifest that its privileges and its prohibitions are not yet sufficiently clear to bring that sense of security (to which he is clearly entitled) to the business man confronted with the problem of founding his business or his business policy on the plane of sound legal integrity and industrial and commercial expediency. Seemingly, the two are contradictory; they should be identical.

With all respect and reverence for the highest tribunal of justice in our country, does not the unhappy fact remain that the extreme difficulties of interpretation of the Sherman law (perhaps because of its very nature) leave the business world in a state of uncertainty and unrest which may very seriously hamper progress and business stability.

From a sociologic and economic point of view, it would seem that the real problem involved could be better worked out and finally solved by resorting to the employment of those natural and fundamental forces which have been such valuable contributors to all constructive effort during the entire history of civilization, chief among them that vital, splendid, human and comprehensive force which we recognize in the single word: "co-operation." The suggestion does not carry with it the idea of relieving contributive and unrestrained co-operative effort of the need of the wholesome restraint and control of law. It does, however, lead to the thought that any real reform in business and business methods must initiate itself with the people, guided primarily by principle, and supplemented by that knowledge of the wisdom of honesty as a business policy, and safeguarded by laws which will be not only of a corrective and punitive character, but which will be illuminating, instructive and regulatory: laws which will serve as logically to point out the right path as they are to assess drastic penalties upon those who, with the innocence of technical ignorance, are lead into a labyrinth of error which the state, for reasons of so-called public policy, is pleased to call criminal.

While this may seem like a altruism, and while it may be truly said that the real purpose of a law is to state that which is forbidden and not to state that which is permitted; it nevertheless seems a sad commentary on legislative intelligence that it does not find it possible to clothe its enactments in language sufficiently clear to admit of correct interpretation by business men, to say nothing of its having divided the legal fraternity into two camps of opposite views, and befogged the United States Supreme court to an extent which has caused it to permit an unreversed decision to stand for upwards of sixteen years, during which period vast business enterprises were reared on its foundation, now challenged as unsound.

It must be obvious that it is well nigh impossible to frame a statute in such concrete terms as to clearly draw the line of demarcation between "things permitted" and "things forbidden." To attempt to do so would doubtless cause confusion many times confounded. Our government would be very much in the position of the astute country school master who sought to simplify his problems of discipline by posting a list of "things forbidden" before the keen eyes of his pupils, only to discover

its stimulating effect in their clever evasions of his seemingly complete code of good conduct.

If this is true, is it not equally true that a law, to be effective, must deal only with the fundamental principles involved, such as, the motive, the result, and (if adverse to the interests of the public) the methods of correction. The real and broadly admitted purposes of the Sherman law are evidently to protect every individual in our country from imposition upon the part of business; to secure to him freedom of selection of occupation; freedom in business undertakings and the privilege of satisfying his human wants on terms which are not the result of artificially created values. Logically and economically there should be a mutuality of interest between the producer and the consumer. Any scheme of correction of existing conditions which fails to recognize this fundamental principle seems foredoomed to failure. But the concrete question is, how can this be accomplished?

To revert to the suggestion of co-operation: Our government urges that co-operation among industrial producers has gone too far; has worked injustice to the consumer primarily, and secondarily, has injured the individual in business popularly known as "the small man." Should not the attitude of our government, in so far as it relates to the distribution of the fruits of industry on the one hand and the cost of supplying all human wants on the other, recognize both as being essentially one and the same question? In its attempted solution of the present day problem, should not the government so readjust its attitude toward co-operative effort as to take clear and unprejudiced cognizance of both sides of this question?

All men in active life are, in final analysis, producers; manifestly all men are likewise consumers. What all men desire is to maintain a certain equilibrium between the fruits of their productive effort and their expenditures for the necessities of life. Particularly is this true of the wage worker, the small tradesman, the salaried man and the man individually conducting a moderate business. In other words, conditions of stability, provided they are distributed equitably, are far more conducive to the general welfare and happiness of the people than are the kaleidoscopic changes which are the logical accompaniments of periods of inflation and depression, the direct result of lack of co-operation between production and consumption.

It is a well known fact that, both in industry and commerce, the most satisfactory and profitable results (of any permanence) are accomplished under stable conditions of production and consumption, with a consequent stability of prices. Broadly speaking, buyers are divided into two classes: (1) Those who buy materials that enter into manufacture, or purchases of merchandise for re-sale. (2) Those who buy for individual consumption or to satisfy an individual, human want.

Admitting that all men are, in a sense at least, both producers and consumers: All men are logically interested in, and in the long run, benefited by, stable prices. All industries, to exist, must make a profit, a profit which returns a legitimate rate of interest on the capital employed, plus an increase or gain that compensates for the energy, ability and the many human qualities which are essential to successful production and its continued development. In industrial operations, it is much more important that the cost of raw materials or semi-finished products which enter into manufacture, be stable as a general condition, than that the manufacturer may at times be able to buy below the market, below the actual cost of production or at a price (in a depressed market) made possible only by the magnitude of his purchases.

Right here it should be noted that this latter feature is of a most dangerous character, tending toward real "restraint of trade" in its most insidious and injurious form. Stability of prices when accomplished only by the natural (and difficult to measure) laws of supply and demand, means the rare (though ideal) condition of an equilibrium between production and consumption.

But if this status is desirable under natural (accidental) con-

ditions, why is it not equally so when, to accomplish it, men must bring their individual and collective judgment to bear upon the basic question of how much to produce, and the answer to which is, the amount which can be consumed or sold.

In other words, co-operation between producers up to a point that liberally provides all of a commodity that can be absorbed seems a very legitimate and wise course to follow. To over-produce is economic waste, which all economists agree fails to benefit the people generally.

Another and most important economic advantage of stable prices is found in their equitable influence upon the average sized industry; they maintain many sources of supply and tend toward the prevention of the more or less complete monopoly of a business by a concern of sufficient size and financial strength to destroy a selling market by cutting prices, thus eliminating competitors who drop by the wayside or who are brought out on dictated terms; a preliminary to a field cleared of competition and arbitrarily seized by the survivor who exploits it on his (then) own terms. This is real restraint of trade.

It has aptly been said, that the affairs of a nation are but the affairs of an individual many times multiplied. An individual would not make more goods than his field of distribution would absorb. Why then a nation, or more concretely, the several producers of an article or commodity in common?

One of the most distributing and demoralizing factors in the conduct of a legitimate industry lies in the fact that the lack of equilibrium between production and consumption causes erratic and radical fluctuations in the prices of basic materials and commodities, with a consequent uncertainty as to cost of production and delivery over a reasonable period of time, and with a further consequent uncertainty as to what are reasonable and equitable selling prices.

Under this condition the manufacturer who has been either clever enough or lucky enough to cover his needs on the ebb of the market, is sorely tempted, under the spur of cut-throat competition, to give this advantage to his customer in the form of a selling price lower than can be met by his competitors generally, and with what results?—only to tear down the prices of his competitors sooner or later, and with the net result of a generally lower selling market to them, and to himself. Who is benefited? Nobody; he has simply succeeded in lowering the general level of prices in his industry; his own gain being the slight advantage he enjoyed in securing a certain volume of business before the effect of his action has fully exerted itself.

It has often been demonstrated that a producer of 10 to 15 per cent capacity (of the total field) can virtually make the market for the remaining 85 per cent (his competitors) and by this process. Again, who is benefited, either among the producers or buyers? Again, nobody. And why? Because the producers are all substantially on the same plane, unhappily, a lower plane. This same condition reaches the buyers in essentially the same form. If the buyers are re-manufacturers (so to speak) middlemen, or retail dealers, they have thus inherited from the first producers a condition which eventually passes to the final buyer, the individual consumer. Any temporary benefit to the consumer is soon lost in the same manner. Does not the action of the manufacturer, who seeks to gain an economically unfair advantage suggest the anomaly of the tail wagging the dog?

It is at this point, in the chain of distribution from original maker to final user, that the radical advocates of wholly unrestricted prices claim that, disastrous to the manufacturer, jobber and dealer as this process may be, it nevertheless benefits the public, that mystical individual for whom our government indulges such zealous care.

But, who is (or are) the public? Are they not producers as well as consumers? There seem to be many unthinking people who, when they speak of "consumers" and their interests, convey the impression that "consumers" are an isolated race of beings, interested only in what they buy, completely overlooking the fact that (in a composite sense) they must be producers before they can be consumers, and are consequently quite as much,

if not more, interested in the fruits of production than in the privileges of consumption and its terms. Artemas Ward is said at one time to have accosted a genial looking stranger on the street and inquired as to where he could get a square meal for 25 cents. Being courteously told, he confided to his informant that his real problem was to learn where he could get the 25 cents.

If the Sherman law or the present attitude of our government means anything to the lay mind, it suggests a live and let live policy. The practical and ultimate effect of wide open, unrestricted cut-throat competition, which many of our legislators seem to advocate, is just the reverse; it is the doctrine of the middle ages, the survival of the fittest; it is simply war.

If any discrimination as to classes is permitted in legislation (and which is more than doubtful) should it not seek first to safeguard the interests of the wage worker? Where do wages come from? From industry. What determines high or low wages? The answer is obvious: industry conducted at prices that will admit of fair wages, or the converse. What keeps industries moving steadily, at fair returns and with equitable divisions of its fruits between capital and labor? Well regulated and even production, and a reasonable return to every other factor which it includes. Why is the price of labor so vital as an economic question? First, because of the important part it plays in all industry. Second, and of vastly more importance, well paid labor means a good average, individual buying power on the part of over ninety millions of people, whence our real business and our real prosperity as a country comes. Is this not a righteous plea for co-operation?

Reverting again to the question as to how co-operation is to be initiated, used without abuse, controlled when over-reaching wholesome limits, punished when persistently indulged in unfairly. As to initiation, this will take care of itself. As to its abuse: it is well known that when this reaches serious proportions, additional competition springs up and the correction is almost automatic, although not economic.

As to the needed punishment for insistent offenders—and there need be no others, this is the simplest feature to deal with and needs no comment. But as to the really vital and important question of determining the limits of co-operation, and of controlling it within such limits: Fortunately, our country with its wonderful industrial and commercial history, has developed a class of men who, by temperament, native ability and broad experience, are amply qualified to really regulate business, on business lines, by business judgment and on sound business principles. Happily, such men (and there are many of them) have achieved their success and distinction in the business world together with abundant financial reward. There are many such men; men of the highest character, integrity and ability, who would be able to round out and supplement a successful business career, and with added honors, by serving the country on some legally established regulatory body which would, in a sense, sustain the same relation to the general business of the country and its conduct that a board of directors sustains to a corporation. The now proposed interstate trade commission is perhaps a step in the right direction. But it is only a step, and upon its personnel and the scope and character of the powers which may be given such a body, depend its measure of usefulness.

It has been suggested, and it cannot too forcibly be repeated, that the proposed regulation of business by the government can only hope to succeed by a clear, unprejudiced view of the natural rights and interests of producers as well as those of consumers; that these two should be blended and treated as the entire question; that in final analysis what should and what should not be permitted, is manifestly a question of sound business judgment; hence the able, honest and tried out business man is obviously the one to serve on such a body.

Such a body would logically occupy an intermediate position between general business and our federal courts. Its functions should be advisory both to business and to the courts; regulatory in an advisory way to business, and, when necessary, its

findings should establish the basis of any legal action which the government should take against its admitted offenders, and then only when such body had exhausted all amicable and advisory effort toward the adoption of its views.

It would seem that this vital question is too big, too important and too far reaching to place its determination in the hands of any one man; and that no legal action on the part of the government against an alleged offender should be taken on any individual official's sole judgment or sole initiative. Is not the present status of this vital question one which logically suggests co-operation in its many phases as the one great human and economic principle upon which our government may establish an equitable plane for the conduct of business?

Manufacturers' Exploitation Meeting, Convention of the Air Brake Association.

On Tuesday afternoon, May 5, at the convention of the Air Brake Association in Detroit, Mich., an interesting innovation was inaugurated in what was known as the Manufacturers' Exploitation Meeting. The time of the afternoon session was given over to the several exhibitors attending the convention, allowing each an opportunity to demonstrate his particular wares or to discuss such phases of the trade as in his opinion, warranted presentation under circumstances of this kind. As might be expected, a very interesting session was the result, the members of the association in not a few instances, taking occasion to ask question or to bring up for discussion various points in connection with the merits of the devices presented.

Among the manufacturers maintaining exhibits at the convention and availing themselves of the opportunity to appear on the convention floor were: The Flexible Railway Supply Co., Ottawa, Ont.; the Detroit Lubricator Co., Detroit, Mich.; The Ashton Valve Co., Boston, Mass.; The New York & New Jersey Lubricant Co., 165 Broadway, New York; The H. W. Johns-Manville Co., New York; The Emery Pneumatic Lubricator Co., St. Louis, Mo.; Tom Brown & Co., Chicago, Ill.; Greene Tweed & Co., New York; The Joseph Dixon Crucible Co., Jersey City, N. J.; The Leslie Co., Lyndhurst, N. J.; The Standard Heat & Ventilation Co., New York; Oliver Wilhelm, automatic safety air hose couplers, Michigan City, Ind.; The Anchor Packing Co., Detroit, Mich., and the United States Metallic Packing Co., Philadelphia, Pa.

Iron and Steel Industry.

The past week showed slight improvement in the demand for steel, due to the absolute necessity of having material to prosecute urgent work. The cut in lake ore is important. The declining tendency in steel prices on present basis of cost has run its course. This is being recognized. A fair volume of bridge steel has been ordered this week and recent inquiries denote strong probabilities of an improvement in general business at mills.

SUPPLY TRADE NOTES.

—At the recent annual election of the Bronze Metal Company, Alexander Turner was elected president and R. J. Davidson was elected vice-president.

—W. Sharon Humes, who has been associated with the General Railway Supply Co., Chicago, for the past five years as sales manager, has been retained by the Transportation Utilities Co., 30 Church street, New York city, which company acquired the entire business of the General Railway Supply Co., on April 15, as published in our issue of April 25. He will establish headquarters in Chicago and represent the new company in all of the territory west of Pittsburgh. Mr. Humes is a native of Altoona, Pa., and finished the

special apprenticeship of the Pennsylvania Railroad twelve years ago, is a graduate mechanical engineer from Purdue university and a member of American Society of Mechanical Engineers. He has had fifteen years' experience in the railway, traction and supply business and has established an identity and friendship with many railway and supply men who will be pleased to know of his continuance in the field of railway work.

—The Chicago, Burlington & Quincy R. R. has ordered Street stokers for 35 locomotives.

—Sumner J. Collins, former general superintendent of the Southern Railway and recently connected with the Rail Joint Co., died in Chicago, April 30. He was born at Oconomowoc, Wis., March 24, 1848. He learned telegraphy and at the age of 15 became night operator. Starting thus he completed 28 years of continuous service with the Chicago, Milwaukee & St. Paul Railway, advancing rapidly by promotion to various positions of responsibility in the operating department. At the time he resigned to enter the manufacturing business he was superintendent of the Chicago and Milwaukee and the Chicago-Council Bluffs divisions of this road. His services were of especial value in the building of its extension from Ottumwa, Iowa, to Kansas City, Mo. In 1891 he was induced to again enter the railway service and for three years was the general superintendent of the Chicago, Indianapolis & Louisville Ry. During his service with the Monon he handled the extremely heavy traffic occasioned by the Chicago World's Fair and made a unique record in railway operation; the Monon showing a record free from fatalities for this period of enormous traffic. Early in 1894 he became general superintendent of the Wisconsin Central Ry., which position he held for nine years. Following this he went east to the Southern Railway, taking charge as general superintendent of the Eastern Division, comprising about 4000 miles of main line. After a brief service with the Southern Railway, he became interested in the railway supply business, being associated for a number of years with the Rail Joint Company with headquarters in Chicago. Mr. Collins was a recognized authority on railroad operation. No man had a wider circle of friends among the prominent railroad men of the country. He is survived by two sons, Willis Collins of Milwaukee, Wis., and Sidney W. Collins of Pittsburgh, Pa.

RAILWAY NEWS.

Canadian Northern.—The main line of the Canadian Northern Ry. from Edmonton, Alta., to Vancouver, B. C., through Yellowhead Pass of the Rocky Mountains, will be completed and in operation early next fall, it is said. The head of steel, west of Edmonton, is now at Alpland, and rails are being laid eastward from Vancouver. There remains a gap of only 70 miles through the valley of the North Thompson river. Only a small amount of grading remains to be done on the main line. The steel is being erected for the Athabasca river bridge. It is given out that the engineering department will turn the line between Edmonton and Teller over to the operating department in June.

Chicago, Rock Island & Pacific.—The report of E. W. McKenna on the financial needs of the Chicago, Rock Island & Pacific Ry., made for the bondholders' committees, is said to place the amount required at \$65,000,000, which is exclusive of the construction of any additional lines. The question of shortening the Rock Island's Chicago-Kansas City line has been discussed from time to time and Mr. McKenna's report recommends that that work be undertaken. It is estimated that this would require an additional \$22,000,000.

The Chicago, Rock Island & Pacific Ry. Co. has filed a formal announcement with the New York stock exchange, that the semi-annual coupon of 2 per cent due May 1 on the collateral trust 4 per cent bonds would not be paid.

Great Northern.—The Great Northern Ry. plans the expenditure of about \$2,000,000 on the line from Williston, N. D., to Cutbank, Mont. Eight new stations will be built, extension of industry tracks and construction of 25 water-softening plants and about 30 steel bridges.

Illinois Central.—The Illinois Central R. R. recently awarded contract to the Robert Grace Construction Co., of

Pittsburgh, Pa., for work on second track between Fulton, Ky., and Memphis, Tenn. The maximum grade will be one-half of 1 per cent; maximum curvature, 4 degrees; about 4300 cu. yds. per mile on cuts and 18,000 cu. yds. on fills.

The Illinois Central R. R. has asked for the authority of the Illinois public utilities commission to issue \$15,000,000 of refunding bonds for improvements made and property purchased several years ago.

Kansas City, Mexico & Orient.—Edward Dickinson, former vice-president of the Kansas City, Mexico & Orient Ry., will, it is stated, become president after the receivers have been discharged. This is expected early next month following the sale of the property to the new company. It is planned to extend the road at once from Wichita, Kan., to Kansas City.

Lake Shore & Michigan Southern.—The Lake Shore & Michigan Southern Ry. has sold in London and Paris a total of about \$20,000,000 one-year notes, to be dated May 15. The proceeds will be used to meet the \$10,800,000 of sterling notes due in London on the date mentioned and to reimburse the treasury for cash used in meeting earlier maturities of the year and in various outlays for improvements.

Missouri, Kansas & Texas.—The Missouri, Kansas & Texas Ry. of Texas took over the Beaumont & Great Northern, the Texas Central, the Wichita Falls & Northwestern of Texas, the Wichita Falls & Southern and the Wichita Falls & Wellington of Texas railway companies on May 1.

Nashville, Chattanooga & St. Louis.—The Nashville, Chattanooga & St. Louis Ry. is preparing to build a short extension into Lebanon, Tenn., and will build a passenger and freight depot at that place. An officer of the company says there is no foundation to the report that the road will extend to Sparta, Tenn.

St. Louis & San Francisco.—Failure to pay interest of \$140,000 due in June, 1913, when the St. Louis & San Francisco R. R. went into the hands of a receiver, has caused that company to lose its one-half interest in the New Orleans terminal, amounting to \$8,000,000, leaving the Southern Railway in sole possession of the terminal. The appellate division of the Supreme Court so decided on May 1. In a lower court the St. Louis & San Francisco Railroad had from obtaining the other railroad's half interest.

Employment of 2000 additional men in the making of road-bed improvements on the St. Louis & San Francisco R. R. provided for by a \$1,000,000 fund, authorized by the receivers of the road, will go forward immediately, according to a report quoting E. D. Levy general manager of the railroad.

The receivers of the St. Louis & San Francisco R. R. have filed a statement with the New York stock exchange to the effect that the semi-annual coupon due May 1 on the general lien 5 per cent bonds will not be paid. Speyer & Co., however, are paying the interest on all bonds deposited with that firm.

Southern Railway.—See St. Louis & San Francisco R. R.

PERSONALS.

Samuel C. Stickney, assistant to president of the Erie Railroad, has been appointed assistant general manager, with office at 50 Church street, New York.

H. D. Mudgett has been appointed trainmaster of the Northern Pacific Ry., at Livingston, Mont., vice W. E. Berner, promoted.

E. W. Fowler, has been appointed inspector of transportation of the Chicago Great Western R. R., with headquarters at Chicago, effective May 1.

A. K. Stone has been appointed trainmaster of the Dakota division of the Great Northern Ry., at Grand Forks, N. D., vice S. J. O'Gara, transferred to the Willmar division.

A. S. Steirer has been elected auditor of the Union Terminal Co., with headquarters at Dallas, Tex.

Benjamin Campbell, vice-president of the Boston & Maine R. R., and the New York New Haven & Hartford R. R., has resigned his office with the former company.

D. R. McLennan, supervisor of the insurance fund of the Rock Island Lines, having resigned, effective May 1, the position is abolished. Paul Hevener is appointed superintendent of the insurance department.

Charlton Messick has been appointed assistant general auditor of the St. Louis Southwestern Ry., with office, at St. Louis, Mo., succeeding R. E. Kimbell, promoted. S. W. Greaves, assistant auditor of the St. Louis, Southwestern

Ry. of Texas, with office at Tyler, Tex., becomes accountant of freight and passenger charges, succeeding Mr. Mes-sick.

K. Bowerfind, former secretary-treasurer of the Texas Central R. R., at Waco, Tex., has been appointed general paymaster of the Missouri, Kansas & Texas Ry., of Texas, with headquarters at Dallas, Tex.

T. W. Hansell, superintendent of terminals of the Atlantic Coast Line R. R., at Jacksonville, Fla., has been appointed assistant district superintendent, with headquarters at Sanford, Fla.

H. A. Worcester, general manager of the Cleveland, Cincinnati, Chicago & St. Louis Ry., including the Peoria & Eastern Ry., heretofore in charge of operation only, on



William G. Besler, Elected President of the Central Railroad Company of New Jersey.

May 1 assumed charge locally of the property and business of these companies, reporting to the president at New York. By this plan there is given to the local management a more comprehensive authority in the local matters and a degree of autonomy which the circumstances of the property and its business seem to require.

William G. Besler was elected president and general manager of the Central R. R., of New Jersey, at a meeting of the board of directors, May 1, 1914. He succeeds the late George F. Baer. Mr. Besler was born March 30, 1864, at Galesburg, Ill. He entered the service of the Chicago, Burlington & Quincy R. R., in 1880, as trainmaster's clerk. He resigned in 1884 to attend the Massachusetts Institute of Technology, graduating in the class of 1888. Upon leaving college he returned to the Burlington and from 1888 to 1899 was consecutively yardmaster, chief train dispatcher, trainmaster and division superintendent. Mr. Besler left the service of the Chicago, Burlington & Quincy in 1899 and entered the service of the Philadelphia & Reading Ry., as division superintendent of their main line. A year later he was made general superintendent of the same road, and in 1902 was transferred to the Central Railroad Company, of New Jersey, as general manager. Mr. Besler has been vice-president and general manager of that company since 1903.

TRAFFIC.

J. J. McManus, assistant freight claim agent of the Northern Pacific Ry., at St. Paul, Minn., has been transferred to Tacoma, Wash., and J. M. Mooney, assistant freight claim agent at Tacoma has been transferred to St. Paul.

John D. Carter has been appointed commercial agent of the Atchison, Topeka & Santa Fe Ry., at Detroit, Mich., succeeding C. J. Kendall, assigned to other duties.

David L. Gray has been appointed assistant general traffic manager of the Erie Railroad, with office at 50 Church street, New York.

E. S. Reader, traveling freight agent of the Western Pacific Ry., has been appointed general agent of the Western Pacific Ry., Denver & Rio Grande R. R., and Missouri Pacific-Iron Mountain system, with headquarters at Reno, Nev.

C. B. Lindsay, traveling freight agent of Missouri Pacific-Iron Mountain, Denver & Rio Grande and Western Pacific railroads, at Little Rock, Ark., has been appointed commercial freight agent at Pine Bluff, Ark.

F. G. Fitz-Patrick, soliciting agent of the Chicago & North Western Ry., at Pittsburgh, Pa., has been appointed passenger agent, with office at New York.

Charles A. Brister, general freight agent of the Cleveland, Cincinnati, Chicago & St. Louis Ry., has been appointed traffic manager, with office at Cincinnati, Ohio.

ENGINEERING.

W. C. Edes, chief engineer of the Northwestern Pacific R. R., Lieut. Frederick Mears, general superintendent and chief engineer of the Panama Railroad and Thomas Riggs, Jr., of the United States coast and geodetic survey, have been appointed members of the Alaska railroad commission.

E. Von Sprecken has been appointed assistant engineer of the Atlantic Coast Line R. R., with headquarters at Savannah, Ga.

MECHANICAL.

A. C. Hinckley, whose appointment as superintendent of motive power and machinery of the Oregon Short Line R. R., was announced last week in these columns, was born in New York in 1863. He received a common school education and then attended Meads College for two years. He entered railroad work in 1885 and for six years was apprentice and machinist. He then went to the Chicago, Burlington & Quincy R. R., working as locomotive engineer out of La Crosse, Wis. Mr. Hinckley was then for three years with the Utah Central R. R. as road foreman of engines and master mechanic at Salt Lake City, Utah. He was master mechanic of the Denver & Rio Grande R. R., at Salida, Colo., for about three years. In February, 1905, he was appointed master mechanic of the Northern and Southern divisions of the Cincinnati, Hamilton & Dayton Ry., and in June of the same year he became master mechanic of the



A. C. Hinckley, Superintendent of Motive Power and Machinery of the Oregon Short Line R. R.

entire system. Mr. Hinckley was made master mechanic of the Southern Pacific Co., at West Oakland, Cal., in January, 1910, which position he has just resigned to accept appointment as superintendent of motive power and machinery of the Oregon Short Line R. R.

L. B. Wickersham, chief electrical engineer of the Oregon Electric Ry., Spokane & Inland Empire R. R., and the United Railways Co., with headquarters at Portland, Ore., has been appointed assistant general manager, and his former position has been abolished.

Mark Baer has been appointed master mechanic of the Colorado, Kansas & Oklahoma R. R., with headquarters at Scott City, Kan.

OBITUARY.

John Forrest Dillon, consulting counsel of the Western Union Telegraph Co. and formerly general counsel of the Missouri Pacific Ry., and Texas & Pacific Ry., died at his home in New York city, May 5, aged 83 years.

J. B. Smalley, assistant general manager of the second district of the Chicago, Rock Island & Pacific Ry., with headquarters at Topeka, Kan., died in that city May 8.

NEW ROADS AND PROJECTS.

Alaska.—W. C. Edes, chief engineer of the Northwestern Pacific R. R., Lieut. Frederick Mears, general superintendent and chief engineer of the Panama Railroad, and Thomas Riggs, Jr., of the United States coast and geodetic survey, have been appointed members of the Alaska railroad commission. The commission will leave with a party of assistants later this month for Alaska, to begin surveys for the proposed government railroad.

Florida.—The Seaboard Air Line Ry., says a report, has awarded contract for the construction of a line from Bartow, Fla., to a point near Lake Wales, Fla., about 25 miles, to A. D. Langford, of Bartow, Fla., formerly of Valdosta, Ga.,

Idaho.—The Spokane, Wallace & Interstate Ry., it is said, will soon let contracts for about 50 miles of grading. This is the company which was incorporated in Idaho November 27, 1906. Its incorporation was recently advertised in Paris preparatory to issuing first mortgage 6 per cent bonds, \$4,750,000 of which have been authorized. The line is projected to extend from Spokane, Wash., to Coeur d'Alene, Idaho, and thence to Wallace, Idaho, 83 miles, with 16 miles of branches, Kellogg to Warner, Wallace to Burk and Wallace to Mullan. The motive power will be either steam or electricity. The authorized capital stock is \$3,750,000 in \$100 shares. Directors at the time of incorporation: Alfred Page and A. J. Devlin, Wardner, Idaho; William L. Hall, M. J. Flohr, F. F. Johnson, H. P. Knight and John P. Gray, all of Wallace, Idaho; H. M. Thatcher, Spokane, and John A. Shafer, Indianapolis. Mr. Hall subscribing for 992 shares, the others one each.

Bids have been asked by the Oregon Short Line R. R. for grading 72 miles of right-of-way in Idaho for the proposed Snake River Belt line. See Railway Review of December 27, 1913.

Indiana.—The Cincinnati & Indiana Railroad Construction Co. has been incorporated to build the proposed railroad from Cincinnati, Ohio, to Madison, Ind.

Maryland.—Reichley Bros. & Co., Cumberland, Md., will build a logging road near Little Orleans, Md., to develop a tract of 10,000 acres.

New York.—Bills recently passed by the New York legislature to extend the time of Buffalo Frontier Terminal R. R. and the Frontier & Western R. R., to begin and finish the construction and extending the corporate existence and powers of the companies have been signed by Governor Glynn.

Tennessee.—A report says that rights of way are being obtained and subscriptions secured for a contemplated extension of the Tennessee, Kentucky & Northern R. R. from Algood via Cookeville to Sparta, Tenn., about 20 miles.

See Railway News under Nashville, Chattanooga & St. Louis Ry.

Texas.—Construction of a branch line which will touch several points on the bay shore between Houston and Galveston, Tex., has been started by the Southern Pacific Co. The line will branch off from the main line of the Galveston, Harrisburg & San Antonio Ry. about two miles west of La Porte and will follow the San Jacinto and Galveston Bay line to Seabrook, where it will again connect with the main line. Gas-electric cars will be operated over the new line.

Utah.—It is reported that the Ballard & Thompson R. R., which was recently built from Thompson, Utah, to Neslen, Utah, 5 miles, will be extended north from the latter place to the picture rock of the Navajo trail, and eventually into the Uinta country. W. T. Harris, Neslen, is superintendent.

Washington.—The Tuku Railway & Navigation Co. has been incorporated to construct a railroad from Tuku inlet, in Washington, to the boundary of British Columbia. The capital stock is \$3,000,000. William B. Herr, Frank S. Bayley and Worrall Wilson, of Seattle, Wash., are interested.

West Virginia.—The Charleston, Parkersburg & Northern R. R. will soon ask for bids for construction of the proposed 75-mile line from Parkersburg via Rockport, Sandyville, Ripley, Fairsplain, Kenna, Sissonville and Guthrie, to Charleston, W. Va. Henry H. Archer, Parkersburg, W. Va., president of the company writes that estimates will be ready about July 1, 1914. The new road will use steam for freight service. Gas-electric cars will be used for passenger service.

Electric Railways.

Plans are being considered to build an electric line from Washington C. H., Ohio, to Hillsboro and east to Columbus, Ohio. A. M. Fisher, Indianapolis, Ind., is said to be interested.

The Oil Belt Traction Co., of Oklahoma City, Okla., has applied for a franchise to enter Fort Smith, Ark. The company proposes to build a railroad from Fort Smith to Shawnee, Okla., about 150 miles. Rights of way, station sites and bonuses are being sought along the proposed route.

Officials of the Erie & Ontario Ry. who propose to build a traction line from Port Maitland, northeast through the Niagara peninsula, have been conferring with the official boards of Dunnville and Port Maitland, Ont., with reference to rights of way and sites for stations.

Contract is reported awarded to the Century Engineering & Construction Co. for building a 22-mile interurban electric line from Columbus, Kan., to Miami, Okla., via Hattenville, Okla.

The Belmont Electric Co., of Dallas, Tex., capital \$5000, has been incorporated to construct electric railroads in and near Dallas. The incorporators are: J. A. Sniders, H. W. Brouse and E. W. Morton, Jr.

The J. G. White Engineering Corp. has been retained by the Capitol Traction Co., Washington, D. C., to make complete inventory and valuation of their property. This valuation is to be made simultaneously with a valuation of all public utilities in the district by the public utilities commission of the District of Columbia, in accordance with the provisions of the Act of Congress passed March 4, 1913, creating that commission.

A new financial plan has been adopted for the Hagerstown & Frederick Ry., and Edward F. Peck, who has been president for over a year, has resigned, and Emory L. Coblenz of Frederick, Md., has again been elected to the presidency. Proposed construction that has hesitated for some time is expected to soon be undertaken. The company was lately granted an extension of time for the building of the branch from Jefferson to Brunswick, Md., seven miles.

Bankers are offering \$6,000,000 West Penn Traction Co. three-year 6-per-cent notes at 99 and interest. The purpose of the issue is to liquidate certain indebtedness incurred for new construction and acquisition of additional properties and securities. The company with part of the proceeds of these notes will expend at least \$4,000,000 during the years 1914 and 1915 for betterments and improvements, against which expenditures its first mortgage bonds will be issued and pledged as security for these notes. The company must spend out of its own funds at least 28 per cent of the cost of such new construction before drawing upon the funds provided for that purpose by the proceeds of these notes.

The San Antonio, San Jose & Medina Interurban Ry., capital \$100,000, has been incorporated in Texas to construct a line from San Jose, Bexar county, to Kirk, Tex., a distance of about 15 miles. It is proposed to operate the line with gasoline motor cars for passengers, the motors to also haul trailers for the transportation of freight. Headquarters are at San Antonio, and the officers are A. D. Powers, president; C. A. Newton, secretary; A. J. Bell, general counsel, and L. S. Powers, managing director. The Texas Construction Co., in which J. G. Miller and others are interested, will make the survey.

The South Kentucky Power Co., capital \$100,000, has been chartered in Delaware to operate with electric or other power street and interurban railways. The incorporators are F. D. Buck, G. W. Dillman and M. L. Horty of Wilmington, Del.

Foreign Railways.

Servia.—The Servian government is contemplating an extensive scheme of railway construction in Servian Macedonia, quite a number of new lines being at present under consideration. In addition to these proposals the line between Mladenovatz and Nish and between Leskovatz and Uskub, or Skoplje, as the Serbs call it, is to be rebalanced, and all the bridges and culverts are to be strengthened. At present Monastir can only be reached by rail

from Belgrade by way of Saloniki, which is in Greek territory. This difficulty will be obviated by building a line from Uskub up the Upper Vardar valley to Kalkandelen (Tetovo of the Serbs) to Gostivar, whence it will probably be extended in time to Dibra, which is, however, more readily accessible by way of the Drin. From Gostivar it will have to raise 2000 feet before dropping down to Kritchevo, whence it will run by way of Prilep to Monastir. A branch from Prilep will connect, probably by way of the lower Tsrna Reka valley, with the existing Uskub-Saloniki line at a point not far from its junction with the new Bregalnitsa valley Ry., which will serve Ihtip and Kotchane, and reach as far as Tsarevo Selo, near the new Bulgarian frontier. From Monastir a line will be constructed into the lake district past Resna and Ochrida to Struga at the head of the Drin valley. This will be the last important Servian station on the Adriatic Railway, over which Servia will enjoy certain rights in virtue of the treaty of London. The Adriatic Railway will connect Struga with the Albanian towns of Elbasan, Pekinje, and Kavaia, and reach the sea at Prince William's present capital, Durazzo. A new route to the north will leave Nish and, going by way of Prokuplje and Mrdare, will descend the Lab valley past Prishtina, and into the Kossovo Polje, where it will cross the narrow-gage Uskub-Mitrovitza Ry. The exact route of the new line is not surveyed. A French company has obtained the contract for building the section Mrdare-Prishtina. A Franco-Servian company has secured the contract for extending the narrow-gage Uskub-Mitrovitza line from its present terminus at the latter town to Rashka on the old Turko-Servian frontier. Thence it will connect with Uvatz, the frontier terminus of the Bosnian line from Sarajevo, by way of Novibazar, Sienitza, Priepolje, and Priboy. In the north a standard-gage line will connect Belgrade with the Roumanian system by way of Pozharevatz and Maidanpek to the proposed new Danube bridge at Brza Palanka. The station at Belgrade is to be enlarged and rebuilt, and a circular line around that city is likely to be constructed.

Peru—D. C. Reid has been appointed chief engineer of the Cuzco-Santa Ana Ry., known as El Ferrocarril á la Convención. Construction work has already commenced. The first section is 63 kilometers long and work on the second will follow. The total length is about 500 kilometers, with a gage of 75 centimeters. This road will follow out of Cuzco, along the Huarcondo route to the city of Santa Ana. This is virtually a local project under government administration and will be paid for by the revenue collected from the department of Cuzco, by taxes on alcohol and coca which amount to nearly £12,000 a year and a further £8000 guaranteed by the government on the basis of which a loan will be made. The work is now underway with these funds in hand.

W. L. Morkill of the Peruvian Corporation recently inspected the line of the projected Lima to Chilca railway. Mr. Morkill's presence has revived the rumors that the Peruvian Corporation will eventually take over the construction and operation of the projected railway.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Delaware & Hudson Co. has placed an order with the American Locomotive Co. for 10 Pacific (4-6-2) and 15 consolidation (2-8-0) locomotives.

—The Rutland Railroad is in the market for one switching (0-6-0) locomotive.

—The Phoenix Sand & Gravel Co. has ordered one four-wheel saddle tank (0-4-0-T) locomotive from the American Locomotive Co. The engine will have 10x16 in. cylinders, driving wheels 30 ins. and a total weight in working order of 38,000 lbs.

—The American Locomotive Co. will build the 4 80-ton electric locomotives, recently mentioned in these columns as ordered by the Butte, Anaconda & Pacific Ry. from the General Electric Co., also 3 electric trailer trucks.

—The Alabama Great Southern R. R. has ordered one superheater mikado freight locomotive (2-8-2-S type) from the American Locomotive Co. The cylinders will be 27x30 ins., driving wheels 63 ins., and a total weight in working order of 278,000 lbs.

—The Death Valley R. R. has ordered one consolidation (2-8-0) locomotive from the Baldwin Locomotive Works.

—The Kneeland-West Lumber Co., Phillips, Wis., has ordered one prairie (2-6-2 type) locomotive from the Baldwin Locomotive Works.

—The Maryland & Pennsylvania R. R. has ordered 2 consolidation (2-8-0) locomotives from the Baldwin Locomotive Works.

Freight Cars.

—The Lehigh & New England R. R. has ordered 9 cabooses from the American Car & Foundry Co.

—The Bethlehem Steel Co. is inquiring for 50 ore cars.

—The Kansas City Southern Ry. is in the market for 150 ballast cars.

—The Red River Lumber Co., Westwood, Cal., has ordered 60 logging cars, 80,000 lbs. capacity, from the Seattle Car & Foundry Co., Seattle, Wash.

—The Norfolk & Western Ry. will build 65 caboose cars in its own shops.

—The Delaware, Lackawanna & Western R. R. is inquiring for 500 50-ton steel hopper cars, and 100 36-ft. and 100 40-ft. 60,000 lbs. capacity automobile cars.

Passenger Cars.

—The Union Pacific R. R., reported in the Railway Review of March 21, as preparing to purchase about 200 passenger cars, has issued inquiries for 107 cars.

—The Chicago, Milwaukee & St. Paul Ry. has ordered 4 parlor cars, 2 cafe-observation and 2 parlor-observation cars from the Barney & Smith Car Co. Bids are now being received on 29 cars mentioned in the Railway Review of April 18.

Iron and Steel.

—The Erie Railroad has ordered 14,000 tons of rails. Of this amount 12,000 tons go to the Carnegie Steel Co. and 2000 tons to the Illinois Steel Co.

Bridges.

—The Chesapeake & Ohio Ry., according to report, has issued inquiries for 10,000 tons of steel for the proposed bridge over the Ohio river at Portsmouth, Ohio.

—The St. Louis & San Francisco R. R. has ordered 142 tons of bridge steel from the Virginia Bridge & Iron Co.

—The Lake Shore & Michigan Southern Ry. is reported as ordering 800 tons of steel from the Mt. Vernon Bridge Co.

—The Duluth, South Shore & Atlantic Ry. has awarded contract to Frankman Bros., Minneapolis, Minn., for 368 tons of steel for viaducts at Brimley, Mich., and Middle River, Wis.

—The Washington Southern Ry., according to report has ordered 2200 tons of bridge material from the Phoenix Iron Works.

—The Oklahoma, New Mexico & Pacific Ry. has awarded contract for the construction of three bridges to J. J. Harrison, Muskogee, Okla.

—The Great Northern Ry., it is said, plans to spend \$2,000,000 for improvements including 30 steel bridges on its line between Cutbank, Mont., and Williston, N. D.

—The Morgantown & Wheeling Ry. plans the construction of 7 steel bridges and culverts.

—Brazoria county, Texas, asks bids at the office of J. W. Munson, county judge, Angleton, Texas, until May 11 for the construction of the previously mentioned steel and concrete bridge across Brazos river between Velasco and Freeport. The expense is to be borne jointly by Brazoria county and the Houston & Brazos Valley R. R.

—The Illinois Central R. R. will construct three plate-girder bridges, 60, 80 and 108 ft. long, on its line between Fulton, Ky., and Memphis, Tenn.

—The Chicago & North Western Ry. will build a steel bridge across East branch river at Fond du Lac, Wis.

—Local authorities of La Cross, Wis., are reported to have approved plans of Chicago, Milwaukee & St. Paul Ry. for a viaduct to be erected at Rose street in that city, to cost approximately \$83,300.

—Steps are being taken by the city council of South Bend, Ind., to secure the elevation of the tracks of the Lake Shore & Michigan Southern Ry. and the Grand Trunk Ry. through the city.

—The Oregon Short Line R. R. will build a viaduct at Third North street, Salt Lake City, Utah.

—Serious damage from floods has been reported from the Southwest. A new bridge of the Chicago, Rock Island & Pacific Ry. over the Canadian river at Bridgeport, Okla., it is said, was swept away May 3.

Buildings, Terminals, Etc.

—The Norfolk & Western Ry. is reported as taking bids on steel for shop extensions at Roanoke, Va. About 700

tons are involved, including bridges and an inspection building in West Virginia.

—The Chicago & North Western Ry. is preparing to build a new freight depot at Green Bay, Wis., at a cost of about \$50,000.

—The new yards which the Florida East Coast Ry. plans to construct at Buena Vista, near Miami, Fla., will have a capacity of 1200 cars. A round house and shops, it is said, will also be built.

—The Connecting Terminal R. R. has awarded contract to the Monarch Engineering Co., Buffalo, N. Y., for the proposed concrete elevator at Buffalo. This structure will take 600 tons of shapes, 250 tons of corrugated bars and 350 tons of twisted bars and flats.

—Morgan's Louisiana & Texas Railroad & Steamship Co., says a report, will enlarge its shops at Algiers, La.

—The Louisville & Nashville R. R., according to report, contemplates the enlargement and improvement of its yards at Hazard, Ky.

—The Texas & Pacific Ry. is planning to enlarge its station at Fort Worth, Tex.

—The Illinois Central R. R. has purchased ground in Chicago which, it is said, will be used as a site for a hospital. According to report, the cost of the buildings will be about \$400,000.

—The Pennsylvania Railroad has notified the city of Baltimore, Md., that it lacks the funds with which to carry out its proposed terminal improvements in that city, and as a result the negotiations between the municipal authorities and the railroad company have been called off. This announcement postpones very indefinitely the program of freight terminal improvements outlined May, 1913, involving \$10,000,000 to \$12,000,000 which the railroad company at that time announced it would spend to modernize its terminal facilities in Baltimore.

—The Nashville, Chattanooga & St. Louis Ry. will erect a passenger and freight station at Lebanon, Tenn.

—The Pennsylvania Railroad is reported to have bought Berry Lake, an old-time summer resort, now a suburb of Whiting, Ind., and will convert it into a site for railroad yards and repair shops. A lake in the center of the tract will be drained and 15 cottages around it will be moved away.

—The Northern Pacific Ry. will start work immediately on a new depot at Second and Pine streets, Walla Walla, Wash. Including new trackage the improvement will represent an expenditure of about \$160,000.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE APRIL 28, 1914.

Switchmen's hand-actuated air-brake valve, 1,094,426—Robert Francis Colborne, Strathfield, near Sydney, New South Wales, Australia.

Block-signal system, 1,094,441—Laurence A. Hawkins, Schenectady, N. Y., assignor to The Union Switch & Signal Co., Pittsburgh, Pennsylvania.

Brake mechanism, 1,094,442—Louis A. Hoerr, St. Louis, Mo. Door-operating mechanism, 1,094,483—Frederick Seaberg, Chicago, Ill., assignor to National Dump Car Co., Chicago, Ill.

Freight or cattle car, 1,094,485—John Bell Shelton, Edson, Alberta, Canada.

Railway-switch, 1,094,488—John C. Speas, Alma, Mich.

Electric railway, 1,094,494—Louis H. Thullen, Edgewood Park, Pa., assignor to The Union Switch & Signal Co., Swissvale, Pa.

Signaling system for railways, 1,094,495—Louis H. Thullen, Edgewood, Pa., assignor to The Union Switch & Signal Co., Swissvale, Pa.

Car-truck, 1,094,513—John C. Barber, Chicago, Ill., assignor to Standard Car Truck Co., Chicago, Ill.

Rail-joint, 1,094,515—Louis Blessing, Jackson, Mich.

Rail-clamp, 1,094,516 and 1,094,518—Louis Blessing, Jackson, Mich.

Railway-tie, 1,094,517—Louis Blessing, Jackson, Mich.

Car-track, 1,094,524—Thomas H. Burnett, Exchequer, Cal.

Railway-tie, 1,094,572—Eli Jarvis, Faust, N. Y.

Signaling device, 1,094,584—Mark S. Morse, Oakland, Cal.

Time-burning railway signal-fusee, 1,094,596—Louis S. Ross, Newtonville, Mass., assignor to Central Railway Signal Co., Pittsburgh, Pa.

Anti-creeping railway-rail, 1,094,606—Edgar M. Smith, Chicago, Ill.

Automatic car and train-pipe coupling, 1,094,612—Charles H. Tomlinson, Mansfield, Ohio, assignor to The Tomlinson Coupler Company, Denver, Col.

Railroad-tie, 1,094,635—Benjamin Franklin Blessing, Waynesboro, Pa.

Railway-tie, 1,094,641—John W. Clark, Jr., Salt Lake City, Utah.

Switch-stand, 1,094,650—Benjamin C. Haukenberry, Kansas City, Mo.

Automatic train-pipe connector, 1,094,670—Daniel B. McTaggart, Butte, Mont.

Splice-joint for car-sills, 1,094,682—John Yancy Satterwhite, Wagoner, Okla.

Car-truck, 1,094,708—Patrick J. Fant, Hugo, Okla.

Metallic Railroad cross-tie, 1,094,719—Freeman S. Hunter, Bedford, Ind.

Car-coupling, 1,094,721—Joseph Kelso and William Kelso, Pittsburgh, Pa., assignors to McConway & Torley Co., Pittsburgh, Pa.

Anti-rail-creeper, 1,094,736—James E. McNeil, Los Angeles, Cal.

Railway-spike, 1,094,748—Charles Daniel Russell, St. Paul, Minn.

Railway cross-tie, 1,094,769—William H. Alexander, Pittsburgh, Pa.

Latch for sleeping-car headboards, 1,094,781—Clark L. Dorney, Dayton, Ohio.

Draft-gear for cars, 1,094,792—George T. Johnson, Columbus, Ohio, assignor to The Buckeye Steel Castings Co., Columbus, Ohio.

Car-truck, 1,094,822—George T. Starbuck, Waltham, Mass.

Flush car-door, 1,094,835—Fred T. Carpenter, Toledo, Ohio.

Metallic Railway-tie, 1,094,847—Claus Erickson, Ironwood, Mich.

Car-window-opening device, 1,094,863—John Noreko, Pittsburgh, Pa.

Rail-brace, 1,094,881—John E. Conley, Memphis, Tenn.

Steam-trap, 1,094,883—John L. Creveling, New York, N. Y., assignor to Standard Heat & Ventilation Co., New York.

Railway-switch, 1,094,889—Henry Elliot, St. Louis, Mo.

Block-signal system, 1,094,894—Laurence A. Hawkins, Schenectady, N. Y., assignor to The Union Switch and Signal Co., Pittsburgh, Pa.

Automatic block system for preventing collisions on railways, 1,094,906—Andre Joseph Icard, Toulon, France.

Triple valve, 1,094,941 and 1,094,942—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Pittsburgh Air Brake Co., Pittsburgh, Pa.

Air-brake system, 1,094,943—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Pittsburgh Air Brake Co., Pittsburgh, Pa.

Emergency cut-off and pressure maintenance valve for air-brake systems, 1,094,944—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Percy E. Donner, Pittsburgh, Pa.

Quick-recharging valve, 1,094,945—Jacob Rush Snyder, Pittsburgh, Pa., assignor to Percy E. Donner, Pittsburgh, Pa.

Antifriction center-bearing, 1,094,957—Edwin S. Woods, Chicago, Ill.

Compression-regulator for engines with superheated steam, 1,094,958—Fritz Adam, Berne, Switzerland.

Torpedo-setting device, 1,095,000—Roy Kepner, St. Elmo, Ill.

Buffer for car-couplings, 1,095,011—Luis Manzano, Huelva, Spain.

Truck fender, 1,095,017—Joseph F. Minnich, Fort Wayne, Ind.

Reinforced brake-shoe, 1,095,019—John J. Morse, St. Louis, Mo.

Rail-joint, 1,095,026—Everett W. Preble, Anson, Me.

Car-coupling, 1,095,029—Henry B. Reynolds, Petal, Miss.

Flange lubricator, 1,095,042—Ivan F. Talbot, Boise, Idaho, assignor to Ernest O. Atwood, Boise, Idaho.

Railway-spike, 1,095,052—Leopold Wechsler and Richard Scherer, New York, N. Y.

Track construction, 1,095,072—Andrew Bender, Washington, D. C.

Car-step attachment, 1,095,086—Stephen G. Davis, Cayuga, Ind.

Air-brake apparatus, 1,095,087—William R. Davis, Columbus, Ohio.

Hot-box cooler, 1,095,108—Ernest S. Hammond, Valley Junction, Iowa.

Railway-switch, 1,095,115—Alexander Jonas, Philadelphia, Pa.

RAILWAY REVIEW

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Chair of Railroading in Harvard University.

A plan having for its object the endowment of a professorship of railroading in the graduate school of business administration of Harvard University is near consummation. The sum of \$100,000 has been pledged. The total amount required is \$125,000, though it is proposed to raise additional funds to the amount of \$250,000 for instruction in railroad-ing. The chair will be named in honor of James J. Hill. The plan is said to have been started by Howard Elliott, chairman of the New York, New Haven & Hartford; Robert Bacon, former ambassador to France, and Thomas W. Lamont, a New York banker.

Chesapeake & Ohio Given More Time.

The Chesapeake & Ohio Ry. has been allowed an extension of time, to October 15, in which to sell its holdings in the Kanawha & Michigan Ry. The original time set for disposing of the holdings expired May 13. The extension is effected by reason of the allowing of an appeal to the Supreme court of the United States of a part of the order of United States Circuit Judges Warrington, Knappen and Dennison, who sitting as a special District court, recently ordered the dissolution of the alleged soft coal trust and directed the Chesapeake & Ohio and the Lake Shore & Michigan Southern railways to dispose of their stock in the Sunday Creek Coal Co. and break up their combination control of the Kanawha & Michigan Ry. The appeal applies only to that portion of the court's decree ordering the Chesapeake & Ohio to dispose of its holdings in the Kanawha & Michigan. Under the original decree of the court the railroads were given sixty days in which to dispose of their holdings in the coal companies.

Car Weighing Orders, Baltimore & Ohio System.

In order to insure accuracy in the weight of its freight car equipment, a general order has been issued by the Baltimore & Ohio system which provides for the reweighing of equipment at regular intervals. Cars from which the figures of weight and capacity have become effaced will be reweighed and restenciled at once, and the regulations provide that cars in regular service shall be reweighed at regular times. Wooden and steel underframe cars will be placed on the scales once every twelve months during the first two years in service, after which they will be reweighed every two years. All-steel cars will be reweighed and restenciled every three years. In cases where the weight of equipment is materially changed by repairs or alterations, new figures will be substituted. This plan of weighing equipment periodically will offer to shippers and the railroad great assistance in computing tonnage and compiling records on which charges are based.

Texas Conductor Law Annulled.

The United States Supreme court rendered a decision, May 11, which annulled as unconstitutional the Texas statute providing that a person should not act as a freight railway conductor without having had two years' experience as a freight brakeman, except in cases of emergency. Justice

Lamar announced the court's decision. He stated that, while the public had a right to fix standards and tests for those serving in semi-public positions, yet it could not establish arbitrary rules which gave certain classes a monopoly of positions. He declared the law gave freight brakemen a monopoly of the right to succeed to freight conductors, and excluded therefrom all others of the public, including firemen, engineers, passenger conductors, and passenger brakemen. "The law does not require a freight brakeman to be qualified, but it does shut out all others of the public who might show themselves by proper tests to be qualified," said Justice Lamar. "It does this in the face of the practice of railroads recognizing that engineers become qualified to act as conductors." Justice Holmes dissented. The decision was announced in the case of W. W. Smith, for years an engineer on freight trains of the Texas & Gulf Ry., convicted of violating the conductor law by acting as conductor of a freight train on one trip.

Revelstoke National Park.

The Canadian government has set aside an area of 95 square miles to be used as a national park, located within the railway belt of British Columbia in the vicinity of Mount Revelstoke, on the line of the Canadian Pacific Ry. The park will be known as the Revelstoke National Park and possesses striking natural beauty, including glaciers, great mountain peaks and waterfalls.

Economy on the Baltimore & Ohio System.

Late reports of the efficiency and economy campaign among the employees of the Cleveland division of the Baltimore & Ohio R. R., show that Engineer G. W. Nicholson has a credit of \$104 in the value of recovered material. Engineer Lynch, who is leading the list, recently received a credit of \$78 in thirteen working days. Among the other high credits are those of Conductor Grant Lowther, \$25, and Engineer J. A. Moore, \$18. An interesting comment contained in the circular issued by Superintendent Lechliden is as follows: "Baggage Master G. W. Nicklas helps to keep his car neat by cleaning it while off duty, without extra expense to the company."

Large Dredge Dippers for the Panama Canal.

The Scientific American gives an account of two new dipper dredges, the "Gamboa" and the "Paraiso," recently constructed for the Panama canal by the Staten Island Shipbuilding Co., in which the capacity of the dipper, in each case, is 15 cu. yds. The dippers have been built with manganese steel lips and dipper-door hinges of forged steel which are 6x10 ins. in cross section. The dippers are 10 ft. 9½ ins. in height from the bottom band to the upper edge of the lip. They are hung on a ¾-in., single-part, wire rope, hoisting cable. The dredges can dig to a depth of 50 ft. below the surface of the water. The dipper handle is 72 ft. long, with top and bottom bars measuring 2x12 ins. in cross section. The weight of the dipper handle is 40½ tons. The dipper boom is 62 ft. long, weighs 66½ tons, and is of plate-girder construction. The pins for the sheaves on the boom are 11 ins. in diameter, and the parts are larger than any built before this purpose. In a photographic view the dipper is shown with 34 men standing on a platform inside of it.

New Wagon Road to Cliff Dwellers' Ruins

A new wagon road to the prehistoric cliff dwellings in the Mesa Verde National Park, located in southwestern Colorado 25 miles from the town of Mancos on the Rio Grande Southern R. R., has just been completed by the United States Department of the Interior. This road will also be available for automobiles by June 1st, if the department consents to allow motor

cars in the park. Heretofore these picturesque and mysterious ruins, which are said by archaeologists to be the best preserved of any in North America, have been all but inaccessible by reason of the long horseback ride over a precipitous mountain trail; now, however, two seasons' work by the government has made the trip an easy and enjoyable one for all classes of tourists. A new lodging camp with excellent accommodations has been established at Spruce Tree House, one of the principal ruins. Dr. Joseph Kossuth Dixon, leader of the Rodman Wana-

maker Expedition, who visited the ruins last fall, said, "If the people of the United States and of foreign countries knew about these wonderful cliff dwellings, the Mesa Verde National Park would become the mecca for sight-seers."

The serious illness of Interstate Commerce Commissioner Clark is a matter of general regret. It is hoped that the serious operations which he underwent last week will lead to his full recovery.

New Freight Terminal Warehouse of the B. & O. R. R. in New York City

About three months ago the Baltimore & Ohio R. R. made an important addition to its freight terminal facilities in New York City by placing in operation a new concrete warehouse. It occupies the block bounded by Twenty-fifth and Twenty-sixth streets and by Eleventh and Thirteenth avenues. The building is 353 ft. long by 68 feet wide and has eight stories for business purposes, with a mezzanine floor for offices, while there is an additional floor below the grade of the street. Included in the terminal are team tracks and paved driveways to facilitate the handling of business through the terminal, while within the building there is provided every modern device for moving shipments. The new terminal equips the Baltimore & Ohio R. R., with enlarged freight facilities on Manhattan island and combines both station and terminal storage with track connections. Business concerns frequently find it desirable and convenient to store goods some distance from the railroad, and being fitted out with storage space and track connections, the terminal will eliminate trucking charges. Another attractive inducement for the merchant is the minimum rating allowed by the insurance companies, because of the fireproof qualities of the building and the facilities provided for fighting fire.

The structural features are especially interesting, the building being of the "flat slab" type. It is the first building of this type approved by the building department of Manhattan. In this type the reinforcing rods radiate in all directions from the columns into the floor slabs, the loads being transmitted from the floor direct to the columns. Floor beams cut down the headroom, obstruct light and interfere with the sprinkler system; therefore, by eliminating these, there was a saving in the height

of the building, better light was provided and the cost of installing sprinklers was lessened.

The curtain walls were carried up monolithic with the floors and the columns, instead of being filled in after the column and floor skeleton was in place. The building laws of Manhattan make it necessary to provide double reinforcing for the curtain walls, but this is expensive and unnecessary, as the curtain walls do not carry any of the floor loads.

Bids were taken on three types of concrete construction, as follows: Beam and girder with exterior curtain walls of concrete; beam and girder with exterior curtain walls of brick; flat slab type with exterior curtain walls of concrete. The lowest bid was on the flat slab type; the next lowest was on the beam and girder with concrete curtain walls—the increased cost for this type was approximately 10 per cent. The highest bids were on the beam girder type with brick curtain walls, the increased cost of this type over the flat slab with concrete curtain walls being approximately 12 per cent.

Before work was started, test holes were sunk and it was found that the rock sloped very rapidly toward the river; the depth to rock below the street at Eleventh Avenue being approximately 55 ft. and at the opposite end of the building approximately 90 ft. There were 3590 wood piles driven, ranging from 45 to 85 ft, the total length of piling driven exceeding 41 miles. These were driven with great difficulty at certain points, as they encountered old piles, the remains of old piers, and at one point an old timber crib bulkhead approximately 35 ft. deep and 18 ft. wide, which was filled with one-man stone, and it was necessary to drive sheet piles and remove these

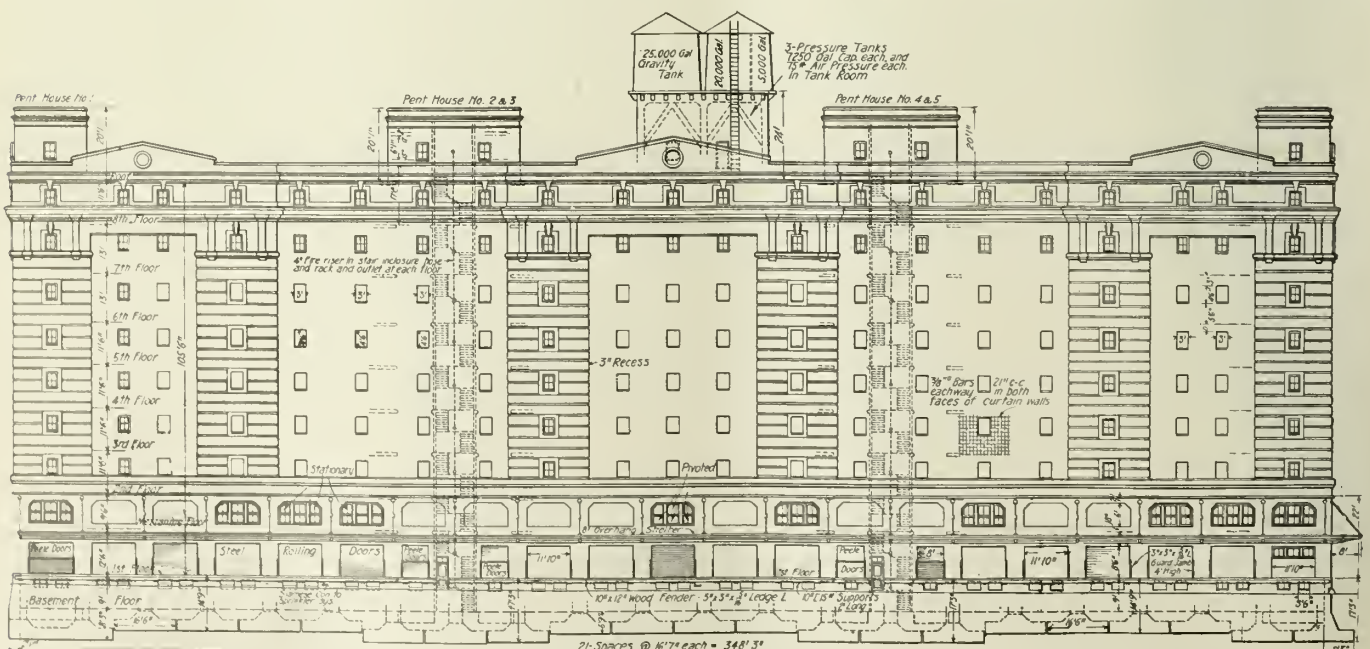


Fig. 1—Side Elevation of 8-Story Concrete Terminal Warehouse of B. & O. R. R., in New York.

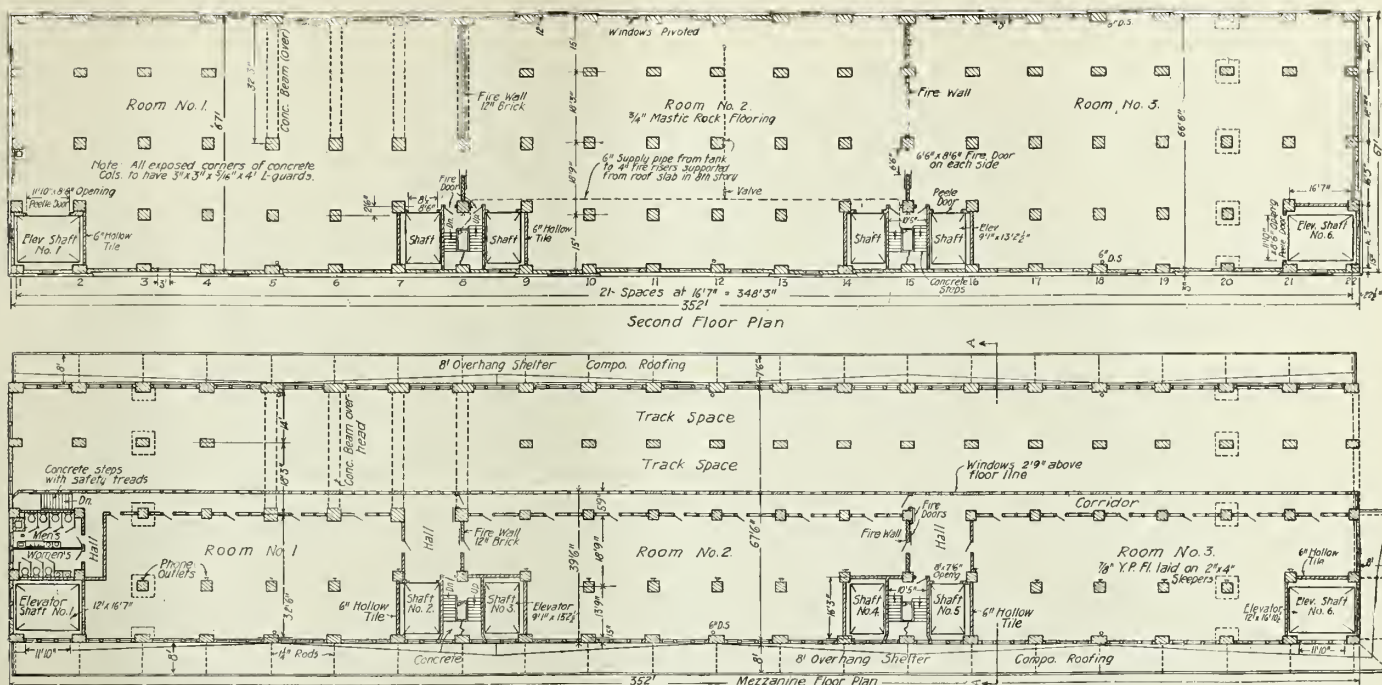


Fig. 3—Plans of Second and Mezzanine Floors of B. & O. R. R. Terminal Warehouse in New York.

stones one at a time. A number of old boats were also struck. These had been filled with stone and sunk, and it was necessary to remove them in the same manner. These obstructions caused delay and added expense.

In the construction of the building 15,000 cubic yards of concrete and 675 tons of reinforcing steel were used. The general plans are shown in the accompanying illustrations. At present the building covers only one-sixth of the lot, but is so arranged and constructed that additions can be made as the business warrants. The company anticipates covering the entire lot in the course of a few years.

The largest amount of trucking will be done on the first floor, and this is finished with a rock mastic wearing surface. The office on the mezzanine floor has wood wearing surface, while all storage floors have a granolithic finish. As the material stored varies considerably in weight, the floors were designed accordingly, the safe load varying from 500 lbs. per square foot on the first floor to 150 lbs. per sq. ft. on the top floor. Above the first floor the building is divided into three sections by fire walls, making three separate compartments each served by two elevators, and an enclosed stairway which will also serve as a fire escape.

There are three toilet rooms located centrally in the building, convenient for teamsters as well as warehouseman and clerks. Articles that require heat are taken care of in two rooms on the mezzanine floor. The house is equipped with electric lights and telephone service. All conduits for both systems are concealed, having been placed in the floor slabs and columns during construction. The interior telephone system provides means of communication from any section of the building direct to the office or to any other section of the building. The telephones of the offices connect direct to the New York Telephone Co., also to the private switchboard of the railroad company, providing direct communication with the numerous offices of the railroad company in the city and on Staten Island.

The building is of the latest design in fireproof construction. Goods stored in the building are also protected by a sprinkler system, having as its immediate supply a 50,000-gal. gravity tank located above the roof, and a 25,000-gal. supply in pressure tanks located in a concrete house on the roof. Should these two supplies be exhausted, there are five Siamese connections at the street level to which the city apparatus can be attached, replenishing the sprinkler system. In addition to the sprinkler

system, there are two hose risers with 75 ft. of hose at each floor level.

That part of the lot not used for the building is occupied by team tracks and driveways. The yard has a capacity of 75 cars. Every car can be reached by teams and each team driveway is paved with granite blocks. Spanning one driveway and a track

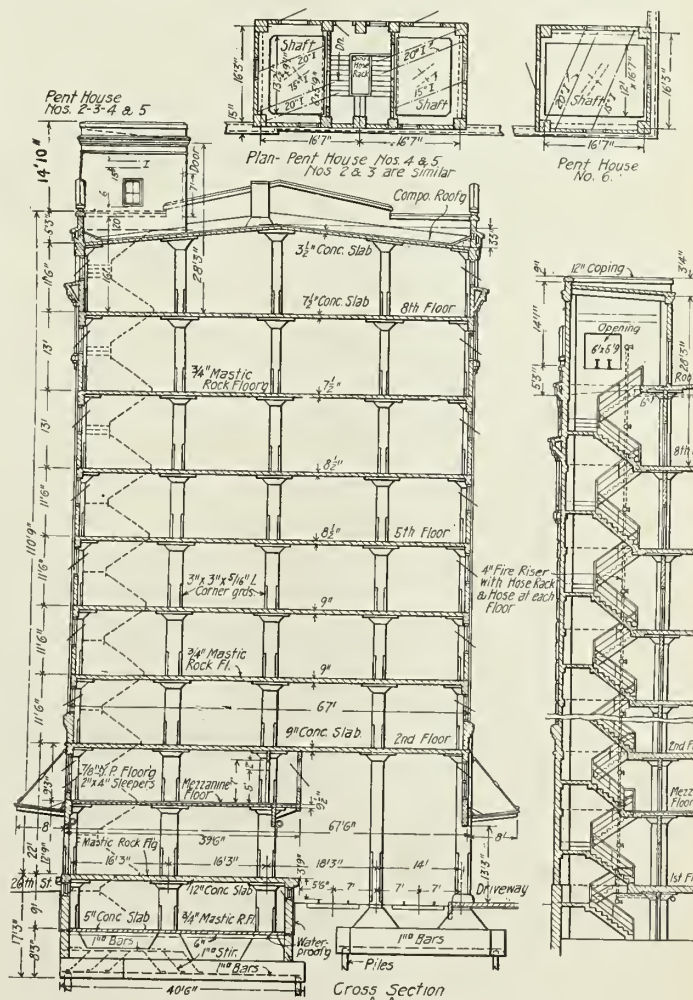


Fig. 2—Cross Section of B. & O. R. R. Terminal Warehouse in New York.



Fig. 2—Progress View of Cordova Street Front and East End of Vancouver Passenger Station, C. P. Ry.

Ohio R. R., W. B. Redgrave, engineer maintenance of way, and M. P. Northam, assistant division engineer, had charge of the field work.

Terminal Improvements of the Canadian Pacific Ry. at Vancouver, B. C.

The Canadian Pacific Ry. terminal improvements at Vancouver, B. C., an account of which was given in the *Railway and Engineering Review*, July 6, 1912, are nearing completion. It will be recalled that the general scheme embraces a passen-

ger station and office building, located on land immediately east of the present passenger station. Another dock, 200x490 ft. has been built. A particular point of interest in this work was the use of piles 135 ft. long on the pier end.

The main entrance to the station (Fig. 1) is located on Cordova street with the main waiting room on the street level. The tracks (Fig. 3) are located about 25 ft. below this level and there is provision for four passenger tracks separated by wide platforms. Stairways and lifts connect the two levels of the station, and a separate foot-bridge is carried over the passenger tracks and directly connected with the waiting room at one end and with the stairways leading to the track level,



Fig. 3—Progress View of Track Side of Canadian Pacific Ry. Passenger Station at Vancouver, B. C.

thus giving access to the platforms without crossing the tracks at grade.

In order to avoid a grade crossing and the consequent delays to traffic between the city and the piers a steel viaduct is being built on the line of Granville and Burrard streets passing over the tracks to the piers. An incline is also being built on the west side of the Granville street viaduct to the wharf, thus giving access to the lower deck of the pier and freight sheds and to the water front.

The passenger station is a combination stone and brick structure with a steel frame. The station is divided into two principal levels, on the lower of which are the baggage, mail and express rooms, while on the upper are ticket offices and waiting rooms. Above the public rooms in the station the space will be devoted to the general offices of the railroad company. The interior arrangement of the office space will be on the unit system, and each unit will have complete heating and lighting facilities, with partitions that may be readily installed or removed as changes in the arrangement of office accommodation become necessary. The principal problem was to provide easy and economic communication between the city, the railroad station and the piers, these last introducing an element which is unusual in most railroad terminals, so far as passenger traffic is concerned.

It is expected that the station will be ready for occupancy during this summer and that the steamship station facilities will be available somewhat earlier, although due to the necessity of removing the old station before the viaduct can be built on the extension of Granville street the use of the present grade crossing over the freight yard tracks will have to be maintained for a month or two longer.

Messrs. Barrott, Blackader and Webster, of Montreal, are the architects for this work. Westinghouse, Church, Kerr & Co., of Montreal, are the engineers for the complete design, construction and equipment of the terminal working in co-operation with the officials of the Canadian Pacific Ry.

Suspended Track for Filling at Washouts.

In ordinary cases the method of supporting the track for filling to replace an embankment which has been washed out, is to drive piles for a temporary trestle or to set framed bents for the same purpose. An interesting piece of emergency work carried out by the Wheeling & Lake Erie R. R., where neither of these methods was feasible, was the substitution of an improvised suspension bridge, or supporting the track on cables for dumping material from cars.

The accompanying illustrations show how the work was done. The washout was at Fremont, Ohio, the stream having cut out the bank behind the abutment and leaving the track suspended over a clear span of about 100 ft. The water underneath was 12 ft. deep and the bottom solid rock, and no equipment was available for handling framed bents. Accordingly, it was decided to support the track with cables, and for this purpose three 1-in. caboose cables were used under one side of the track and two 2-in. wrecking cables and a 1¼ inch cable spliced

to full length with a one-inch cable, were used under the other side. At the stream end the cable was anchored to a plate-girder span of the bridge, which remained standing, and at the other end to two dead men.

The filling was done with rock and dirt, and the cables were

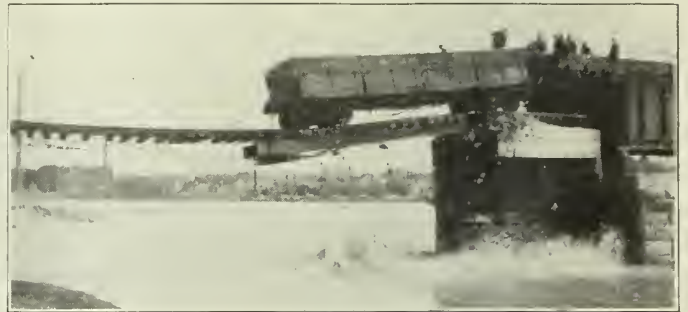


Fig. 2—Dumping Filling Material from Track Supported on Cables, W. & L. E. Ry.

found to be of sufficient strength to hold up two cars loaded with such material. After the bank had been built it was ripped on the up-stream slope with three carloads of spoiled cement that had got wet and set in the bags.

Electric Wrecking Car for the New York Central R. R.

A noteworthy piece of equipment for use in case of accidents at the Grand Central terminal of the New York Central R. R., has been received recently by that road. This appliance is a double-end electric wrecking crane, with independent 100-ton capacity cranes at each end, the whole being especially designed for the underground clearances and conditions existing in Grand Central terminal. While primarily designed to meet Grand Central terminal conditions, it is also adapted for use on the main line of the Electric division, where operating conditions and clearances are such as usually obtain on steam roads. This machine may be dispatched at high speed, under its own power, to the scene of an accident anywhere on the Electric division. In fact, it combines the functions of a crane or derrick with many of those of a high-power electric locomotive. It is completely equipped for high speed, independent operation, with air brakes, whistle, and all necessary fittings.

To design a crane of the large capacity required, under the unusual limitations imposed by the conditions of tunnel operation, was not a simple matter. In the restricted space of the express level deck of the terminal, the capacities must be attained under conditions where headroom for raising the boom and room at the side for slewing were both restricted, and in addition where excessive concentration of wheel loads must be avoided. In spite of these complications a crane has been built and furnished, fulfilling all the requirements desired. Just as operating conditions in Grand Central terminal are different from those found elsewhere, so is this crane, which was designed to meet those conditions, unusual in some of its features.

The procedure in case of a wreck underground would be somewhat as follows: If possible, the wreckage would be lifted clear of the track and the crane would then back out with it. However, if the crane could not raise the damaged equipment off the track, either on account of lack of head room or because of the size of the piece, one end would be lifted with the main hoist and with the auxiliary hoist and a special truck, would be placed under it. The crane would then drag away the load.

In construction the crane is unusually massive and of great strength. The car body is 67 ft. long, with a wheel base of 51 ft., and is carried on two compound trucks, made



Fig. 1—Supporting Washed-Out Track with Cables, W. & L. E. Ry.



Fig. 1—Wrecking Derrick Car of 100 Tons Capacity, for Electric Division of the New York Central R. R.

up of two four-wheel trucks each. A cradle on which the car body rests allows the compound trucks, as well as each single truck, to have perfect freedom to swing when taking curves. Complete air brakes are provided, also a hand brake wheel at each end. There is a comprehensive system of air-operated telescopic outriggers or jack beams, used to add stability during heavy lifting and to distribute the load over a greater area. These are controlled by valves with suitable levers, and are instantaneous in action, thus combining ease and speed of operation.

At each end of the car there is a complete independent crane, with a structural mast and boom, accurately turned roller path and rollers, and the slewing mechanism. All of the motions of operation may be performed independently, and with loads up to the capacities of the motors may be performed simultaneously. A special feature is the air operation of all clutches, to insure quick and sure engagement and release. Such a system, with suitable levers, is at both ends of the car, each operating its respective end, except for the propelling, which may be controlled from either end.

The electrical equipment is noteworthy, not only on account of the power it develops, but because of its flexibility. Six principal motors, with a total rating of 1100 h. p., are used for operating the crane, as follows: Four motors of 200 h. p. each for propelling, and two of 150 h. p. each for hoisting and for operating the machinery. The propelling motors are direct-connected to the axles of the compound trucks, two at each end of the car. They are arranged so that all four may be used for traveling, or, if desired, only the two at either end. They are capable of operating safely

on fluctuations of line voltage between 300 and 750 volts, d. c. Control is from each end of the car, the controllers being arranged for connecting the motors in series, series-parallel, and parallel. There is also an electrically driven air compressor.

For intermittent and emergency service, as might be required with the third rail out of commission, or when suitable cable connections could not be made with a feed line, there is installed on the crane a high-capacity storage battery. This is ready for instant service to operate the crane independently of any outside source of power. It consists of 230 cells, and has a capacity of 75 amperes for 8 hours, with a maximum discharge rate of 350 amperes for 2 hours. There is a complete testing and charging outfit, in order that the battery may be charged anywhere that connection can be made with a feed line. At each end of the car there is installed a switchboard, suitably equipped with lamps and instruments, including an ampere-hour meter for use with the storage battery.

The operation of hoisting is by means of a train of cut spur gearing. There is a brake of sufficient capacity to hold the maximum load in any position, or to lower it at a low rate of speed. A combination clutch and brake is provided for dispatch lowering of the block. In addition there is a ratchet and pawl of ample strength to hold the maximum load when the clutch is disengaged and the winch heads are in operation. These winch heads, on either side of the crane, are of 25 tons' capacity, and are independent in operation of all other mechanisms. The auxiliary hoist is arranged to operate at the same radius as the main block, or at different

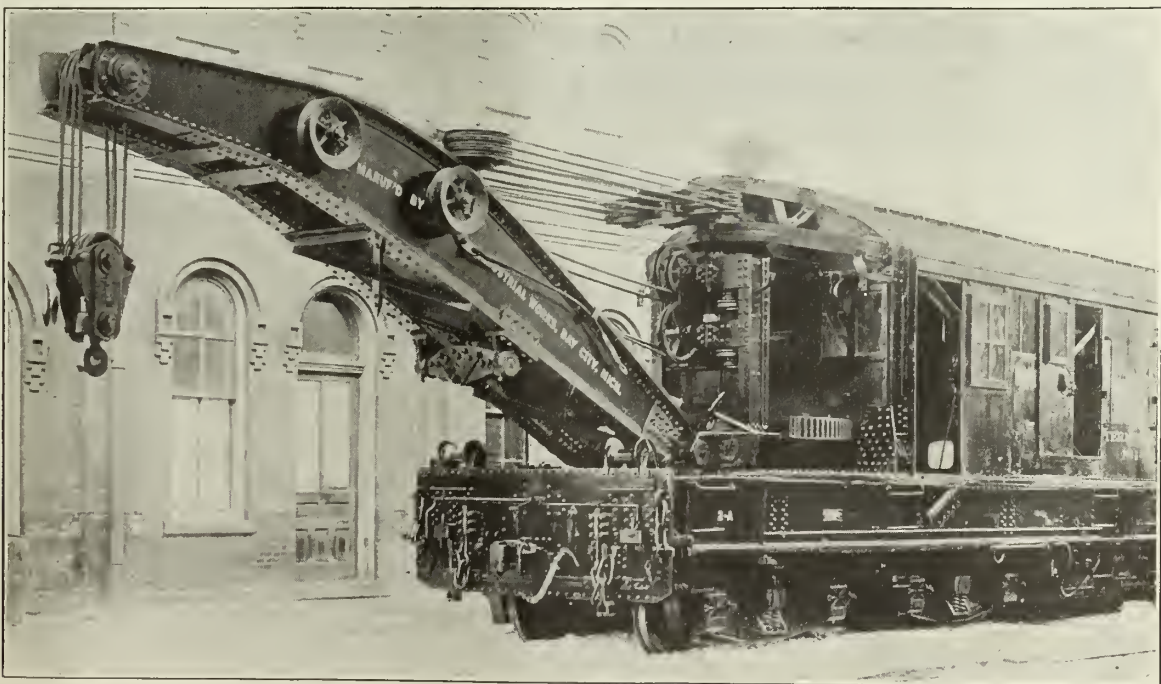


Fig. 2—One End of 100-Ton Derrick Car, Electric Division, New York Central R. R.

points on the boom. The boom hoist or radius-varying mechanism may be operated with the maximum load suspended from the boom.

With all four propelling motors in use the crane was guaranteed to travel at the following speeds: Hauling an 80-ton rolling load, 25 miles per hour on straight level tracks; 15 miles per hour on a 2.7 per cent grade; 12 miles per hour on straight level track with the addition of a 50-ton suspended load. As a matter of fact, actual speeds greatly in excess of these were attained. At the formal test conducted by the railroad officials, the crane propelled itself at a rate of 34 miles an hour while hauling an 80-ton rolling load. Satisfactory operation is also possible using only the two motors at either end of the car, with resulting speeds of about 60 per cent of these when all four motors are used.

In general, the following capacities are provided for: On solid foundation with outriggers, 100 tons at 24 ft. 2 ins. radius straight ahead or 6 ft. 6 ins. either side of the center; 100 tons at 22 ft. radius straight ahead, or 12 ft. either side of the center; 100 tons at 13 ft. 8 ins. swinging 180 degs.; without outriggers, 50 tons at 24 ft. 2 ins. radius, straight ahead, or 25 tons at 13 ft. 8 ins. swinging 180 degs.

This crane was designed and built by the Industrial Works, Bay City, Mich., from specifications prepared by a committee consisting of C. H. Quereau, superintendent of electrical equipment, chairman; H. A. Currie, assistant electrical engineer, and B. J. Buell, wrecking master of the New York Central & Hudson River R. R.; and was furnished through the Geo. M. Newhall Engineering Co., eastern agents of the Industrial Works.

Des Moines River Viaduct, C. M. & St. P. Ry.

By J. H. Prior, assistant chief engineer, Illinois Public Utilities Commission, formerly engineer of design, Chicago, Milwaukee & St. Paul Ry. This is the second long and high viaduct over the Des Moines River valley, the other being the Boone viaduct of the Chicago & Northwestern Ry. It saves the detour and grades necessary to drop into the valley and out again, as was the case with the old line.

The Chicago, Milwaukee & St. Paul Ry. has recently completed a steel viaduct across the Des Moines river valley, three miles west of Madrid, Ia. The bridge is but seventeen miles south of the well-known Boone viaduct of the Chicago & Northwestern Ry., and ranks with other notable structures

of this type; the outlines of several of the larger ones being shown in Fig. 1.

The viaduct forms part of the double-track reconstruction work of the C., M. & St. P. Ry. on its Chicago and Council Bluffs division in Iowa, and is on a new alignment extending from Madrid to Woodward, as is shown in Fig. 2. The present line between these two points, which crosses the Des Moines river about two miles southeast of the new line, is single track and 7.65 miles in length. The new line reduces the distance 2.13 miles and eliminates 790 degrees of curvature and 197 feet rise and fall in grade.

From the east the viaduct is approached by a double track

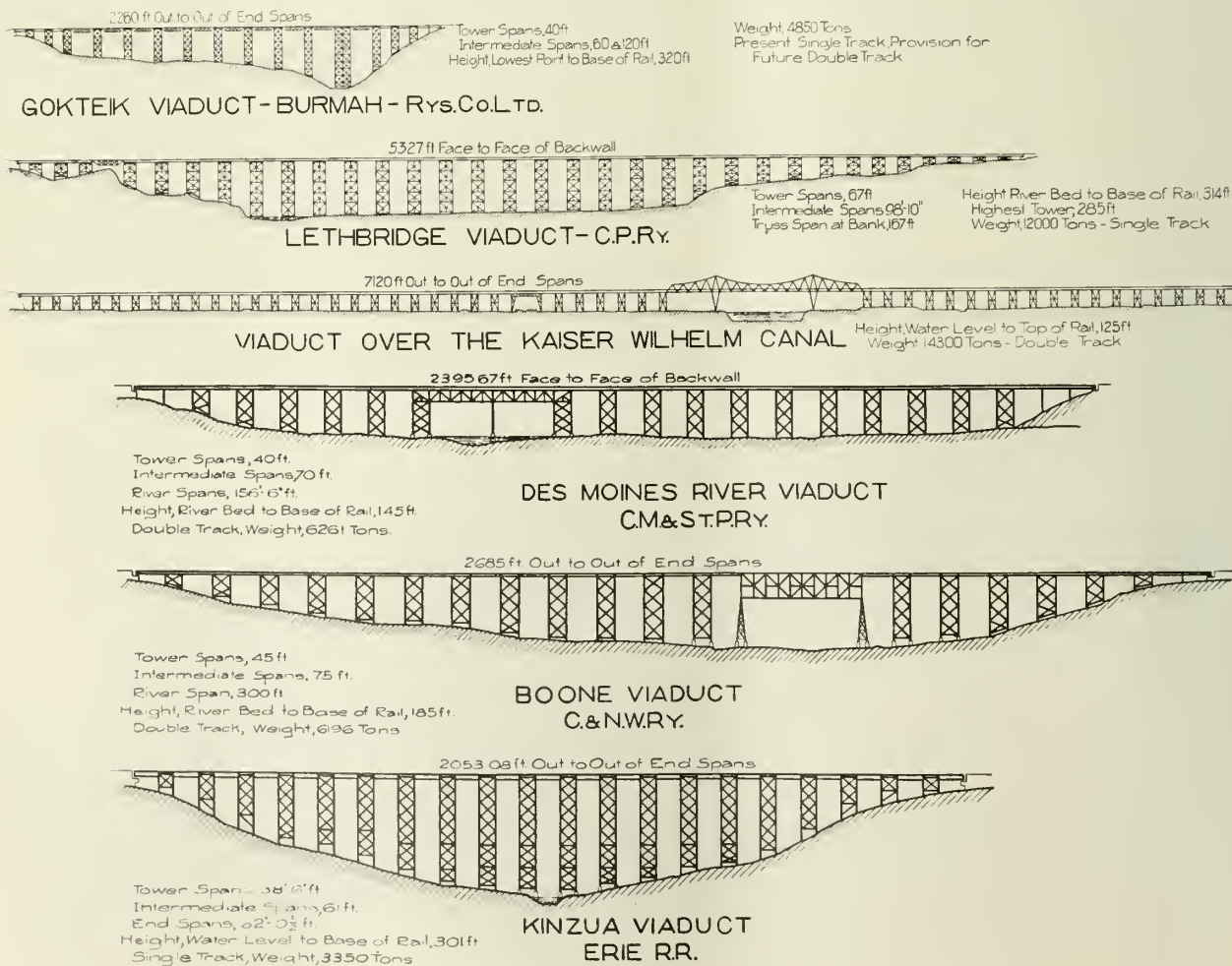


Fig. 1—General Elevations of Notable Viaducts Shown Comparatively.

fill, the maximum height of which is about 100 ft. and the length 3500 ft. It contains approximately 1,300,000 cu. yds. of material. The bridge is on a tangent and a 0.66 per cent grade rising west, and is a double track structure 2394 ft. 2 ins. long, made out of steel. The maximum height above the ground is 130 ft. The superstructure, as shown in Fig. 3, consists, in general, of 40-ft. tower and 70-ft. intermediate girder spans. The portion spanning the main channel of the river is composed of two 155-ft. riveted deck truss spans, supported by the adjacent tower bents and a single rocker bent in the middle of the channel.

The viaduct was designed for a live load of Cooper's E-55 Classification (two 195.25-ton engines followed by a train load of 5500 lbs. per lin. ft. of track). The dead load consists of the estimated weight of the structure and the weight of reinforced concrete deck slabs and a ballast floor, the latter being taken as 3900 lbs. per lin. ft. of track. The structure was designed according to specifications of the C., M. & St. P. Ry., which are similar to the general specifications for steel railway bridges of the American Railway Engineering Association.

Substructure.

Borings showed that from the west abutment up to and including bent No. 27, there was a thick bed of stiff yellow clay from 6 to 10 ft. below the surface of the ground. Tests proved this material to be good for an average pressure of over three tons per square foot. The footings for this portion of the viaduct were designed accordingly.

From Bent No. 26 east, the surface layer consists of sand from 25 to 35 ft. in thickness, beneath which exists a strata of hardpan. Piles were used to support these foundations. They were jetted on the average 26 ft. through the sand and driven from 12 to 14 ft. into the hardpan. The jetting was done with a 2-in. pipe, a pressure of 140 to 160 lbs. being maintained at the nozzle. The hardpan was penetrated with difficulty, the piles moving only about an inch under each blow of a 2800-lb. drop hammer falling about 30 ft. The last inch of penetration required on the average three blows. The average pile load was assumed at 18 tons.

The pedestals, except those in bents No. 0 and No. 1, are 6 ft. square on top and slope toward the center line of the viaduct, making the bearing surface normal to the axis of the columns, which are on a batter of $1\frac{1}{2}$ ins. in 12 ins. The sides of all pedestals are battered.

Figure 4 shows a typical pedestal, as built for bents Nos. 8 to 24, inclusive, the nose being on the upstream side. Figure 4 also shows, in outline, the type of abutments used at the east and west approaches. In each pedestal two 2-in. diameter anchor bolts 10 ft. long were provided, projecting 3 ft. 9 ins. above the tops of the pedestals. These bolts pass through the bed plates and engage lug angles which are riveted along the lower ends of the columns. The rods are anchored by spacers, the concrete being poured around them. In order to provide a little room for variation in their position, box forms extending 2 ft. below the top of the pedestals were provided around each anchor bolt. The holes so formed were grouted after placing the bed plates. In addition, each bed plate is fastened to the masonry with eight 2-in. diameter fox bolts, 2 ft. 6 ins. long, holes for which were drilled after erecting the bed plates and columns. To provide for any lateral motion that may accompany the settling of the fill, the pedestals in Bents 0 and 1 were built with horizontal tops 8x10 ft. and the bed plates for these bents were provided with slotted holes. This permits the bed plates to be shifted and the superstructure adjusted in case the pedestals are pushed forward. Creosoted piles 40 to 45 ft. long sustain these pedestals and are loaded to an average load of but 12 tons.

On account of the expense of an abutment built from the ground up and the uncertainty of its withstanding the earth

pressure and settling of the fill, it was decided to use temporarily a small bank abutment at the east end until the fill in the embankment had settled sufficiently to build more permanent work. The abutment rests on 60-ft. creosoted piles, carrying an average load of 12 tons. It consists of a thick reinforced concrete slab with timber back wall. Bars were provided for a permanent concrete back wall which will be constructed when the embankment becomes thoroughly settled.

The concrete was of $1:3\frac{1}{2}:5$ mix for the footings, and $1:3:4\frac{1}{2}$ for the neat work. An excellent grade of sand (found $\frac{1}{4}$ mile east of the viaduct), containing on the average about 20 per cent gravel, was used. The location of this gravel pit is marked on the map, Fig. 2. The stone used was a good grade of limestone, from 1 to 2 ins. in largest dimensions and was screened, no crusher run material being used. Water was pumped from the river.

The neat work of all pedestals was poured in continuous runs, which necessitated working at night on a few of the largest pedestals. The largest run, of 215 cu. yds. for the

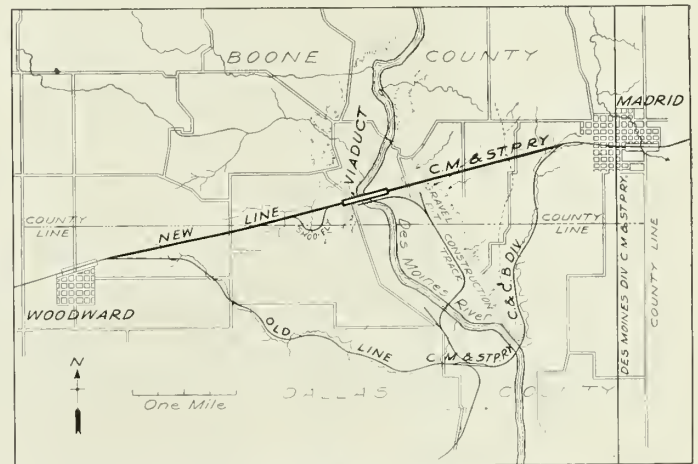


Fig. 2—Old and New Locations of C., M. & St. P. R. Ry. between Madrid and Woodward.

pedestals of bent 24, was made in 24 hours, using one mixer. Most of the concrete work was carried on during the winter. The sand was heated by steam pipes to a temperature of about 100 degs. F., and the water to about 150 degs. F. The stone was not heated. After being poured, the pedestals were housed in and live steam turned in for a period of about four days. The results produced were excellent, even during the coldest weather. The total volume of concrete in the pedestals and abutments amounted to 11,850 cu. yds.

The concrete in the abutments and pedestals situated on the slopes at the east and west ends was mixed at the foot of the slopes and hoisted in concrete cars to the pedestals and abutments by means of an inclined track. The concrete in the pedestals on the flat was placed by means of a stiff-leg derrick.

The layout work was done by means of repeated horizontal measurements with a 100-ft. steel tunnel tape. A spring balance was used and the tape was supported every 33 ft. Corrections were made for temperature. At each measurement point an 8-in. diameter oak post, 5 ft. long, was set in the ground and a zinc plate tacked on top. This enabled the establishment of an accurate and permanent point. Independent lines were run, establishing the 100 ft. stations, and the bents were checked from these points. On the slopes at the east and west ends, slope measurements were also taken as a check. Much of the measuring was done at night, in order to secure the benefit of a more even temperature. The layouts provided for a normal temperature of 70 degs. Concrete bench marks extending 5 ft. into the ground were placed so that direct readings could be made from some

bench mark to every pedestal. These bench marks were checked independently by three sets of levels run at different times by different men, there being no greater variation than 0.008 between the different elevations at any bench mark.

The west bank of the river for a distance of about 700 ft. above and about 300 ft. below the bridge was thoroughly riprapped, as the soil is soft and the bank had been rapidly wearing away for some time. Further protection was obtained by wing dams built up to the ordinary high water level. Riprap was also placed around each of the pedestals in bents Nos. 3 to 24, inclusive, as a protection against scour during the flood period, when the water frequently covers the entire flat.

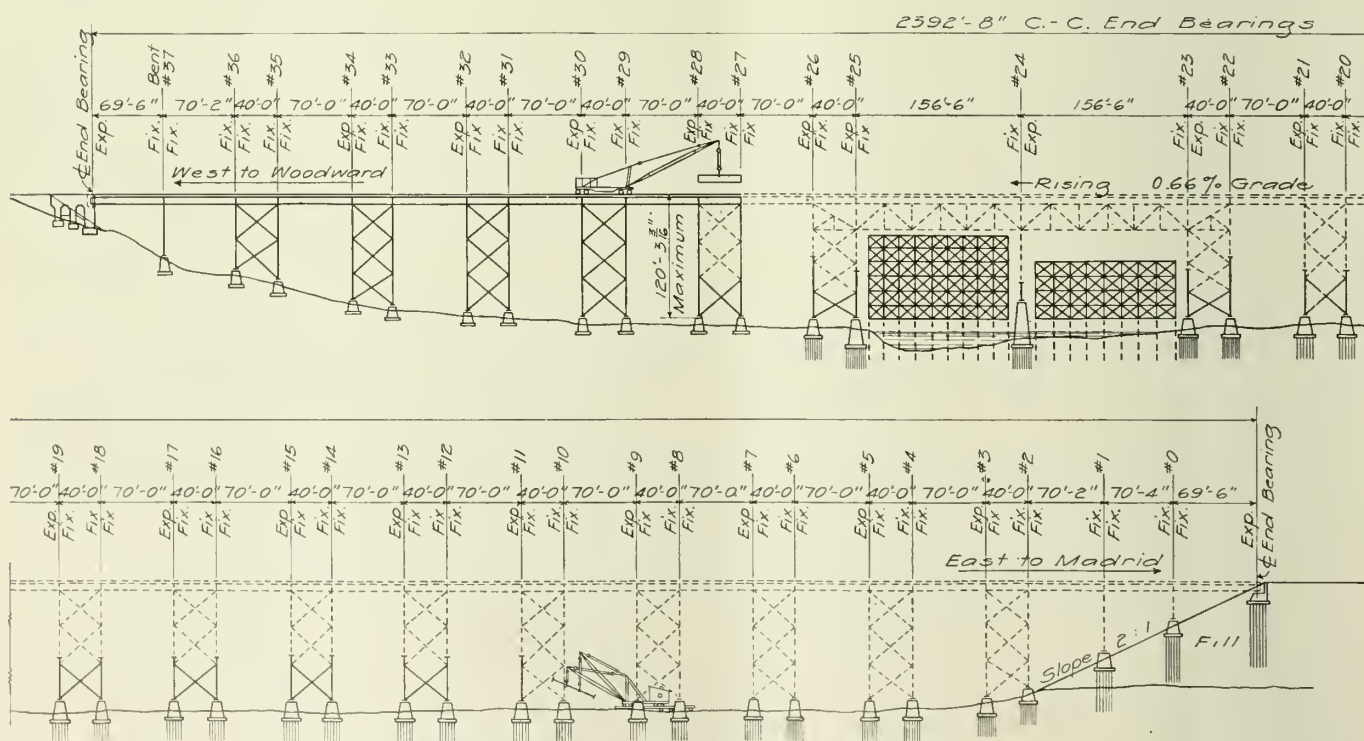
Superstructure.

The deck girders, as shown in Fig. 5, are spaced 8 ft., center to center, and are carried directly on top of the cross girders. They differ slightly from the ordinary standard C., M. & St. P. Ry. type of deck girder, in that the web does not project above the top flange angles; cover plates being used instead, in order that the concrete deck slabs should have central bearing on the girders. The slabs are provided with bearing strips which rest on the cover plates between the inner lines of rivets. At the ends of the 70-ft. girders, where the section does not require the cover plate, a plate of the same thickness as the cover plate, but of a width only sufficient to engage the rivets on the inner line in the flange

the cross girder to permit the gussets for the longitudinal bracing to be entered and riveted to the column webs and angles. This construction is easily erected and presents an excellent appearance. Hand holes in the gusset plates and ladder bolts at the ends of the cross girders provide easy access for inspection and painting.

The upper and middle sections of the columns in all bents except Nos. 23 to 26, inclusive, are of the common built-up channel section, composed of two webs 26 ins. x 15-16 ins., and the four angles 6 ins. x 6 ins. x $\frac{3}{4}$ in. The rivet holes in the 15-16-in. webs were drilled from the solid, except such holes as were required in assembling. After the holes in the 6 ins. x 6 ins. x $\frac{3}{4}$ in. angles were sub-punched, the angles were bolted to the webs through the above-mentioned assembling holes. The angles were then reamed with a twist drill, which passed entirely through the webs.

The longitudinal and transverse bracing is a double system capable of taking both tension and compression, and is made up of channels turned in and laced. One diagonal of the longitudinal bracing is in all cases carried through the intersection as a single member, while the other one is broken. This is done to provide an additional safety factor against the sagging of these members. The tendency to sag is greatly increased by the fact that the longitudinal braces do not stand in a vertical plane, but are in the same plane as the columns of the towers. In the transverse system all



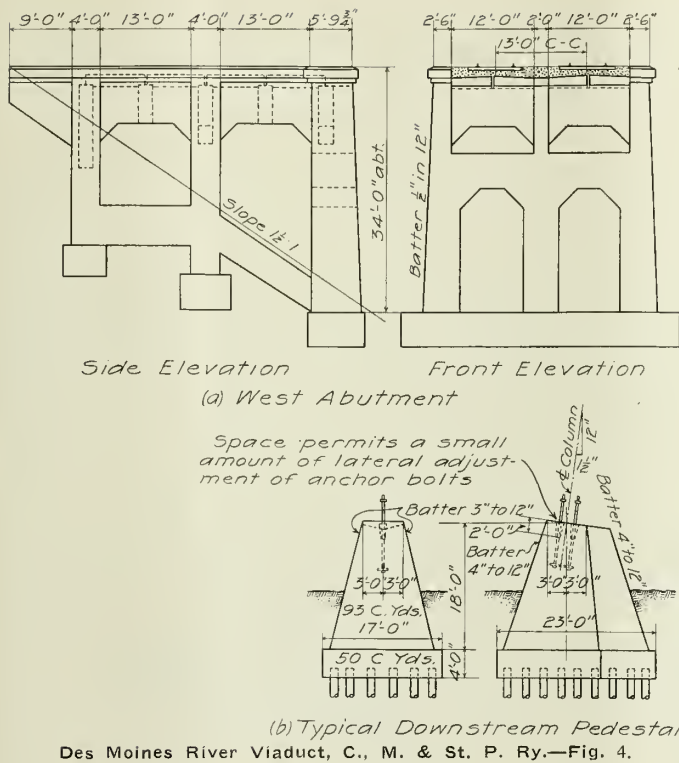
Des Moines River Viaduct, C., M. & St. P. Ry.—Fig. 3.

angles, was used to keep the bearing surface of the slabs at the same elevation. Holes for future staging are provided in the outstanding legs of the stiffener angles of all girders and cross girders. Over every bent one girder span has ladder bolts through the outstanding legs of the two outside end stiffener angles, the bolt heads being countersunk in the end stiffener angles.

The cross girders are box girders, diaphragms being placed directly under the two inside deck girders, and also at the splices of the web plates and gusset plates. At the ends, as shown in Fig. 5, the webs are shop-spliced to the gusset plates, which are shop-riveted to the outstanding legs of the column angles, the columns being spliced below the gusset plates. These gusset plates are also slotted on one side of

the diagonals were broken at intersection points, the tendency to sag not being so great, as the bracing lies in a vertical plane, and the method used made the erection somewhat simpler. The double system of bracing was chosen because of the increased rigidity; rigidity as well as ultimate strength being an important consideration in the design of high trestles. At the top the towers are braced in a horizontal plane by cross frames composed of two 6x4x $\frac{5}{8}$ in. angles riveted back to back. These laterals connect to large lateral plates riveted to the tops of the columns and cross girders, and are also riveted to the lower flange of the inside tower girders.

Bents 22, 23, 25 and 26, composing the shore towers, are similar to those above described, except that they are 4 ins.



wider. The columns of the river bents 23 and 25 are cut off at the proper elevation to support the shoes of the truss span which are placed directly on top of the columns. A 2-in. plate is used under the bearings to secure a more equal distribution of the load over the column section. Struts are substituted for the cross girders in these bents. The longitudinal and transverse bracing in the shore towers is similar to the bracing above described, except that it is some-

what heavier. At the top of the shore towers it may be seen, in Fig. 7, that there is but one diagonal. This member is braced against sagging by an inclined transverse cross frame between the diagonals of each tower, and extends from the middle to the point where the lower end of the diagonal joins to the column of the river bent. As shown in Fig. 7, the horizontal thrust from the truss span is designed to be partly carried through the tower bracing by a horizontal strut, connecting the top of the river bent to a point in the same horizontal plane on the other bent of the tower. By this means the thrust from the truss span is equally distributed into all of the tower pedestals. The shoes on top of the river bents are each connected to the column with eight bolts. Four bolts pass through the heavy 2-in. plate and connect to the horizontal cap angles on the longitudinal sides of the columns. The other two which anchor the bearing pass through the same plates and engage lug angles riveted vertically on the transverse sides of the columns.

On account of the heavy loads it was necessary to make the columns of the rocker bent much heavier than those in the towers. An "H" section was decided on because of the simpler shop work for the large amount of metal required for the section, and because of the advantage in having continuous webs in both directions. At the base the columns rest on cast steel rocker shoes connected by a 14-in. diameter pin. The load is further distributed by means of an I-beam grillage. The spaces between the I-beams were filled solid with concrete after the grillages were set and before the superstructure upon them was fully erected.

The main section of the columns is shown in Fig. 6, which also shows the manner in which the columns were widened out in a longitudinal direction at the top to provide seats for the bed plates of the truss spans. The columns are reinforced with horizontal diaphragms placed about 11 ft. apart. The flanges are braced by the transverse gusset plates, batten plates and single angle lacing, composed of $3\frac{1}{2} \times 3\frac{1}{2} \times 7-16$

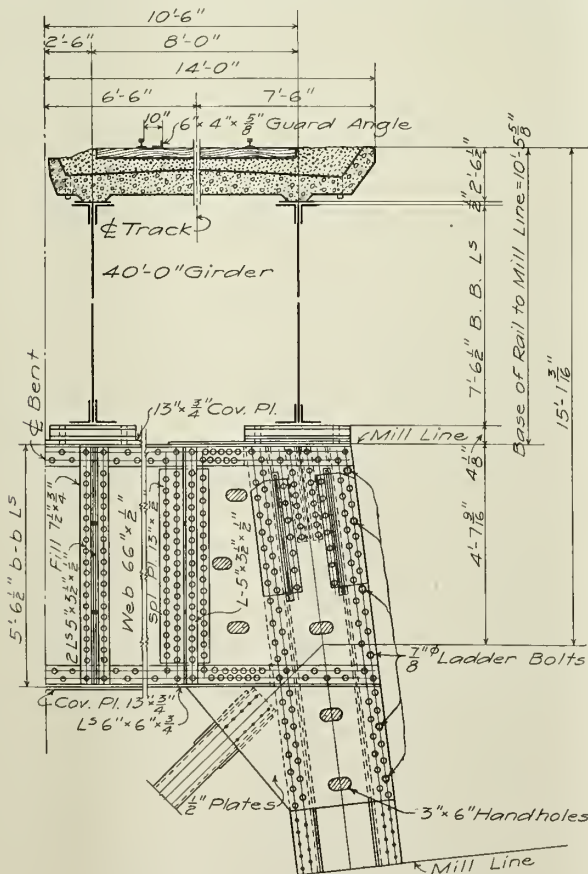


Fig. 5—Half Section of Cross Girder for Tower Bents.

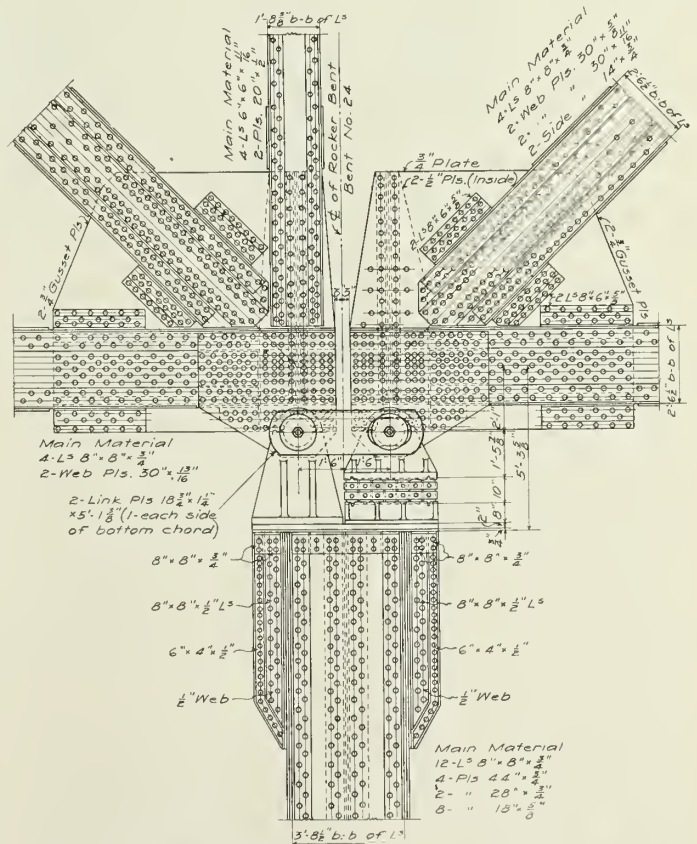


Fig. 6—Longitudinal View Showing Top of Rocker Bent and Bearings of Truss Span.

in. angles connected to each flange with four rivets. The gusset and batten plates are provided as on the tower columns with 3x6 in. hand holes. The transverse bracing in the rocker bent is composed of four 8x6x $\frac{1}{2}$ in. angles laced horizontally with 3 $\frac{1}{2}$ x3 $\frac{1}{2}$ x $\frac{3}{4}$ in. angles and vertically with 3x7-16 in. bars.

As shown in Fig. 6, the west truss has a fixed bearing on the rocker bent, while the east truss is provided with segmental rollers for expansion. By this arrangement the traction forces in the truss spans are equally divided between the two river towers, whereas had the expansion been placed at either of the river towers, the bracing in the opposite river tower must necessarily have been very heavy. Large links having one round hole for the fixed end and one slotted hole for the expansion end engage the pins on each

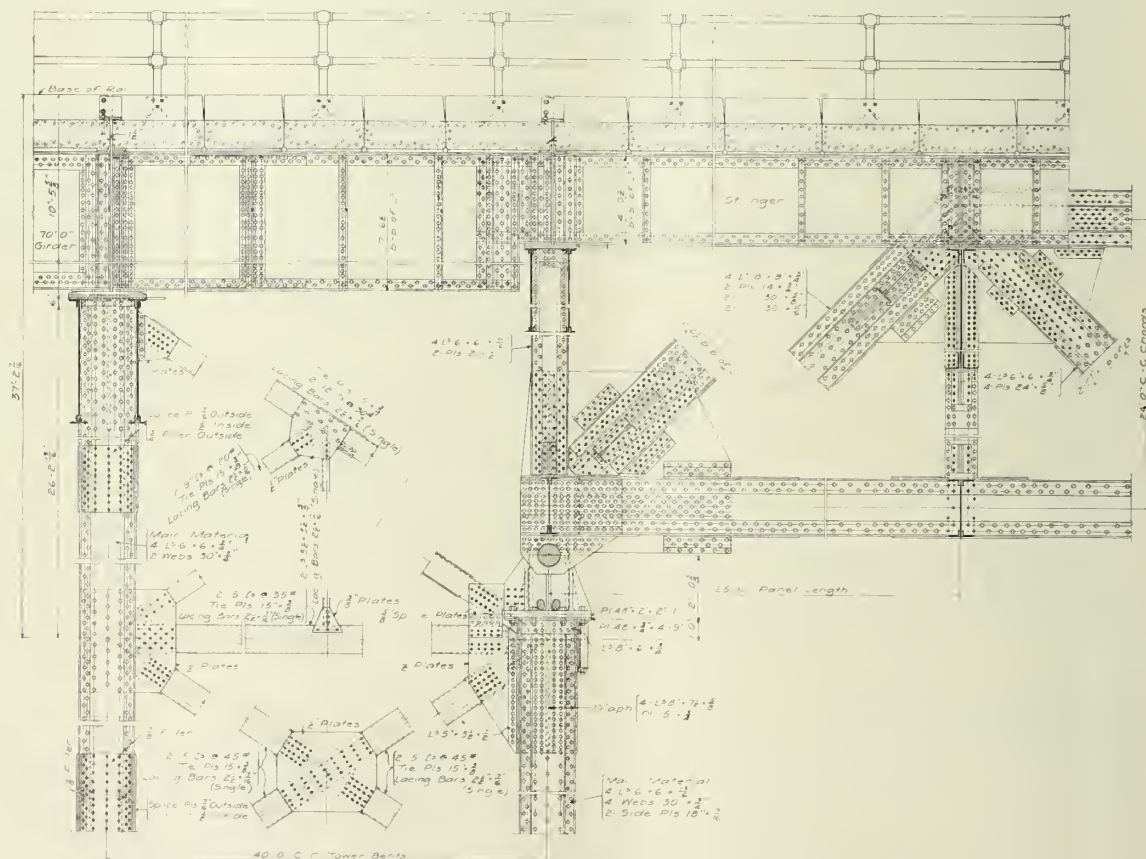
panels in a plane below the stringers transfer all thrust to one truss at the intersection of the top chord and end post.

(To be continued.)

Railways Make Efficiency Record in 1913.

AVERAGE FREIGHT RATE OF 7.27 MILLS, LOWEST WITH ONE EXCEPTION, IN FACE OF RISING COSTS.

Highest freight movement on record (300 billion ton miles) and with a single exception, the lowest average receipts in their history—7.27 mills per ton mile—are the outstanding features of the annual report of the Bureau of Railway News and Statistics reviewing the railways of the United States for the year ending June 30, 1913. This gives complete returns of con-



Section of Upper Part of River Truss and First Panel of Truss Span
Des Moines River Viaduct, C., M. & St. P. Ry.—Fig. 7.

side of the shoes and limit the movement due to expansion and contraction. The links are provided as an extra precaution in case of the settlement of either shore tower, so that the spans would still be held at the rocker bent.

The channel spans are double track, riveted deck truss spans, each span having two trusses of the Warren type. The tops of the floor beams are flush with the bottom of the top chord, the stringers being placed on top of the floor beams, and being the same distance center to center as the girders on the trestle. This arrangement allows the floor to be uniform from end to end of the viaduct. It also prevents the projecting ends of the floor beams from marring the appearance of the structure.

In the end panel, shown in Fig. 7, the stringers are riveted to the floor beam joining the vertical posts which come directly over the end bearing points. The 40-ft. girder spans, which also rest on this floor beam, have expansion provided at their bearings on the floor beam. This detail enables the vertical post to move when the truss span deflects without causing excessive bending stresses. Thrust frames in these

construction, maintenance and operation of United States railways for the last fiscal year, comparing the results, compiled from returns identical with those made to the Interstate Commerce Commission, with the latest official figures of the commission available, those for the fiscal year 1911.

"The average receipts of 7.27 mills per ton mile," says the report, "is the highest achievement of American railway efficiency. When it is considered that everything entering into the movement of one ton one mile costs from 10 to 30 per cent more than it did in 1899, when the previous low mark was touched, it challenges credulity. Moving freight the world over is the most important function of a common carrier. In the United States this has been developed to a degree unapproached in any other quarter of the globe. By reason of density of traffic and inferiority of equipment other countries may handle passengers more cheaply than we do, but in the movement of freight which brings commodities of the most remote part of the Union within the reach of all its inhabitants, the railways of the United States are without a peer on earth.

"Had the railways received as much per ton-mile in 1913 as

in 1901 they would have been nearly \$70,000,000 better off at the end of the year. Or if they had received the average rate of 1904, from which point they have been battered by selfish shipping interests, they would have been nearly \$160,000,000 better off on June 30th last, and we would not now be waiting for a five per cent raise to temper the wind to the shorn lamb."

Ton mileage for the year for the first time in history passes the 300 billion mark, the railways reporting a total of 2,009,462,000 tons of freight carried 300,558,334,000 miles, against 261,416,642,000 miles the year before, the previous high record. In the passenger branch of railway service another record is made, the number of passengers for the first time passing one billion, the total reaching 1,018,283,000 passengers carried 34,447,000,000 miles, which also is the largest mileage ever attained.

Yet with a total gross revenue also making a record incident to these record traffic figures, crossing the 3 billion dollar mark for the first time to \$3,118,929,000, rising expenses offset the improvement. Operating costs rose for the first time above 2 billion dollars to \$2,164,851,000 and left a net after taxes of \$825,026,000, which though \$77,000,000 above the unfavorable year 1912, was only \$1,000,000 above 1910, when \$368,000,000 less business was carried on 16,000 fewer miles of trackage.

Total mileage of all tracks operated for June 30, 1913, is placed at 367,658 miles, the mileage of owned line being 251,500. There were 8.46 miles of line per 100 square miles of territory in the United States against 8.34 in 1912, and 387 inhabitants per mile against 382 the year previous. In relation to Europe the disparity in ratio of mileage to population is shown to be 6 to 1 in favor of the American.

Total employees numbered 1,910,000 with aggregate compensation of \$1,439,000,000. There were 749 employees per 100 miles of line in 1913 against 735 officially reported in 1907, but the pay roll in 1913 was \$5673 per mile of line against only \$4711 in 1907. Average daily compensation paid per man rose from \$2.44 in 1912 to \$2.49 in 1913, the latter figure being an advance of 20 per cent over 1905, when the bureau began compiling the information. This 20 per cent meant that the railways paid \$226,000,000 more for labor than would have been paid for the same number of days worked under the 1905 scale.

Bill for Federal Supervision of Railroad Securities.

The committee on interstate and foreign commerce favorably reported to the house on May 7, a bill embodying the administration's plan for federal control of railroad stock and bond issues. This is one of the trio of anti-trust measures which the administration now hopes to put through before adjournment of congress. The other two measures of the trio are the Covington bill creating an interstate trade commission, referred to in the Railway Review, May 9; and the Clayton bill, which supplements existing laws against restraints and monopolies, pertaining to which we published, on May 9, an extended discussion by Arthur Wyman.

The latest measure, by which it is intended to place railroad securities under government supervision, is an amendment of section 20 of the act to regulate commerce. It is regarded as one of the most drastic regulations of the kind ever proposed to congress. Its essential provisions are summarized as follows: 1.—A provision requiring railways, before issuing stocks and bonds, to obtain authority for such issues from the Interstate Commerce Commission. 2.—A provision requiring publicity through the commission, of all facts bearing on the issuance of railway stocks and bonds. 3.—A provision making it unlawful for any person to hold the position of officer or director or more than one railway company without the approval of the Interstate Commerce Commission.

The bill is made up in part of features of the Hadley commission plan and drastic prohibitions proposed by Representa-

tives Sims of Tennessee and Rayburn of Texas, Democratic radicals. It provides that it shall be unlawful for any railway corporation to issue any capital stock or certificates of stock, or any bond or other evidence of indebtedness, or assume any other obligation, "unless and until, upon application and after investigation by the Interstate Commerce Commission of the purposes and uses of the issue, and the proceeds thereof, such issue is approved by said commission as necessary and appropriate for the purposes stated in the application." The only exception made in this prohibition is in the case of one year notes issued by railways to an amount not exceeding 5 per cent of their outstanding stock and bond obligations.

The commission is directed, upon the receipt of an application for authority to issue stocks and bonds, to serve notice upon the railway commission of the state through which the road passes, or, in the absence of such commission, upon the governor or attorney-general, setting forth all the facts in the case. The state commission or the governor or attorney-general is given the right to present to the Interstate Commerce Commission "such representations as they may deem just and proper for preserving the rights and interests of their people." Representations made by the states are to be given due weight by the commission in acting upon applications for authority to issue stocks or bonds.

The measure provides severe punishment in the form of fine and imprisonment for violations of the proposed law. The principle of "personal guilt" is applied to all offenses. Officials who fail to make prescribed reports relating to capitalization may be fined and imprisoned. Likewise they may be fined and imprisoned if they countenance stock and bond issues contrary to the methods laid down in the bill.

The bill seeks to put a restriction upon the activities of railway officials. It prohibits them from accepting compensation from any concerns that undertake to finance railway operations. It also attempts to put a limitation upon the salaries of railway officials. The section applying in this connection reads as follows: "It shall be unlawful for any officer, director, or directory to appropriate, pay, or receive as salaries or dividends any money resulting from the sale of stocks or bonds, or from any other source except from the earnings of railroads, and from the earnings only after proper provision shall have been made for the upkeep of the roadbed, its equipment and facilities."

All the information obtained by the commission relative to stock and bond issues to be made public by the commission in such form as it deems proper. The commission is given authority to examine the books and papers of railway companies, and may require carriers to "discuss every interest of the directors in any transaction under investigation."

In the report of the bill filed by Chairman Adamson of the committee, this statement is made: "The provisions of the bill can be enforced effectively through two provisions. One is by injunction against unlawful conduct and the other is by punishment in the courts of persons who violate the law. As to those persons who practice wholesale speculation and manipulation in stocks and bonds, known in the past as magnificent wreckers of railroad systems, we have left the punishment in the discretion of the courts, as it is thought proper to leave to the courts the full limit of human ingenuity in inflicting punishment on those who injure commerce and the prosperity of the country by crippling the great systems of transportation."

As a part of its campaign to improve agricultural methods, the Pennsylvania Railroad is to distribute among the farmers along its lines 10,000 copies of a book describing the possible uses of concrete on the farm. The distribution of these books will be made through the office of the railroad agriculturist.

RAILWAY REVIEW

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CORRESPONDENCE.—Information concerning any matter of railway or engineering news is invited. We desire to receive particulars of changes in the personnel or organization of railways; of work projected or of the improvement of existing roads; bids asked or contracts let; new structures or new equipment; experiments with new devices or methods; adoption of new rules or practice; methods of maintenance; changes in the supply and equipment trade and advice of important sales or orders. Railway or engineering literature, including trade catalogues and circulars describing new devices and appliances, will receive attention if sent to this office. Our columns are available for criticism or comment on articles published, and for expression of opinion on any subject of railway business or management, if of an impersonal nature and of general application. All matters for editorial purposes should be addressed to the Chicago office.

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SATURDAY, MAY 16, 1914.

According to Washington correspondents the appointment of a civil engineer to take charge of the surveys and preliminary work of construction of the railways the government is to build in Alaska, is disappointing to those who believed the entire work should be intrusted to the army engineers. A military engineer has been appointed as assistant; but placing a civil engineer at the head seems to be a concession in favor of the superior ability of civilians for this work. It appears, however, that Col. Goethals recommended the plan which has been adopted, and the Secretary of the Interior and the President acted on his recommendation. Col. Goethals himself has credited the civil engineers with the important work they did at Panama; and he evidently is not in sympathy with the prevalent Washington idea of the superiority of military over civil engineers for everything.

Senators from Iowa and Wisconsin proclaim it to be a shame that citizens of various parts of the country, either as individuals or as organizations, have endeavored to let the Interstate Commerce Commission know that they favor the railway rate increase. It is possible that many useless letters have been written,

but it is not probable that the commissioners have been unduly burdened by their perusal. They are public servants and should be guided to a reasonable extent by public sentiment on matters of fact and policy. The decision will be a matter of policy—not of abstract right or of law. The Commission is not a court of law but an administrative body. The self-advertising attacks of Cummins and La Follette are aimed at the freedom of the press and of the citizen. They have met with no sympathetic response that we can observe. It would be unfortunate for the Commission to close its ears to all but the lawyers.

Clifford Thorne bobs up again, after the case is closed, with a supplementary brief which is a howl of rage. While the honorable senators mentioned above would bar commercial organizations and business men generally from addressing communications to the Commission, any lawyer can enter an appearance on his own "say so," and occupy the time of that body. Thorne did not have the authority of his own Iowa board to represent them. As his claim to do so is proven false there is no good reason to believe his other claims that he represented seven other states, etc. And now he comes out with a supplementary brief abusing Mr. Brandeis and threatening the Commission. In fact, his whole testimony and argument were an insult to the intelligence of the Commission. Brandeis in his closing argument admitted the need of the railways for more revenue. This infuriated Thorne. "Whom the gods would destroy, they first make mad."

Among his choice tirades and epithets, he accuses Brandeis of actually going to the railroad side of the case, and speaks of him as "our brilliant Boston friend," "a second Daniel," "our brilliant Boston philosopher and economist," etc., ridiculing his "still hunt for leeches" and denouncing his "utter disregard and absolute neglect to consider basic issues involved."

Not content with this performance in what purports to be a legal brief, he threatens the Commission with terrible things if it agrees with Brandeis and does not take Thorne's own view of the case and absolutely refuse any increase. "It will be a sad, sad day, etc." If the Commission permits this abusive brief to be filed after the case was closed, it seems to open the door to any ranter or brainless crank who comes at any time as a lawyer. Do the honorable senators from Iowa and Wisconsin approve of Thorne? Apparently they do, while declaiming against the solid business interests of the country which have thought that the one right of expressing their views to their public servants was still left to them.

The doctors disagree. The Senate of the United States ordered the Interstate Commerce Commission to investigate the New Haven Railroad history.

When the Commission proceeds to put the former president and directors of the company on the witness stand, the Attorney General objects to the process on the ground that their testimony will give them immunity from prosecution. The reply is made that he had previously reported that they could not be successfully prosecuted under existing laws; and that it is most important to know the facts as a basis for new legislation. The Attorney General declares that the reorganization which he has forced upon the company will be seriously impeded by this investigation and the publicity given it; and appeals to the Senate to stop the matter. Some acrimony seems to have been developed between the Department of Justice and the Commission as represented by Mr. McChord and Mr. Folk. Mr. Mellen was placed on the stand Thursday, but the examination was merely introductory, and was then postponed until next week. Mr. Mellen's counsel declared that he is willing and desirous of telling all he knows; and when asked his occupation he himself smilingly said "Assistant to the Interstate Commerce Commission."

The ponderous effort of Senator La Follette was briefly but completely answered by President Daniel Willard, of the B. & O., in his closing address to the Commission. He detailed simply the efforts of the railway companies to put their case fairly before the public; and it is inconceivable that any fair minded man could object to what was done. The Senator's effort really fell still-born, although it cost the Government some \$12,000 to print it in the records—a gross waste of public funds for which the only excuse is the Senator's own political ambition. By the way, the question of who provided the considerable sum expended by Thorne, is a pertinent one. He is said to have explained that his expenses were or would be provided by the Iowa board, of which he is chairman. The other two members of the board do not agree with this statement.

President Wilson's program of federal legislation for the regulation of big business, enunciated with the beginning of the current year as embodied in five bills at that time in course of preparation, has been revised, and is now comprised, according to the latest announcement of the administration, in a trio of bills. All of these have now been favorably reported out of committees, and it is understood to be the intention of the administration to insist upon disposal of them before adjournment of congress, which everybody hopes will be accomplished before July 1. The first of the trio of measures is the Clayton bill, which supplements the Sherman anti-trust law, defining and extending certain provisions against restraints and monopolies; in reference to the terms of which we published an interesting contribution by Arthur Wyman, on page 712 of last week's issue. The second of the three bills is the Covington bill creating an interstate trade commission, the

terms of which were summarized also in our issue of May 9. The latest and last of the trio was favorably reported to the house this week. It is the administration's plan for federal control of issues of railroad securities, and its provisions are given in abstract elsewhere in the present issue.

The legislation as now framed contains many radical ideas. If it is passed in this form it will demand decided changes in business methods and in the general practices of trade and commerce. All of the bills are drastic, it is hard to say which more drastic than the others. It is important that business interests of the country should give serious attention to all of them, for the probability is that the proposed legislation will be pushed to a conclusion, in spite of the distractions of war or other complications which may apparently be overshadowing congressional interest. The house is understood to be pretty well committed to the radical measures. The senate may be inclined to listen to the advice of those who see the necessity of proceeding with caution in matters of such large consequence. Public hearings upon the subject are now in progress, and some of the country's prominent railroad officials have already offered testimony. As evidencing the common attitude of large business men in relation to the bills, Frank Trumbull, chairman of the boards of the Chesapeake & Ohio and Missouri, Kansas & Texas systems, exclaimed in the course of his testimony, on Monday: "You are trying to burn down a big barn to get at a few rats."

Proposed National Board of Mediation and Conciliation.

The United States Commission on Industrial Relations has under consideration a tentative draft of a bill which its staff has prepared, creating a national board of mediation and conciliation to deal with all strikes and lockouts in any part of the country that seem likely to involve the federal government. This tentative draft, like that of the bill for a national bureau of labor exchange, mentioned editorially May 2, will be made the subject of public hearings. These sessions will begin in New York city, May 18, and copies of the draft of the bill will be sent out to the public, with requests for criticisms and suggestions.

The bill as provisionally drawn up provides strictly for voluntary conciliation, and expressly denies to the board any compulsory powers of arbitration or prohibition of strikes or lockouts. In this respect it avoids all conflict over any question of state or interstate jurisdiction.

A memorandum accompanying the bill points out that within the past year congress has been called upon to investigate strikes in the three states of West Virginia, Michigan and Colorado, and that in the latter state federal troops had to be called in. All of those strikes involved interstate shipment of gunmen and strike breakers. A precedent for a federal commission is

found in the anthracite coal strike commission of 1902, which settled the great strike in Pennsylvania. It is pointed out that all efforts at conciliation in recent strikes have failed, and that if the federal government is compelled to intervene after matters have reached a crisis, it is advisable that the government should have a permanent board, representing the entire nation and having the confidence of both employers and employees, to intervene at the very inception of such disputes.

The bill is modeled somewhat after the plan of the Newlands act creating the present board of conciliation and mediation for dealing with disputes on railways. The great success of both the Erdman and Newlands acts in preventing strikes, suggests in the view of the commission, that a similar agency might prevent other strikes, or at least prevent their reaching violence and bloodshed. The commission has authorized extensive investigations of the workings of other boards of mediation and conciliation in the various states and in foreign countries, and the tentative bill is the first result of these investigations.

One of the important features of the bill is its plan for co-operation with state boards of mediation whenever such exist, and its plan for joining with such boards in any section of the country for united action whenever a dispute extends beyond the limits of a single state.

Improved Methods of Handling Concrete.

The use of concrete and reinforced concrete having now become so nearly universal for foundation and masonry construction in engineering work, any development in methods to economize in the handling of the same is, obviously, far reaching. Labor being a large factor in the cost of handling the materials to and from the mixing plant, the effort to economize in this direction has been largely to secure direct and expeditious movements and to increase the volume of the unit mass in such movements. The mixing of concrete by hand on large works has become almost obsolete and is not now practiced except where the conditions are unusual. Power mixing being the method everywhere employed, it has remained to work out for each situation the least laborious methods of handling the materials that may be consistent with continuity of operations.

Last fall we commented in these columns on the then new scheme of shipping cement in bulk, and handling it to the mixer direct from carload lots, on large undertakings. We then mentioned two railroads which had adopted this method in track elevation work last year, where important economies had been realized, in contrast with the usual plan of handling cement in sacks. One of the large manufacturers of cement reports gratifying progress in this method of shipping cement and handling it on the work, and tells of some interesting comment on the part of an engineer who recently addressed one of the company's agents as follows: "The more I think of this, the more I am convinced, young man, that you have no business to be here." At first

the agent did not catch his meaning, so he asked for an explanation, "I mean," said the engineer, "that things ought to be reversed. Instead of your coming to my office and persuading me to take cement in bulk, I should have gone to your office years ago and insisted on your shipping me bulk cement."

In moving the material from the mixer to the forms, tram tracks and dump cars are now very commonly used, or even horses and dump carts, where formerly the wheelbarrow was commonly found. In tunnel work it is customary to mix the material on the outside and transport it to the forms in the tunnel by cars running on an elevated track. Elevating buckets in towers, dumping into chutes for distribution over considerable areas, as at bridge pier sites, building construction, etc., have become a familiar method in practice. In building a series of piers for a bridge, as in the case of a viaduct across a valley, it is now usual to find the mixed material being transported to the different forms by tram track and car from a single set-up of the mixing plant, or in the case of even a long side hill, the material may be spouted to final position direct from the mixer. For the building of long continuous structures, as retaining walls in track elevation, the mixing plant is made portable, usually on a car or other plant on wheels, and is moved ahead as the forms are filled; or the concrete may be piped to the forms by compressed air, as was described in this journal two months ago.

Important economies have also been made in reducing the amount of lumber required in forms, as well as the time required to erect and remove forms. In tunnel work the arched traveler, to support the form for the overhead work, is now commonly used, and the same lumber can be employed repeatedly without cutting. The waste of lumber in forms for concrete work has in many instances been very considerable, the cost of the same amounting to a large percentage of the cost of the work.

A method that is now being employed by the Chicago, Rock Island & Pacific Ry. in building a high retaining wall in track elevation work is interesting in connection with this question of reducing the amount of lumber required in the forms. The wall is being built in alternate sections of about 25 ft. length, and, instead of erecting a staging or framework, in place, for backing up the form planks, a wide-gage track has been laid, with a rail on either side of the wall foundation, and on this track there is a traveler, constructed of timbers and braced, much after the fashion of travelers used in bridge erection. This traveler spans or straddles the wall foundation, and is so constructed that it provides a line of posts to back up the form planking on either side of the wall to be built. The planks do not bear directly against the said posts, there being intervening removable chocks, which can be quickly knocked out of place when it is desired to take down the form planks or sheathing. Two of these travelers are used, alternately, the concrete in the forms supported by one of them being in process of setting while the forms in the

other traveler are being filled. The manner of handling the material is as usual, there being a portable mixing plant on a car, with an elevating tower for spouting the material into the top of the forms, the wall being quite high, perhaps 30 feet above foundation. By this method

a minimum of lumber is required for the forms. The work proceeds continuously, one of the travelers being used in advance to mold alternate sections of the wall, while the other follows in rear and is used for filling in the sections left vacant by the first one.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

One Way of Looking at Things.

The Wall Street Journal diagnoses the railway situation as follows:

"It is a common belief that fashions return. There is a recurrence in recognizable features, but in every department of human progress there is never a complete reproduction of the old. Transportation is progressive and is shifting, as any other fashion. It has of late been an era of express trains, monster locomotives, steel cars, heavy rails and hundred-million-dollar railroad terminals. That era is ended. The country could not stand the pace. Accidents to express trains become too common over the whole world. Railroad credit could not stand the strain of re-equipping and rebuilding with heavier bridges, rock ballast and heavy rails.

"The public has refused to pay the bill. The passenger rates throughout the country have become unprofitable. We must get back to slower trains and lighter equipment and give freight cars a little more right of way in the daytime. When it has come down to an average movement of only ten miles per day for freight cars there is need of reform in railroad motion. The swelling of the capital account on railroads for improvements and increased facilities for the public must stop. The pace has been set too high in railroad passenger competition."

Free-For-All Railroads.

"Government ownership of railroads produces results that were not contemplated by those who first advocated such a policy. By the agreement under which the provinces of the Dominion were confederated, Canada was forced to build the Intercolonial Railway because no private corporation would undertake it on terms that the people would sanction. This railroad has never paid interest on the investment and has seldom been operated without a yearly deficit. The Canadian Minister of Railways now in office has been fired with ambition to make this white elephant pay and he has put experienced railroad men in charge of it. These experts proceeded to do the only possible things to make both ends meet, they raised the rates. From Montreal to Halifax the people living along the line of this railroad are up in arms against the increase in transportation charges and the party in opposition is making the most of the opportunity.

"Canada has spent many millions of dollars and is about to spend still greater sums on its canals. These canals are free to all shipping, including vessels that fly the flag of the United States and other foreign countries. The Province of Ontario and the grain-growing provinces of the Far West benefit greatly by this canal traffic, which makes transportation cheaper and tends to put a check on the rates charged by the railroads.

"Now, come the people of the eastern provinces, who say that if the wealthy western provinces can use the canals free of charge and can get the government to improve them at great expense so that they may be navigated by ocean-going vessels, they of the east are just as much entitled to have the Intercolonial railway run independent of a profit and, that so long as it pays its way, the Dominion should charge nothing for its

use in the shape of getting any returns on capital account because it foregoes the receipt of such returns on account of the money that has been spent on the canals.

"This dispute between the eastern and western provinces of Canada should give us pause. If we on this side of the line listen to the arguments in favor of government ownership of railroads, sooner or later we will be confronted with a similar demand that the railroads shall not be run for profit because the canals and the improved waterways of this country are not sources of revenue for either the federal or the state governments. What is happening in Canada throws light on what will happen in this country if we listen to the demands of the advocates of government ownership. Canada is populated by similar classes of people and conditions are very much the same there as they are here. It is therefore reasonable to infer that we would finally land just where the Canadians now find themselves as a result of government ownership of the railroad which, it is true, they could not avoid. We can avoid government ownership and the experience of our northern neighbor should make us very desirous to keep out of it."—New York Commercial.

High-Power Headlight Legislation.

In mentioning last week, in these columns, the fact that the Illinois Public Utilities Commission had fixed a date after which the new high-power locomotive headlight law will be enforced, we referred to the law, by inadvertence, as the "new electric headlight law." This was a mistake, for the statute in question does not specify the kind of light, but only makes requisite a degree of illumination for passenger engines which will render an object clearly distinguishable 800 ft. away, and 450 ft. for freight engines. We stand corrected in the matter by a letter from Oscar F. Ostby, chairman of the International Acetylene Association, 42nd street and Madison avenue, New York City, from whose letter some further extracts follow:

"The Illinois headlight law does not necessarily mean electric, but any light which will show an object at the specified distances will comply. However, the specific distance at which objects can be seen under varying conditions has not been definitely settled, and a law that specifies the distance an object can be seen speaks of an unknown quantity. This distance depends upon the vision of the engineer, atmospheric conditions, amount of light furnished by the moon, the relative color of the object on the track and the roadbed, as well as surrounding conditions. It may be that the electric arc headlight will distinctly outline an object at the specified distances under all conditions, but that point has not been settled, and it may be that there are other lights which will do it, and, although the Illinois law is vague, it cannot rightfully be considered an electric headlight law.

"It would be interesting to know how the distances called for in the Illinois law were arrived at by the legislators who drafted and passed this legislation. Did they conduct a series of tests to ascertain that such lights would materially

increase the safety of railroads at night, and just what kind of tests were made to show that minimum of 800 and 450 ft. are the proper ranges of vision? Is the Illinois commission convinced that the introduction of high power headlights may not increase danger of night operation? The exhaustive tests made by the Master Mechanics' Association headlight committee would certainly lead one to believe that the disadvantages of the high-power electric headlight out-

weigh its advantages, and such evidence should be sufficient grounds for any reasonable commission to go slow.

"The action of the Illinois commission in not granting the request of the railroads in this case seems unfair, and it would almost appear that certain interests are over-anxious in forcing the railroads to comply with an unreasonable law which does not take natural laws and conditions into consideration."

Fundamental Characteristics of Signal Lenses

The purpose of lenses in signal lamps and how these are designed to accomplish various results. Illustrations of lenses of different types, with data of candle power on the axis, and the spread, for each, as prepared by the Adams & Westlake Co. and published by their permission.

The primary purpose of a signal lens is to control the distribution of the light of the burner, and this is accomplished without increasing or appreciably diminishing the volume of light at the source. The light from a naked lamp diverges so that only a small portion of the light falls upon the eye of the observer. The effect of the lens is to concentrate the rays of light which are refracted through it, and this process may be carried to the point where all the light falling upon the lens may be so focused as to fall upon one spot; but in practical signal service such an extreme result is not desired, since the indication should be visible from more than one position in the general direction of the track.

On tangent track, where the engineer's movement is practically in a constant direction with respect to the signal, it is possible to concentrate the light in a narrow beam and make it visible over a long distance. Should it be desirable not to diminish the spread of the beam horizontally, as in Fresnels for marine service, all that can be done is to converge the light toward the horizontal plane. Obviously the wider the area over which the light is distributed, the shorter will be the distance at which the signal can be seen. For comparison, a 5 $\frac{3}{8}$ -inch standard optical lens gives 69 beam candle power, while an 8-inch Fresnel, with the same source of light, gives only 9.1 beam candle power, or less than one-seventh as much.

It should be borne in mind that with the same flame and lenses of the same design and focal length, the beam candle power of the signal increases or diminishes in proportion to the square of the diameter of the lens,—in other words, in proportion to the area. Thus the advantage of using a large lens is apparent. For example, by increasing from a

5-in. to a 5 $\frac{3}{8}$ -in. lens, the candle power is raised from 57 to 69, or twenty per cent, and the effectiveness of the signal is increased proportionately. Further, the spread will increase as the dimensions of the source of light increase, and as the focal length decreases.

Atmospheric conditions largely determine the distance at which any signal is effective. Under like conditions, the range of visibility varies in proportion to the square root of the candle power of the beam.

Below are data of the sizes, foci, candle power, and spread in feet per hundred with one-day and long-time burners, and the various types of signal lenses now in use. In securing the figures, the flame of the one-day burner was adjusted to give 2 candle power, and that of the long-time burner to give 1 candle power. The spread was measured at right angles to the axis of the beam at 100 ft., and the figure given is the maximum spread in feet at that distance. The same ratio is maintained at all distances,—that is, a spread of 15 ft. at 100 ft. in distance indicates a spread of 150 ft. at a distance of 1000 ft. from the lamp.

In obtaining these figures, the flame was set at right angles to the axis of the lens. About 25 per cent more candle power can be obtained along the axis by setting the flame at a 45-deg. angle to the lens axis—as is the practice in four-way switch lamps—but there is a corresponding loss in spread.

It will be seen that with most lenses the long-time burner gives a beam of greater candle power than the one-day. This is due to the greater intrinsic brilliancy of the long-time burner flame because of more perfect combustion.

The standard optical semaphore lens (Fig. 1) has been in universal use since 1905 in practically all types of railroad signal lamps. It is so designed that the greatest possible amount of light falling upon its surface is utilized, and it directs this light in a concentrated beam so that the signal can be seen for a maximum distance. These lenses

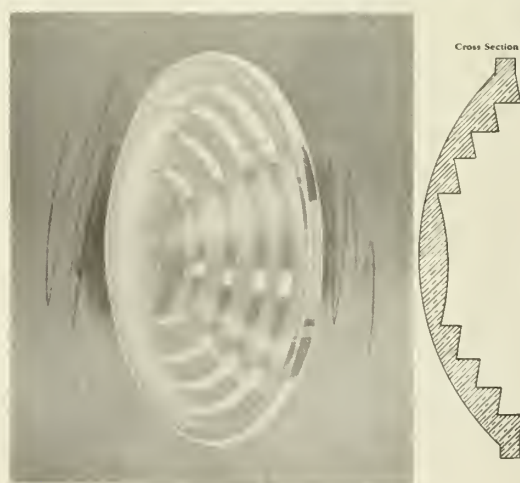


Fig. 1—Standard Optical Semaphore Lens.

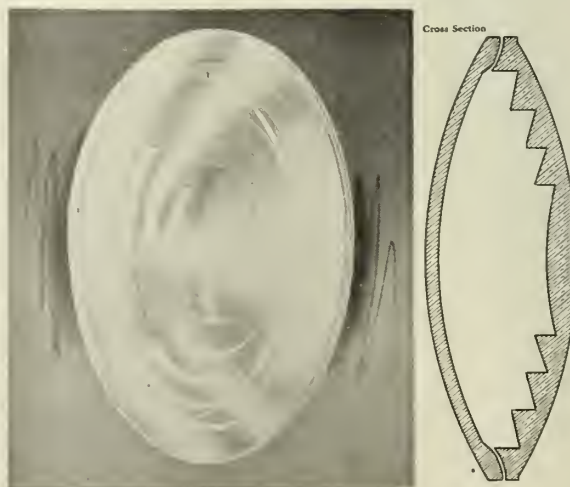


Fig. 2—Inverted Lens with Cover Glass.

have sufficient spread to insure the signal being picked up at long range, provided the lamps are not set at points where the track curves sharply. The data of candle power and spread for one-day and long-time burners, with a 5⅜-in. lens, 3½-in. focus, are as follows:

Burner	Candle Power along axis	Spread in feet per 100
One-day (2 c. p.)	56.2	22.6
Long-time (1 c. p.)	69	14

The inverted lens (Fig. 2) with cover glass was designed to meet the demand for a lens with greater spread and approximately the same range as the optical type. This lens without the cover glass has practically the same candle power as the optical lens, and with the cover glass it has

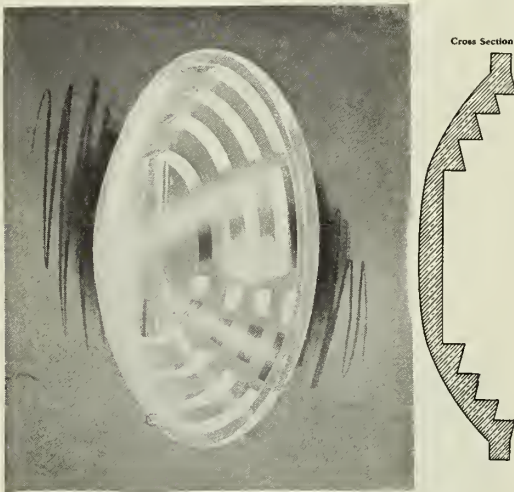


Fig. 3—Wide-Angle Lens.

within 10 per cent of the candle power of the optical lens, at the same time giving an increase in extreme spread of approximately 35 per cent. When used with a cover glass it presents two smooth and easily-cleaned surfaces. The inverted lens is being adopted for use in many signal lamps where special conditions make increased spread advantageous. The candle power along the axis of a 5⅜-in. lens, with 3½-in. focus, is 55.3 for the one-day burner and 66.8 for the long-time burner. The spread is 30.3 and 16.75, respectively, for the two kinds of burners.

The wide-angle lens (Fig. 3), although similar to the optical lens in general appearance, is designed to spread the beam over a wider area, so that by placing the lens in the standard lamp the signal will be visible through a wider angle, but with reduced intensity and range. It is well adapted to switch lamps in a yard where high intensity of light is not required, but where a rather wide spread is desirable. Wide-angle lenses are not recommended for long range service. Based on the use of a 5⅜-in. lens the candle powers along the axis for one-day and long-time burners, respectively, are 16.6 and 11½, and the spread in the two cases is 44½ and 34.

"Spreadlite" lenses (Fig. 4) are the latest modification of the series of round lenses. They afford a compromise between the high candle power of the optical and inverted lenses and the relatively diminished candle power of the wide-angle lens. Convex panels on the convex face produce an elongated spread of nearly 35 deg.—in other words, sufficient to cover a 3 deg. curve at 2500 ft.. These lenses have been designed in "smooth face" and inverted types, and have more than double the intensity on the axis possible with a Fresnel lens. The visible illuminated area of this lens being far greater than that of the Fresnel produces a very effective signal, and is equally satisfactory with long-time and one-day burners. A further advantage in

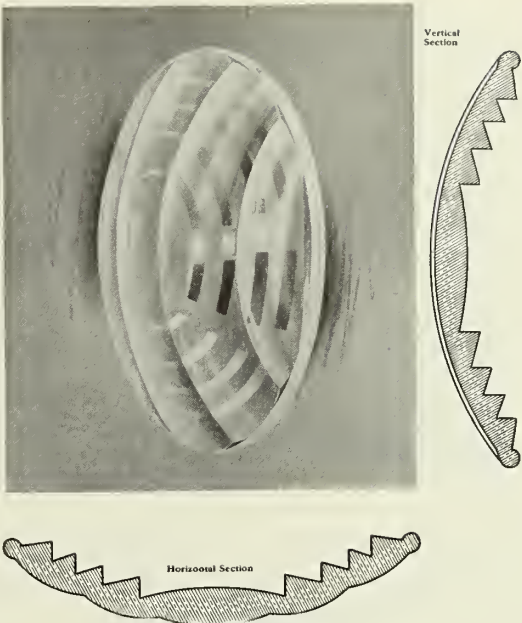


Fig. 4—"Spreadlite" Lens.

the use of these lenses lies in the fact that they do not require special lamp bodies, and can be substituted for lenses of the same size in existing service where a wider spread is considered advantageous.

The data for the "smooth face" type, with one-day and long-time burners, respectively, are: candle powers along the axis, 33.3 and 27; spread, 60 and 65. The corresponding data for the inverted type are: candle powers, 40.2 and 32.7; spread, 63.2 and 61.6. The size of lens in each case is 5⅜ in.

There has been discussion as to the advisability of equipping some lamps with lenses of still wider spread. Experience has shown that the inverted and spreadlite lenses, previously described, fulfill all requirements. The wide-angle lens is also useful under certain conditions. All these lenses have the marked advantage that they fit the present standard lamps.

To meet special cases where a wide spread of relatively high intensity is required, a special type of Fresnel known as the "duplex" lens (Fig. 5) has been designed. This lens is, for its size, the most powerful type of Fresnel which



Fig. 5—Duplex Lens.



Fig. 6—120-Deg. Compound Fresnel Lens.

has ever been produced. By means of suitable prismatic corrugations it confines the light received on 70 deg. of its cylindrical surface to a spread of approximately 35 deg., thereby affording double the intensity of illumination possible with a Fresnel of similar dimensions. The "duplex" lens prevents any possible confusion of signals, such as is likely to occur where Fresnels having an excessive spread of beam are used in lamps which are inaccurately aligned. The utmost care must necessarily be exercised with wide-spreading Fresnels to prevent false indications, especially on curves. Too much spread is worse than too little. Based on the use of a 5-in. lens, the candle powers along the axis for one-day and long-time burners, respectively, are: $27\frac{1}{2}$ and 13.7. The corresponding data for spread are 61 and 52.

The design of the 120-deg. compound Fresnel lens (Fig. 6) presents a novel type of sectional Fresnel, and was primarily made for use in classification signal lamps to meet the suggestion that an observer might pick up classification signals more readily if there were several beams of light in place of only two, as on the standard classification lamp. Of necessity the beams of this new lens are weaker than those of the standard optical semaphore lens, but four separate beams are projected. One beam is parallel to the

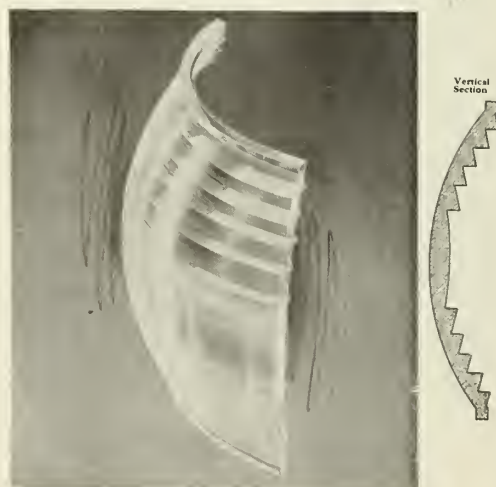


Fig. 7—Smooth-Face Fresnel Lens.

track, one is at a right angle to the track, while the other two are spread intermediately between. This Fresnel has a smooth outer surface, and consequently has no ledges to collect dirt, snow or sleet. The candle power along each axis for one-day burner is $22\frac{1}{2}$ and the spread $45\frac{1}{2}$.

The smooth-face Fresnel lens (Fig. 7) was introduced in 1906 for use in a rear-end platform lamp to secure a maximum spread. By having the corrugations on the inside and a smooth surface on the outside, no snow or dirt can collect upon the outer surface. Due to its short range of visibility it is not recommended except with a high-candle-power burner. In combination with a powerful 10 c. p. burner, it has produced excellent results. It may be used to supplement the standard tail or marker lamps with their penetrating signals, if extremely sharp curves are to be considered. At present it is made in two sizes—45 and 90 deg., 7 in. high, on which basis the candle powers for one-day and long-time burners, respectively, are $12\frac{1}{2}$ and 10.2; and the spread in each case is 200.

Fresnel lenses (Fig. 8) are seldom used in railway service, except as required in lamps on bridges over navigable rivers. Eight inches is the standard height, as called for by the United States Light House Commission. All such lenses are furnished in exact conformity with their requirements. The candle power for the one-day burner is $11\frac{1}{2}$ and for the long-time burner 9.1. It can, obviously, be seen



Fig. 8—Fresnel Lens.

through a horizontal angle as wide as that subtended by the lens.

Roundels (Fig. 9), which are not lenses, are discs of the same color and glass as the standard lenses, insuring a uniformity of colors in all signals. Since they are molded, they are structurally very strong. They can be furnished in all standard colors and sizes called for in present day signal practice. At the present time, all colors for lenses as well as roundels are being furnished according to the Railway Signal Association Specifications. Further developments are in progress, which will shortly insure still greater efficiency. During this development the necessity for distinct color with maximum intensity has been kept in mind at all times, and in consequence the new glasses are called "high transmission" colors.

The use of a reflector with a lens imposes special requirements. It is necessary to redirect the light falling upon the reflector in such a way that it passes back through the source and the lens. This the prism glass reflector (Fig. 10) does in a most efficient manner.

The increase in signal efficiency effected by the use of the prism glass reflector varies with the size and focus of the lens and reflector. By reflecting through the lens some

of the light given off by the burner which would not otherwise fall on the lens, the prism glass reflector usually increases the signal efficiency 15 to 20 per cent. The size commonly used in railway semaphore lamps is $3\frac{3}{8}$ -in. diameter and $1\frac{1}{4}$ -in. focus.

The prism glass reflector has a further advantage over metal reflectors in that it will not tarnish and lose its reflecting properties. Should it become soiled, it can always be restored to its initial efficiency by washing.

Convention of the Air Brake Association.

(Continued from page 706.)

ONE HUNDRED PERCENT EFFICIENCY IN FREIGHT TRAIN BRAKES.

On Thursday morning the proceedings were begun with the reading of a brief paper on the above subject, that had been prepared by Fred von Bergen, Nashville, Chattanooga & St. Louis Ry. The author of the paper sought to dismiss the subject on the grounds of its total impracticability, but nevertheless, a very lively and interesting discussion was thereby precipitated, the tenor of which was that, however impossible this absolute ideal might be of attainment, it was incumbent on the association and its members individually to keep up consistent efforts with that end in view in order that positive retrogression may be avoided.

The methods at present in vogue on the Atchison, Topeka

reference to co-operation with the Master Car Builder' Association in having the rules of interchange revised to include more of the air brake derangements under the category of owner's defects. The effect of such an arrangement, it was argued, would be to discount much of the objections now raised against air brake repair bills and result in greater encouragement in keeping the brakes of foreign cars in good operating condition. Various means of effecting generally improved conditions as respects brake operation were suggested, one of them being a permanent committee of the association assigned to the duty of securing the co-operation of the higher railway officials. No action of this kind, however, was taken.

THE ELECTRO-PNEUMATIC SIGNAL SYSTEM FOR PASSENGER TRAINS.

The above subject was covered in a paper read by L. N. Armstrong, Pennsylvania R. R., who described the apparatus employed on the multiple unit trains running on the West Jersey & Seashore R. R. between Camden and Atlantic City, N. J. This form of signal was developed a few years ago to meet the needs of roads that were using multiple unit electric cars to handle suburban service, at which time the signal equipment on the cars consisted of an ordinary gong with rope extending through the car, necessitating trainmen on each car to pass signal along from car to car until front end of train was reached.

In developing his paper on this subject, Mr. Armstrong



Fig. 9—Roundel.

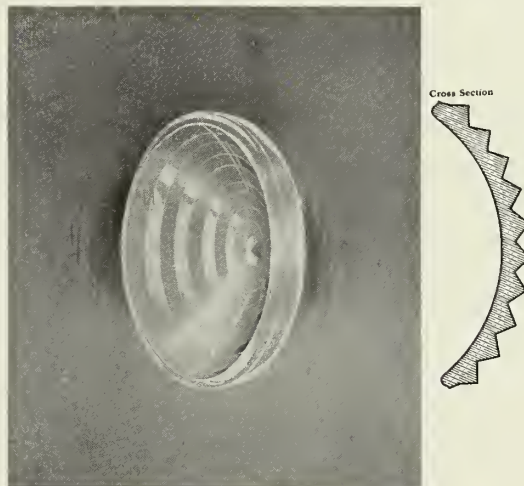


Fig. 10—Prism Glass Reflector.

& Santa Fe Ry., on which line 100 per cent of operative brakes on all cars of all trains are demanded, come in for considerable discussion. It was pointed out that to apply this rule inflexibly, it was necessary to have the co-operation of the transportation department in order that the necessary detentions to allow time for the repair of brake apparatus found defective in trains, may be countenanced. While it was conceded a thing difficult of attainment, much encouragement appears to have been given the mechanical department of this road in this work in providing facilities, such as the piping of all yard and warehouse tracks where air is needed for testing purposes. Yards wherein this work is given particular attention, are selected with reference to their adaptability on the basis of minimum delay to traffic, in spite of which, however, more or less objectionable delays are bound to occur. The conditions in the western mountains were cited as showing the importance of high freight train brake efficiency and how burdensome the effort in this direction becomes when a road is practically alone in a given territory in its efforts to accomplish these results. The general co-operation of all roads in behalf of this movement was solicited.

Other important points bearing on this subject were with

explained that to have applied the pneumatically operated signal to trains of this kind, in which each car can be used as a locomotive and on arrival at terminal rear car arriving becomes leading car departing, it would have been necessary to apply additional line of pipe and hose connections between cars as well as equip each car with train signal reducing valve and signal valve, and provide means to cut this equipment out of service on all except leading car. In seeking a solution to this problem experiments were made with a buzzer system, which gave good results, except that the noise of passing trains on adjacent tracks drowned the noise of the buzzer. The final substitution of the air whistle for the buzzer proved to be entirely satisfactory for purposes of intercommunication between the several cars of the trains referred to.

It was remarked that the present standard pneumatic train air signal used on steam trains has its limitations, and its operation on long trains is far from satisfactory for the following reasons: Where large volumes of air are used, the signal valve has to be very delicately adjusted; considerable time must elapse from the time cord is pulled until signal reaches locomotive; several seconds must be allowed for the wave action of the air to subside and the line to recharge before another signal can be transmitted; false signals are

given, caused by leaks in the signal line, even if signal line is tight at beginning of run, as the long cars now in use when going over crossovers swing far enough to cause leaks at signal hose couplings.

A test train, consisting of an engine and twelve steel cars, equipped with the electro-pneumatic signal apparatus, was operated for a period of four months, on the Pennsylvania Railroad, with such satisfactory results that this type of signal was recommended to be applied to all new equipment. This will eventually result in removing the train signal pipe and hose from the equipment, which will no doubt show a considerable decrease in the expense of maintaining same, and at the same time result in fewer detentions from signal failures, as well as quicken the operation of suburban trains, when starting by the use of the communicating signal since the successful use of electricity as an agent in transmitting the signal from the cars to the locomotive has been demonstrated, and constant additions to the equipment of passenger cars in the form of electric generators and storage batteries for lighting or other purposes, are being made, it seems reasonable to anticipate that the day is not far distant when the electro-pneumatic signal will be in common use on steam as well as on electrically operated trains.

MODERN TRAIN BUILDING.

George W. Noland, Pittsburgh, Cincinnati, Chicago & St. Louis Ry., next read a paper on the subject of Modern Train Building, his treatment of the subject being with more particular reference to the prevention of break-in-twos from weak draft connections. In the paper, a strong appeal was made for the weeding out of the old and light cars from the forward ends of heavy trains and instances were cited where with a very nominal amount of switching, the safety of the train in getting over the road without accident of this kind could be very materially enhanced. It was shown that it is frequently advisable to remove such cars from the train altogether, attaching them to other trains bound to the same destination, and substituting for them a fewer number of heavier cars with the effect that the train is in that manner made uniform throughout, being at the same time shorter and easier to handle.

The discussion of this subject naturally partook of the nature of a consideration of the matter of train makeup from a brake manipulating standpoint which was not the point of view from which the author had chosen to present the subject. The question of the distribution of loads and empties throughout the train occupied a considerable portion of the attention given the subject, during which time many endorsements of the plans formulated by F. B. Farmer in his paper before the Chicago convention of the association in 1911, were expressed, indicating the very great value of that treatise to those men interested in the air brake from the train handling standpoint. While the expediency of Mr. Noland's recommendations under some conditions of operation, was questioned, he was able to demonstrate in closing, that the extra effort required to effect the improvements in train make-up which he advocates, are well worth while.

RECOMMENDED PRACTICE.

The committee on Recommended Practice, in its report, made three recommendations only. Two of these respecting the matter of standard draw on the piston rods of air compressors and that brake cylinders be cleaned at three-month intervals, were adopted; the third, proposing that "on postal and baggage cars having blind ends two retaining valves should be provided; the same placed in the piping in tandem, one at a convenient place on end of car on the outside, the other at a convenient and unobstructed place on inside of car, and to be of such design that the turning up of either one or both will retain the desired brake cylinder pressure," was referred back to the committee.

The business of the convention was closed with the reports of the temporary committees on thanks, constitution and by-laws, and with the election of officers for the ensuing year. A resolution was introduced and carried, providing for a change in the by-laws whereby members of the executive committee will hereafter be nominated and elected from the floor of the convention, instead of being selected with the other officers, by the nominating committee as heretofore. Other changes in the constitution and by-laws were to the effect that hereafter the secretary and the treasurer of the association be deprived of membership in the executive committee and also that the term of service of such members be made five instead of three years, as heretofore.

The result of the election was as follows: For president, L. H. Albers, New York Central & Hudson River R. R.; first vice-president, J. T. Slattery, Denver & Rio Grande R. R.; second vice-president, T. W. Dow, Erie R. R.; third vice-president, C. H. Weaver, Lake Shore & Michigan Southern Ry.; secretary, F. M. Nellis, Westinghouse Air Brake Co.; treasurer, Otto Best, Nathan Manufacturing Co., and members of the executive committee, C. W. Martin, Pennsylvania R. R.; F. J. Barry, New York, Ontario & Western R. R.; T. F. Lyons, Lake Shore & Michigan Southern Ry.; L. P. Streeter, Illinois Central R. R., and Mark Purcell, Northern Pacific Ry.

The enrollment at this year's convention showed that about 300 members and nearly 200 guests were in attendance. Special entertainment was provided in the form of automobile rides, matinee parties and shopping tours for the ladies and a vaudeville entertainment on Tuesday evening, the annual ball on Wednesday evening, a steamboat excursion on Thursday afternoon and a theatre party on Thursday evening, in which all members and guests participated. The selection of the city in which to hold next year's convention was left to the executive committee, their decision to be made the subject of announcement at a later date.

Railway and Engineering Literature.

PRACTICAL TREATISE ON SUB-AQUEOUS FOUNDATIONS.—By Charles Evan Fowler, consulting engineer. Published by John Wiley & Sons, Inc., New York; and by Chapman & Hall, Ltd., London, England. Cloth, 6x9 in., 814 pages; price \$7.50 net.

This extensive treatment of sub-aqueous foundations includes the coffer-dam process for piers and the work of dredges and dredging. All through the book there are cited numerous practical examples from actual work, and there is an unusual number of illustrations, both line drawings and half-tone pictures reproduced from photographs. This is the third edition, each one of which has been a revision and enlargement of a previous work. The first, published in 1898, was under the title "The Cofferdam Process for Piers;" in the next, published in 1904, the title was changed to "Ordinary Foundations, Including the Cofferdam Process for Piers." Particular chapters which have been elaborated upon are those on pile driving; metal sheet piling, the use of compressed air in caisson work, and bearing power of soils. Chapters on new subjects refer to the use of launches, tugs and scows; and quarrying riprap rock for use in foundations. The chapters on piers and wharves; dams, seawalls and retaining walls; dry docks and locks; and on cost of foundation work have been rewritten. In the ten years since the previous revision of this work, the technical periodicals have had to publish a large amount of data to keep abreast of progress in sub-aqueous foundations. Mr. Fowler's study of this progress appears to have been so carefully made that no essential phases of such engineering work have been overlooked in this valuable book.

* * *

La Salle Extension University, 2550 Michigan avenue, Chicago, has published "The Express Service and Rates." by W. H. Chandler, assistant manager traffic bureau, the Merchants' Association of New York. The work has an appendix of test questions, and numerous tables and charts, and consists of 340 pages. It is a book of timely and lively public interest. On February 1, of this year, the new express rates went into effect. The Interstate Commerce Commission's activity, the parcel post

competition, and other events are directing popular interest to this subject. The new publication covers the whole express field, from history, organization, and service to rates and classification. Express statistics and finance are subjects carefully treated; and both the old and the new rate-making systems are fully explained. The relation to the parcel post is also carefully discussed.

* * *

The Chicago Pneumatic Tool Co., Fisher building, Chicago, has issued bulletin E-32, superseding E-28, upon Duntley electric

tools for streets and interurban railways. The illustration on the cover page shows five Duntley electric track drills reaming joint holes on the tracks of the Pittsburgh Railways Co.

* * *

The type "J" standard gage locomotive crane manufactured by the McMyler Interstate Co., Bedford, O., is described in bulletin No. 30 lately issued by that company. The illustrations in this bulletin show the adaptability of these cranes to various kinds of heavy work, both on railways and in industrial plants.

The Railway Supply Man's Point of View

Proverbial philosophy often dominates men's better sense. "In times of drouth all signs of rain fail," so in times of dearth of railway orders some supply men seem to think there will be "no more cakes and ale." When orders come out after a constipated period they do not come at once to every one alike. Some things are needed with greater urgency than others. Some things can wait, although perhaps they ought not to. Some things of the highest economic importance come last when a railway is spending money; because a railway can be operated without them and there are other things which cannot possibly be dispensed with. The program of spending money is one of the greatest problems of railway management. There may be an improvement in railway supply business, although "it has not struck us yet." The man who at the present time is conservatively optimistic, hits off the situation about right. Just as sure as there is a future, that future brings better things. But each man seeks for signs and wants to know whether it is near or afar off. It generally comes when every one is looking the other way, "in such a time as ye think not." Some catch the glint of the rising sun before others; and there is a proverb about the early bird.

Are the more stringent specifications which the M. C. B. Association adopted for air-brake hose being lived up to and are the railways getting the better quality of hose which they called for? Certainly not if the price paid for the hose, in some cases, is a criterion. Specifications have no value if there is a tacit understanding that they are not to be strictly insisted upon. In materials of this kind a price much below the market is pretty sure evidence of inferior quality. Railway managements should not permit any deviation from specifications in a matter in which safety of life and property is so involved as it is in the case of air-brake hose. Even in dull times a small saving in cost is poor inducement for conniving at reduction of quality.

The directors of one large Western railway system have ordered the scrapping immediately of 10,000 cars and replacing them within reasonable time by new cars. They have also ordered the rebuilding of 35,000 freight cars, reinforcing them and modernizing their capacity and appliances.

Another large Western system will begin at once the rebuilding of 30,000 freight cars. These have been classified as to the degree and kind of improvement to be put upon them. The program of this line also includes the early retirement from service of some thousands of cars which have outlived their usefulness.

Such undertakings as these indicate that the market for freight car appliances for repair purposes is likely to be active within a very short time. The advantages of modern equipment and the bad policy of keeping old cars in service because their wheels can still be turned, is at last soaking into the minds of the men who control the purse strings.

There are a good many locomotives "in the white" in the various parts of the country, which can quickly be put into service when the demand comes. It hardly seems possible that this will seriously delay orders for new power, when business becomes active. Locomotive repairs have been postponed on many lines until there is a pretty large proportion of locomotives out of commission. The latter fact will fully balance the former. Large crops inevitably set all industries in motion. The railway companies which have the nerve to get their power into adequate condition and provide enough of it, will be those which reap the most benefit from the coming wave of traffic.

Iron and Steel Industry.

The expansion of output of the steel and iron mills from an average of fifty per cent to approximately eighty per cent in two months from January 1, and a gradual decline since March 1 to 65 per cent, indicates the general course of the industry. With last week another upturn has set in, growing out of the unavoidable accumulation of absolute necessities. The future of the market is made brighter by the assured knowledge that there is a very large volume of necessary requirements which will be precipitated as soon as the railroads and the country at large feel that higher earnings can be relied upon.

A Story of the Air Brake.

LARGE PRIZES OFFERED.

The Westinghouse Air Brake Co. wants the best real and authentic stories it can get regarding the performance of the air-brake in actual service at any time since its invention. For the purpose of stimulating interest and getting matter of real value it offers a grand prize of \$1000, and an equal amount in five minor prizes. These prizes are large enough to enlist the best ability in the narration of real events; and there is room for the exercise of literary talent of a high order. The history of the air-brake is filled with thrilling and dramatic experiences—experiences which have not ended with the thrill but have had great results upon the safety of travel and efficiency of operation.

To bring out and preserve the history which otherwise might die with the engineer or the observer is a good work. Many of the best stories of railway operation are unwritten—many of those written are imaginary. But the truth is stranger than fiction; and every-day railway life bristles with the material of unseen romance. The incident itself is the main thing—its presentation in effective manner is next. We believe that many railway men have the ability for such presentation although they themselves may not suspect it. The details of this interesting contest, as issued by Vice-President and General Manager A. L. Humphrey, are as follows:

1. For the best true stories illustrating the value of the Westinghouse air brake, in terms of performance and capacity, as determined by an independent committee of judges, we will make the following awards in cash:

First Prize Story.....	\$1,000.00
Second Prize Story	500.00
Third Prize Story	200.00
Fourth Prize Story.....	150.00
Fifth Prize Story.....	100.00
Sixth Prize Story.....	50.00

The purpose we have in mind is to draw from the experience and practical knowledge of railroad officials and employees, striking stories of air brake performance. We know that the history of the art of braking railroad trains is rich in dramatic, but as yet unwritten narrative. On the one hand is a vast amount of such material as spectacular escape from wreck or disaster; and on the other hand a still larger—and largely unexplored—field covering the concrete evidences that efficient train control is the supreme factor in the ability to handle heavier freight and passenger traffic; and that increased tonnage, longer trains, higher speeds, etc., are simply visible demonstrations of the controlling influence of the air brake as expressed in the larger earning power possible from operations.

2. Each "story" must be written either from the practical experiences or personal observations of the writer or from information obtained at first hand from railroad men who actually know the facts.

Each contestant may choose his own individual style of expression, use railroad dialect if desired, and illustrations if thought advisable. Correct names, dates, places and persons should be used so far as possible but fictitious substitutes may be employed providing this is so stated in the transmitting letter and the fundamental facts related have actually occurred.

There is no limitation as to the time when the facts given in the story may have occurred, but naturally these facts will be of larger interest if covering recent years and particularly if they apply to present standard forms of Westinghouse brake equipment.

The stories will be judged primarily upon the convincing character of the narrative as to the value of the air brake; originality; striking or unusual features; accuracy of facts given; relation of the story to present day conditions; concise expression; and brevity.

3. The contest is open to bona fide employees of any railroad in the United State, operating regular traffic schedules, without limitation of any kind as to age, character of work, education, or other qualification.

4. No "story" shall be more than two thousand words in length. Manuscripts exceeding two thousand words will not be considered in the competition. Each "story" should be written on one side of the sheet only and preferably typewritten. Neither name, address, nor other means of identification should be shown except in the transmitting letter.

5. No expense is involved in entering this contest but it is understood that all narratives submitted become the property of the Westinghouse Air Brake Co. whether securing an award or otherwise.

6. Decision as to merits of the stories submitted will be placed absolutely in the hands of a committee of judges composed of three prominent persons not associated in any way with the Westinghouse interests.

7. Each "story" should be addressed to the "Judges of Prize Contest," Room 2121, 165 Broadway, New York, N. Y. When received and serially numbered, the manuscripts, without name or other identification, will be turned over to the committee of judges by a disinterested party

appointed by and acting for the committee, and who will retain the transmitting letters after making careful record thereon of the serial number of the manuscript. The judges will, therefore, pass upon the manuscript submitted without knowing by whom written until after the award is made.

8. All stories to be considered in this competition must be in the hands of the committee on or before August 1st, 1914. Announcement of awards by the committee of judges will be made as promptly as possible thereafter.

If—

Other salesmen than those of stock and bond brokers will agree with the following from the Wall Street Journal's mill.

If you can keep up sales when all about you
Are falling down, and talk is awfully blue;
If your staunch faith won't let your clients doubt you,
Though stocks are off and earning sliding, too;
If you have punch, and be not ever tired
Of rooting for the House and what you sell,
And smilingly forget your many turndowns,
To come back long before the Bell;

If you can dream—and turn your dreams to metal;
If you can think—and dope successful trades;
If you can meet with raw, hard competition,
And plug along until the daylight fades;
If you can see all joint agreements broken,
And you keep perfect faith in them yourself,
And help the House to swell their yearly volume,
And know that confirmations mean the pelf;

If you can do all this, and, in the doing,
Be loved by all the men within the shop,
And not hook thumbs into your vest sleeves,
And strut as though you'd really reached the top;
Why then, by gad, you are a live one,
A man, my son, and, what is more,
There is no top for such as you are;
You'll have to build yourself another floor.

Supply Trade Notes.

—The General Railway Signal Company, Rochester, N. Y., has increased its capital stock from \$5,000,000 to \$10,000,000.

—The Chicago office of the Falls Hollow Staybolt Co. has been removed from the Old Colony building to 214 Fisher building.

—The Morden Frog & Crossing Works has moved its Chicago sales office to the new Continental and Commercial Bank building, 208 South La Salle street, rooms 1873-75-77-79.

—The Keystone Construction Co., Erie, Pa., will ask a charter of the state of Pennsylvania. The company would manufacture equipment and construct railways, terminals, bridges and buildings. The incorporators are George Bullock, M. D. Evans and J. M. Sherwin.

—As previously noted the United States Steel Corporation will make a comprehensive exhibit of its industry at the San Francisco Exposition next year. This will be the first time it has made such an exhibit and as it embraces all the subsidiary companies, it will be both instructive and interesting. H. V. Jamison, advertising manager of the American Sheet & Tin Plate Co., has been appointed director of exhibits for the corporation and is planning the participation of the various companies, under a general committee headed by A. T. De Forest, of the United States Steel Co., of San Francisco.

—T. B. Bowman, assistant to president of the Q. & C. Co.,

formerly eastern sales manager for that company and more recently in charge of western sales, with office in Chicago, is now president of the Efficiency Co., which has established offices in the Railway Exchange building, Chicago. The new company will handle track specialties. C. P. Williams, formerly with the National Lock Washer Co., has become associated with the Efficiency Co.

—Alexander B. Scully, president of the Scully Steel & Iron Co., died at his home in Chicago, May 7, at the age of 57 years.

—L. R. Pomeroy, consulting engineer, has removed his office in New York to 16 West Sixty-first street.

—J. F. Oelerich, who has been associated with the General Railway Supply Co. for the past four years, is now connected with the Transportation Utilities Co., 30 Church street, New York City, which acquired the entire business of the former company on April 15, as announced in our issue of April 25. He will have his new headquarters at 857 Peoples Gas building, Chicago, Ill.

—At the recent annual meeting of the stockholders of the Joseph Dixon Crucible Co., held at the company's main office in Jersey City, N. J., the retiring board of directors, consisting of Geo. T. Smith, William Murray, George E. Long, Edward L. Young, William G. Blumsted, J. H. Schermerhorn and Harry Dailey, were unanimously re-elected. The meeting was attended by a large number of stockholders who expressed satisfaction with the present management and recorded the largest vote ever represented at an annual election, 9628 out of a possible 10,000 shares being represented. The officers of the company, consisting of Geo. T. Smith, president; George E. Long, vice-president; J. H. Schermerhorn, treasurer; Harry Dailey, secretary, and Albert Norris, assistant treasurer and assistant secretary, were also re-elected.

RAILWAY NEWS.

Atlanta, Birmingham & Atlantic.—The sale of the Atlanta, Birmingham & Atlantic Railway under foreclosure proceedings, which was originally set for April 22 and postponed to April 27, has been again postponed until May 15.

Canadian Northern.—See New Roads and Projects under British Columbia.

Central New York Southern.—The recently incorporated Central New York Southern R. R. is a re-organization of the New York, Auburn & Lansing R. R. The new company is capitalized at \$2,000,000. R. B. Williams, Jr., is president; H. W. Fitz, vice-president; Charles E. Hotchkiss, vice-president and general counsel; H. A. Clarke, vice-president, secretary and general manager, and T. P. Clancy, treasurer and purchasing agent. Fred T. Ley & Co., Springfield, Mass., have the contract for building 2½ miles of new line for the road.

Erie Railroad.—A press report says tentative plans are now being considered by the Erie Railroad for the double tracking of its cut-off from Cuba on the Allegany division to Hunts on the Buffalo division, a distance of 30 miles. The cut-off was constructed about three years ago at a cost of \$3,000,000 and since it has been completed, has handled a very heavy freight traffic. The single track has been found to be inadequate and some way to better conditions must be found.

Laramie, Hahn's Peak & Pacific.—The Laramie, Hahn's Peak & Pacific R. R. has been sold by Marshal E. Johnson, special master of the United States court at Cheyenne, to John W. Dixon, of New York, representing the Guaranty Trust Co., holder of the road's bonds. The purchaser's bid was \$5000 and there were no other bidders.

Minneapolis & St. Louis.—The stockholders of the Minneapolis & St. Louis R. R. will vote at any early day on merging with the company its subsidiary, the Des Moines & Ft. Dodge R. R.

Missouri Pacific.—The Missouri Pacific Ry. is offering to extend its 5 per cent notes due June 1 next for one year at 6 per cent interest, with additional security deposited under the extension agreement. All extended notes are subject to redemption at 101 with accrued interest at any time

on 60 days' notice. The company reserves the right to rescind the extension agreement if its directors shall decide on or before June 1 that holders of a sufficient amount of the notes have not agreed to the plan.

New York, Auburn & Lansing.—See Railway News under Central New York Southern R. R.

Southern Railway.—A special meeting of the stockholders of the Atlanta & Charlotte Air Line Ry., which is leased to the Southern Railway, will be held at Greenville, S. C., June 2, to authorize an issue of \$20,000,000 new first mortgage 5 per cent bonds to enable the company to complete its program of double tracking its entire line from Washington, D. C., to Atlanta, Ga. It is proposed to issue, in the near future, enough of the new bonds to take up the \$5,500,000 of 4½ per cent bonds of the Air Line which are now held in the treasury of the Southern Railway, and at the same time offer a substantial amount for sale.

Yuma Valley.—Track laying on the Yuma Valley Ry. was begun May 4. The new railroad which will be 21 miles in length is being laid on top of the broad levees constructed by the U. S. Reclamation Service to protect the Imperial valley and the Yuma valley lowlands in California from floods of the Colorado river. Its purpose is mainly for transportation of rock and machinery required to repair the levee system, but it will also be utilized for general transportation.

PERSONALS.

W. R. Dawson has been appointed storekeeper of the Cincinnati, Hamilton & Dayton Ry., at Dayton, Ohio, succeeding T. H. Barker.

C. E. Burchfield, yard master at Johnson City, Tenn., has been promoted to trainmaster of the east end of the Knoxville division of Southern Railway.

Charles H. Hix, president and general manager of the Norfolk Southern R. R., Norfolk, Va., has resigned.

E. C. Bogwell has been appointed president's assistant of the Seaboard Air Line Ry.

Ralph Budd, chief engineer of the Great Northern Ry., has been appointed assistant to the president, with office at St. Paul, Minn.

O. E. Slater, trainmaster of the Fort Dodge, Des Moines & Southern R. R., at Boone, Iowa, has been appointed superintendent of terminals at Fort Dodge, Iowa, and the former position is abolished.

A. B. Kearsey, auditor and traffic manager of the Pascagoula Moss Point Northern R. R., at Moss Point, Miss., has been appointed general manager, with headquarters at Moss Point, succeeding Stewart Starr, resigned.

Joseph H. Young, until recently president of the Spokane, Portland & Seattle Ry. and affiliated lines has been elected president of the Norfolk Southern R. R., succeeding Charles H. Hix, resigned.

J. C. Nolan, master mechanic of the St. Louis, Brownsville & Mexico R. R., has been appointed superintendent, with headquarters at Kingsville, Tex., succeeding R. F. Carr, who has taken service with another company.

E. W. Deuel, assistant superintendent of the Fourth division of the Denver & Rio Grande R. R., at Alamosa, Colo., has been appointed superintendent of the Third division, with headquarters at Gunnison, Colo., succeeding R. C. Ten Eyck, who has been appointed superintendent of the Grand River division, with offices at Helper, Utah, succeeding N. A. Williams, resigned. C. B. Carpenter, inspector of transportation at Denver, Colo., has been appointed assistant superintendent of the Fourth division, with headquarters at Alamosa, Colo., succeeding Mr. Deuel.

J. H. Jackson, who has been connected with the office of the general superintendent of transportation of the Baltimore & Ohio R. R., at Baltimore, Md., has been appointed superintendent of the Newark division, with headquarters at Newark, Ohio, succeeding C. W. Gorsuch, who has been assigned to other duties. The appointment was effective May 4. Mr. Jackson was born at Terre Haute, Ind., February 28, 1873, and was engaged in farming until he was twenty-one years old when, in 1894, he became a station helper at Osceola, Mo., with the Blaire Line. In 1896, he was made freight agent for the same company at Kansas City and in 1898, when the Blair Line was absorbed by the Frisco Lines, he became a clerk in the service of that road, being promoted to freight agent in 1900. In 1901, Mr. Jackson was advanced to assistant superintendent at Kansas City and in 1910 to superintendent at Birmingham, Ala., in which posi-

tion he remained until recently when he entered the service of the Baltimore & Ohio.

Theodore Voorhees, vice-president of the Philadelphia & Reading Ry., was elected president of that company, on May 8, succeeding the late George F. Baer. Edward T. Stotesbury was elected president of the Reading Company. Mr. Voorhees was born June 4, 1847, at New York city. He graduated from Rensselaer Polytechnic Institute, Troy, N. Y., in 1869 and entered the service of the Delaware,

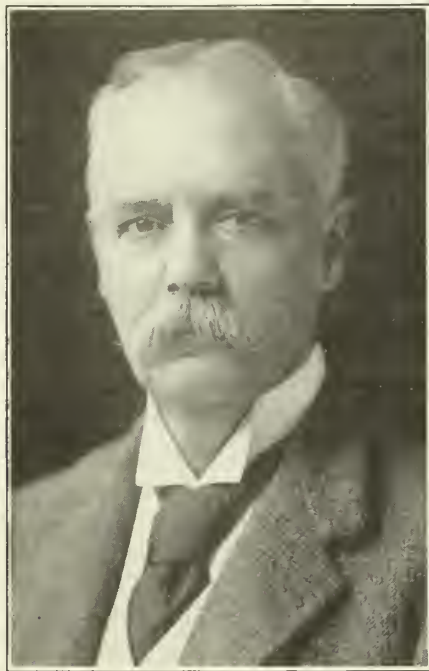


Photo by Gurekunst

Theodore Voorhees, Who has been Elected President of the Philadelphia & Reading Railway.

Lackawanna & Western R. R. Four years later he became superintendent of the Syracuse Binghamton & New York R. R. Mr. Voorhees was with the Delaware & Hudson Canal Co. from December, 1874, to October, 1885; October 20, 1885, to March 1, 1890, assistant general superintendent of the New York Central & Hudson River R. R.; March 1, 1890, to February 1, 1893, general superintendent of the same road and from May 20, 1891, to 1893 also general superintendent of the Rome, Watertown & Ogdensburg R. R. Mr. Voorhees became vice-president of the Philadelphia & Reading Ry. February 1, 1893.

TRAFFIC.

G. E. Allen, traveling passenger agent of the Mobile & Ohio R. R., at Jackson, Tenn., has been appointed division passenger agent at Jackson.

E. F. McDaniel, traveling freight agent of the Chicago & Alton R. R., with headquarters at Salt Lake City, Utah, has been appointed general agent of the freight department at that place, succeeding H. W. Prickett, resigned.

A. J. Brouthers has been appointed traveling passenger agent of the Chicago, Milwaukee & St. Paul Ry., with headquarters at 1200 Broadway, New York city, to succeed E. E. Brewer, transferred to Chicago. W. N. Kee is appointed ticket agent, with headquarters at New York, to succeed Mr. Brouthers, promoted.

C. T. Cope, traveling freight agent of the Southern Railway, at Rome, Ga., has been appointed assistant commercial agent, with headquarters at Rome, and H. A. Platt has been appointed traveling freight agent, succeeding Mr. Cope.

W. H. Townsend has been appointed commercial agent of the St. Louis Southwestern Ry., at Pittsburgh, Pa., succeeding J. C. Toynbee, resigned.

ENGINEERING.

H. D. Scantlin, assistant engineer of the Southern Railway at Birmingham, Ala., has been promoted to a position under special engineer of valuation, at Washington, D. C. Otto Gumper, transitman, has been promoted to assistant engineer, succeeding Mr. Scantlin.

A. H. Hogeland, consulting engineer of the Great Northern Ry., has been appointed chief engineer, with headquarters at St. Paul, Minn., succeeding Ralph Budd, promoted.

E. L. Cruger, formerly assistant chief engineer of the Chicago & Alton R. R., at Chicago, has been appointed assistant engineer of the Illinois Central R. R., with headquarters at Chicago.

I. C. Brower, until recently division engineer of the Chicago & Alton R. R., at Bloomington, Ill., has been appointed assistant engineer of the Chicago, St. Paul, Minneapolis & Omaha Ry., with office at St. Paul, Minn.

J. R. Holman, whose jurisdiction as chief engineer of the Oregon-Washington R. R. & Navigation Co. has been extended over the entire property of the company, as previously announced in these columns, was born in Texas, September 16, 1875, and graduated in 1895 from the Texas Agricultural and Mechanical college, where he took the course in civil engineering. In 1897 he went to Honduras, where he was employed on location and construction of the Honduras Railroad, then under control of an American syndicate. When war with Spain became imminent, he returned to the United States and organized a company of volunteers for service. He was commissioned a captain in the Fourth Texas Infantry in July, 1898, being one of the youngest officers of that grade in the army. His regiment and company were utilized in garrison-



J. R. Holman, Chief Engineer of the Oregon-Washington Railroad & Navigation Company.

ing the border forts and saw no active service. After being held in service pending development in Cuba and the Philippines, after the close of active hostilities, his regiment was mustered out, in March, 1899. Mr. Holman then entered the service of the Houston East & West Texas R. R., and in September, 1899, began work for the Texas & New Orleans R. R., and was engaged in location and construction work for three or four years. During this period he located a line from Lafayette to Baton Rouge, through the almost impenetrable swamps of the Atchafalaya river, where his training in the tropics came in full play. This line of road was afterwards constructed under immense difficulties. In May, 1905, Mr. Holman came to Portland, Ore., to work for the Oregon-Washington R. R. & Navigation Co., under George W. Boschke, chief engineer, and for the following four years was engaged in location and reconnaissance work, during the time of vast expansion and development in the north-west. In 1909 he was appointed chief engineer of the Oregon & Washington R. R., a subsidiary company of the same system, with headquarters in Seattle, Wash. He was in charge of the development of plans and construction of the large terminal facilities on Puget sound, which are used for the whole system. During the same time he has constructed branch lines and terminal facilities in Tacoma and

at Grays Harbor. On January 1, 1913, the construction of the large terminal facilities now being built in Spokane, Wash., was placed under his charge, by the Oregon-Washington R. R. & Navigation Co., and Chicago, Milwaukee & St. Paul Ry., which companies will jointly own and use the passenger facilities. May 2, 1914, Mr. Holman went to Portland, Ore., with jurisdiction over the whole Oregon-Washington R. R. & Navigation system.

William C. Edes whose appointment by President Wilson as a member of the Alaska railroad commission was noted in the Railway Review of May 9, was born at Boston, Mass., January 14, 1856, and was graduated from Massachusetts Institute of Technology in 1875. From 1878 to 1882 he was with the Southern Pacific Co., on location of line through Arizona, New Mexico and Texas. From 1882 to 1886 he was engaged in general engineering work in Boston and vicinity. From April, 1886, to February, 1887, he was in charge of constructing a portion of the Oregon & California R. R. For the past twenty-five years Mr. Edes has been with the Southern Pacific Co., or subsidiary lines. From June, 1905, to January 1, 1907, he was district engineer of the Southern Pacific at San Francisco, Cal., and from January, 1907, until his recent appointment on the Alaska commission, chief engineer of the Northwestern Pacific R. R.

Lieutenant Frederick Mears, who has been appointed a member of the Alaska railroad commission, was born at Omaha, Neb., May 28, 1878. He graduated from Shattuck school, Faribault, Minn., 1899, and U. S. Staff College, Ft. Leavenworth, Kan., 1905. In June, 1897, he entered railway service with the Great Northern Ry., and was engaged in engineering work for that company until October, 1899. He was temporarily with the Chicago, Rock Island & Pacific Ry. in 1905, but since October, 1899, has been with the U. S. Army. From May, 1906, to May, 1907, he was assistant engineer of the Isthmian Canal Commission, from then until December, 1909, resident engineer of the Panama Railroad. Lieutenant Mears was appointed chief engineer of that road in 1909 and since last year has been general superintendent as well as chief engineer. The relocation and reconstruction of the Panama Railroad has been accomplished under his direction.

Thomas Riggs, Jr., whose appointment as a member of the Alaska railroad commission was announced in a previous issue, was born in 1873, at Ilchester, Md., and was a student in civil engineering at Princeton university from 1890 to 1893. From 1893 to 1896 he was engaged in the lumber business at Bucoda, Wash. From 1897 to 1903 he was in the Klondike connected with various mining enterprises, and from 1903 to 1905 on the United States-Canada boundary survey. From 1906 to 1908 he was on the Alaskan boundary survey and at the time of his appointment was a member of the Coast and Geodetic Survey.

MECHANICAL.

Louis E. Endsley, professor of railway mechanical engineering of Purdue university, has resigned. Professor Endsley will leave his present position at the end of the school year to become head of the department of railway mechanical engineering at the University of Pittsburgh. Announcement of the new course of instruction at the latter institution was made in our issue of January 24. D. F. Crawford, superintendent of motive power of the Pennsylvania Lines West of Pittsburgh is interested.

J. J. Carey, master mechanic of the Baltimore & Ohio Southwestern R. R. at Washington, Ind., has been appointed master mechanic of the Texas & Pacific Ry. with headquarters at Marshall, Tex., succeeding G. H. Langton, resigned.

R. E. Rowe, roundhouse foreman of the St. Louis, Brownsville & Mexico R. R. has been appointed master mechanic, with headquarters at Kingsville, Tex., in place of J. C. Nolan, promoted.

J. T. Luscombe has been appointed master mechanic of the Ohio River division of the Baltimore & Ohio R. R., at Parkersburg, W. Va., succeeding J. B. Elliott.

OBITUARY.

B. A. Newland, general manager of the Tennessee Railway, was instantly killed May 9, near Huttsville, Tenn., when the motor car in which he was riding was wrecked. Mr. Newland was 62 years old.

W. H. Brimson, formerly from February, 1904, to September, 1910, general superintendent of the Baltimore & Ohio Southeastern R. R., died recently in his home in Washington, D. C., aged 65 years.

William Wainwright, vice-president of the Grand Trunk Ry. system, with office at Montreal, Que., died May 14, at

Atlantic City, N. J. Mr. Wainwright was born April 30, 1840, at Manchester, England. From 1858 to 1862 he was in railway service in England. He has been connected with the Grand Trunk Ry. since 1862.

NEW ROADS AND PROJECTS.

Arizona.—Engineers for the Tucson, Phoenix & Tidewater R. R. expect to be engaged for the greater part of the summer surveying for the proposed line. The company intends to begin construction work when cool weather comes in the fall.

British Columbia.—Construction work on the Okanagan-Kamloops branch of the Canadian Northern Pacific Ry. is to be started at an early date, according to press reports. The plans of the railroad company are said to call for the construction of a line from Kamloops, B. C., in a general southerly and easterly direction to Armstrong and thence to Vernon, with a spur to the Okanagan lake near Okanagan Landing, a branch from Vernon to Lumby and an extension from Vernon south via Kalamalka lake to Kelowna. The line at present planned will be 140 miles in length. According to the same report, extensive hydro-electric power schemes have been formulated in connection with the Okanagan branch. The company has secured power rights all along the route, it is said, and is arranging to build a power plant at Shuswap Falls, near Lumby, east of Vernon and intends to electrify the spur lines from Vernon to Lumby and the extension to Kelowna. There is said to be a probability of the entire branch from Kamloops to the Okanagan also being operated eventually by electric power.

California.—The Atchison, Topeka & Santa Fe Ry. is reported as contemplating construction of a line of railroad from Corcoran, Kings county, Cal., to Lemoore, Kings county, a distance of about 20 miles.

Georgia.—The Elberon & Eastern R. R. is reported to have let a contract for its proposed extension from Tignall to Washington, Ga., 12½ miles.

Idaho.—The Oregon Short Line R. R. awarded contract on May 6 to the Utah Construction Co. for grading right of way for the proposed Snake River Belt line, something over 70 miles in length. See Railway Review of December 27, 1913.

Illinois.—The La Salle Terminal Ry. is making preliminary surveys for the construction of its proposed freight belt line from La Salle to Granville, Ill., via Oglesby, Ill. J. B. McCaffrey, Continental Bank building, Chicago, is president and Robert Baldwin is engineer in charge.

Kansas.—The Anthony & Northern R. R., which now runs from Pratt to Iuka, Kan., six miles, expects to build an additional 17 miles of line in Pratt county.

Kentucky.—The Big Sandy & Kentucky River it is said, is obtaining right of way for a contemplated extension from Johnson county, Kentucky, through Magoffin county into Breathitt county.

Maryland.—The Westminster & Gettysburg Ry., according to report, has let contract for the construction of an 83-mile railroad from Brentwood, Md., to Gettysburg, Pa., to the Columbia Construction Co., Washington, D. C.

Mississippi.—M. J. Roach & Co., Memphis, Tenn., have the contract for grading the extension of Yazoo & Mississippi Valley R. R. from Chancey to Swan Lake, Miss., about 9¼ miles. The company's forces will do the tracklaying.

Missouri.—The Rolla, Ozark & Southern Ry., Rolla, Mo., is reported as awarding contract for the construction of its proposed line between Rolla and Anutt, Mo., 18 miles, to J. Ellis Walker, who is general manager and secretary of the railway company.

Nebraska.—The Chicago, Burlington & Quincy R. R. will let contracts soon for grading the Chalco-Yutan cut-off, about 15 miles in length, from Chalco, Sarpy county, Neb., to Yutan, Saunders county.

New York.—See Railway News under Central New York Southern R. R.

Pennsylvania.—See New Roads and Projects under Maryland and West Virginia.

The Pennsylvania & Southwestern Ry. on April 28 took over the property of the Pittsburgh Binghamton & Eastern R. R. and proposes to use the 20 miles of graded line as part of a projected 65-mile line between Towanda, Pa., and the coal fields at Oregon Hill, Pa. F. A. Sawyer, president of the company writes to the Commercial & Financial Chron-

icle as follows: "The Pennsylvania & Southwestern Ry. has just acquired all the old P. B. & E. property that was sold at foreclosure sale to the Pittsburgh & Eastern R. R. Co. There was expended on the enterprise, according to the statement filed at Harrisburg with the secretary of the commonwealth, about \$1,750,000, and 22 miles of the road was nearly completed. It is the purpose of the Pennsylvania & Southwestern Ry. to complete this division this season and then extend the same to the Oregon Hill coal fields. The authorized bond issue is \$4,000,000 30-year 5 per cent sinking fund bonds, of which we plan to offer for sale during the year \$3,000,000."

Tennessee.—Wayne county, Tennessee, is expected to issue 5 per cent 20-year bonds in the sum of \$150,000 to buy stock of the proposed Nashville, Shiloh & Corinth R. R. The county court will convene May 23 to decide on submitting the question to a vote of the people. Clopton Thomas, Corinth, Miss., and Allan W. Jones, Augusta, Ga., are interested. George S. Bruce, Nashville, Tenn., is chief engineer.

Texas.—Bird M. Robinson, New York city, according to press reports, is negotiating for the purchase of the Asherton & Gulf Ry., which extends from Artesia Wells, Tex., on the International & Great Northern Ry., to Asherton, 32 miles. If the transaction is consummated, it is said, the road will be extended from Asherton to Eagle Pass and southeast from Artesia to some point in the lower Rio grande valley, about 150 miles.

The Van Horn Valley Land & Railway Co., 511 Andrus building, Minneapolis, Minn., is said to have awarded contract for the construction of a line of railway from Van Horn, Tex., 75 miles through the Van Horn Valley, to the state line.

Work of clearing right of way for the Uvalde & Northern R. R. has been begun and contract for grading the first 40 miles has been awarded to D. R. Morris Oklahoma City, Okla. The road will run from Uvalde, Tex., in a northerly direction up the Nueces river to Cedar brakes and Kaolin mines, approximately 54 miles. The road will be completed by January 1, 1915. The United Timber & Kaolin Association, Ltd., owns and controls about 40,000 acres of cedar and kaolin lands. These products will now find a market. The officers of the railroad company are: L. J. Smith, Kansas City, Mo., president; Will A. Morriss, San Antonio, Tex., vice-president, and F. C. Adams, Uvalde, Tex., secretary and treasurer.

Utah.—Charles C. Carnahan, general counsel for the Southwestern Pacific Ry. has been quoted as saying that the company is to be incorporated soon under the laws of the state of Utah and D. C. Collier is to be president of the new railway company. The Southwestern Pacific would run from Denver, Colo., to San Diego, Cal., and would be about 1150 miles in length.

Washington.—The Bellingham & Northern R. R. proposes to build a 14-mile extension in an easterly direction from Glacier, Wash., up the Nooksack river. The company is now building a 3-mile line to Lake Whatcom.

Contractors on the Seattle, Port Angeles, Lake Crescent Ry. have laid 15 miles of steel and 35 miles more has been graded. E. J. Erickson, the contractor, expects to turn over the line between Port Angeles, Wash., and the Michael Earles timber tract in a few weeks.

West Virginia.—The Wheeling Eastern Ry. has been incorporated to construct and operate a railroad from Short Creek, W. Va., to West Alexander, Pa., about 20 miles. The incorporators are: B. L. Rosenbloom, Schmulbach building, Wheeling, W. Va., R. T. Manning, M. E. McGrail, George A. Feeney and R. J. Smith.

Electric Railways.

A contract is reported awarded to J. Ostling, Slater, Iowa, for the construction of an electric railway from Nevada to Maxwell, Iowa.

The San Antonio, San Jose & Medina Valley Interurban Ry. proposes construction of a 15-mile line from San Antonio via San Jose to Kirk, Tex., on the Artesian Belt R. R. A. D. Powers is president; E. O. Burton, vice-president; L. S. Powers, general manager; C. A. Newton, secretary, and J. G. Miller, chief engineer. Construction will be done by company's forces.

The Little Rock, Pine Bluff & Eastern Traction Co. and the Intercity Terminal Ry. Co. have each filed a \$20,000 bond to bind agreement to construct proposed lines. E. W. Jackson and C. C. Kavanaugh, of Little Rock, Ark., are interested in both companies.

The Cleveland, Alliance & Mahoning Valley R. R. is pre-

paring to begin work on proposed electric line from Brady Lake to Macedonia, Ohio.

The Kewanee, Bradford & Henry Interurban Ry. is said to be about ready to begin construction of its proposed electric line to connect Kewanee, Bradford and Hebray, Ill., about 35 miles. C. G. Lampman, Kewanee, is interested. Noted April 9.

The Keokuk, Nauvoo & Fort Madison Interurban Ry. is making preliminary arrangements for the construction of an electric railway to connect Keokuk, and Fort Madison, Iowa, and Carthage and Hamilton, Ill. H. S. Payne, Fort Madison, Iowa, is interested.

Citizens of Lake Helen, Fla., would organize a company to build on electric line from New Smyrna, Fla., to some point on the St. Johns river, probably Enterprise.

Contracts for grading for the Winnipeg, Selkirk & Lake Winnipeg electric line between Stony Mountain and Stonewall, Man., have been let.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Pacific Great Eastern Ry. has ordered 2 consolidation (2-8-0) locomotives from the Canadian Locomotive Works.

—The Carnegie Steel Co., Pittsburgh, Pa., has ordered one 6 six-wheel (0-6-0) switching locomotive from the Baldwin Locomotive Works.

—The San Joaquin & Eastern R. R. has ordered one ten-wheel (4-6-0) locomotive from the Baldwin Locomotive Works.

—The Missouri, Kansas & Texas Ry. has ordered 5 Mikado (2-8-2-S type) locomotives from the American Locomotive Co., in addition to the 25 reported in the Railway Review of March 7.

—The Georgia Coast & Piedmont R. R. has ordered 2 ten-wheel (4-6-0) locomotives from the Baldwin Locomotive Works.

—The Seaboard Air Line Ry. is reported in the market for 10 passenger and 15 freight locomotives.

—The Mobile & Ohio R. R. has ordered from the American Locomotive Co., 7 superheater consolidation freight locomotives (2-8-9-S type) with 24x30 in. cylinders, driving wheels 63 ins. in diameter and a total weight in working order of 220,000 lbs.

—The locomotives ordered by the Delaware & Hudson Co. from the American Locomotive Co., reported in the Railway Review of May 9 are to be as follows: Fifteen superheater consolidation freight locomotives (2-8-0-S type) with cylinders 25x30 ins. driving wheels 57 ins. and a total weight in working order of 256,000 lbs.; 10 superheater Pacific passenger locomotives (4-6-2-S type) with cylinders 24x28 ins., driving wheels 69 ins., and a total weight in working order of 293,000 lbs.

Freight Cars.

—The Chicago & North Western Ry. has ordered 3000 40-ton box cars from the American Car & Foundry Co.

—The recent report of E. W. McKenna to the bondholders' protective committee of the Chicago, Rock Island & Pacific R. R. advises that about 20,000 cars ought to be retired and about \$15,000,000 should be invested in new cars.

—The Chicago, Milwaukee & St. Paul Ry. has ordered 500 box and flat cars built in its own shops.

—The Denver & Rio Grande R. R. has ordered 500 gondola cars from the Pressed Steel Car Co.

—The Missouri, Kansas & Texas Ry. has ordered 200 50-ton ballast cars from the American Car & Foundry Co.

Passenger Cars.

—The Rutland Railroad has ordered 2 70-ft. smoking cars 3 70-ft. baggage cars and 9 70-ft. coaches from the American Car & Foundry and 3 combination baggage and smoking cars from the Standard Steel Car Co.

—The Erie Railroad has ordered 8 passenger cars from the Pressed Steel Car Co., and 4 from the Standard Steel Car Co.

Iron and Steel.

—The Seaboard Air Line Ry., it is said, is in the market for 17,000 tons of rails.

—The New York, Susquehanna & Western R. R. has ordered 1500 tons of rails from the Carnegie Steel Co.

—The Tennessee Central R. R. has ordered 2500 tons of rails from the Tennessee Coal, Iron & Railroad Co.

—A report says that the receivers of the St. Louis & San Francisco R. R. are about to place an order for 36,000 tons of 90-pound rails with the Tennessee Coal, Iron & Railroad Co.

Bridges.

—The Chesapeake & Ohio Ry., it is said, has extended the time for receiving bids for the proposed bridge over the Ohio river at Portsmouth, Ohio, to June 2. About 15,000 tons of steel are involved. Gustav Lindenthal, 68 William street, New York, is consulting engineer.

—The Pennsylvania Railroad has ordered 450 tons of bridge work from the Riter-Couley Mfg. Co.

—The Boston & Albany R. R. has ordered 1200 tons of bridge steel. The American Bridge Co. and L. F. Shoemaker & Co. will fabricate the greater part of this tonnage.

—Contracts for bridge work for New York Central & Hudson River R. R., 1900 tons, have been awarded Phoenix Bridge Works, L. F. Shoemaker & Co., Belmont Iron Works and others. About 500 tons upon which bids were entered has not been placed.

—The Central R. R., of New Jersey, it is said, has ordered 150 tons of steel for signal bridges from Belmont Iron Works.

—The Troy Union R. R. Co. will rebuild highway bridges crossing its right of way at Hutton and Liberty streets, Troy, N. Y., and will reconstruct the bridge at Fifth avenue, Troy. The work will cost approximately \$32,500.

—Contract for the extension of the Belknap street viaduct, Superior, Wis., to cost about \$60,000, has been awarded by the Northern Pacific Ry., to Gerrick & Gerrick, Seattle, Wash.

—The Chicago, Burlington & Quincy R. R. will erect a bridge over the Platte river near Yutan, Neb.

—The St. Louis & San Francisco R. R. has ordered 142 tons of bridge material from the Virginia Bridge & Iron Co.

Buildings, Terminals, Etc.

—The St. Louis Southwestern Ry. will issue \$283,000 of bonds for enlarging the yard and terminal facilities at Gray's Point, Md.

—The Atlantic Coast Line R. R., it is said, will erect a six-story building in Wilmington, N. C.

—It was said that the Philadelphia & Reading Ry. will build a large passenger station at Reading, Pa., as a memorial to George F. Baer, and that when it is completed, plans for the elimination of the grade crossings will be carried out.

—The Central of Georgia Ry. will erect a depot at Griffin, Ga. This will represent an outlay of \$30,000, it is said.

—The Louisiana Ry. & Navigation Co., according to report, proposes to build a new passenger station at Baton Rouge, La.

—The Oregon & California R. R. (Southern Pacific Co.) is reported to have purchased a site for shops at Springfield, Ore.

—The Atchison, Topeka & Santa Fe Ry. expects to complete its new passenger station at San Diego, Cal., by January 1, 1915. The cost of the work will exceed \$300,000. Contract for steel work amounting to 348 tons has been awarded to the American Bridge Co.

—The Chicago & North Western Ry. is taking bids for the construction of a new inbound freight house to be erected immediately at Fourteenth and Webster streets, Omaha, Neb. It will be one story in height, 45x700 ft.; pressed brick; metal roof, and will be equipped with all the modern appliances. Estimated cost, \$55,000.

—The Northern Pacific Ry. depot at Coeur d'Alene, Idaho, was destroyed by fire, May 9.

Stover Oil Engines for Railroad Uses.

The Stover oil engine, a type of power unit particularly well adapted to railroad uses, has been on the market and in regular service on a number of large systems for several years; but its application to this service is rapidly extending, and the distinctive features of its design and operation are such as to possess considerable interest for those not acquainted with the engine. These engines are entirely different in principle from

the ordinary gasoline engine, and consequently, although operating upon kerosene, distillate or crude oil, are not in the same class with engines of the gasoline type converted to run upon the same fuels.

The principle of the Stover oil engine makes for a remarkable simplicity in design, for there are no cams, valves, battery or magneto ignition, or other parts which are the vulnerable points in ordinary internal combustion engines. The Stover is the two-cycle type. The crank case is enclosed, and air is drawn into the crank case through the valve, on the compression stroke of the piston. On the outward stroke of the piston the air in the crank case is forced through ports into the cylinder and compressed. When it is compressed to the proper point at which ignition should take place, the fuel on which the engine is operating is injected into the cylinder and striking the hot ball is ignited in a manner virtually automatic.

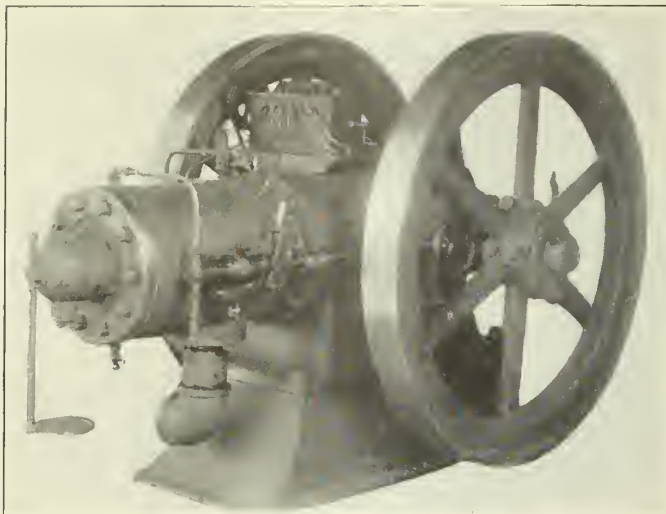
The engine therefore eliminates entirely the necessity of obtaining a proper mixture of air and fuel by means of a carburetor, or an attachment for burning oil fuel. The cycle is simply this: the air in the cylinder is compressed, and when compressed to the proper point the correct amount of fuel is injected into this compressed air under pressure, and ignited. The greatest objection applying to the two-cycle type of gasoline engine, that the mixture being made in the crank case, is taken into the cylinder already mixed, and under the varying loads is rarely uniform, is entirely done away with.

There is only one valve on Stover oil engines, and that is automatic. There is only one mechanically operated part, and that is the pump which injects the fuel. It is controlled positively by a very simple governor which is placed on the fly wheel, so that the right amount of fuel is always injected into the cylinder, even though the load may be a varying one. Each engine is equipped with a positive speed changing device which permits a speed range of fifty per cent, and it is stated that they will operate on a variation of not to exceed $2\frac{1}{2}$ per cent. The normal speed is much slower than the speed of gasoline type engines, a feature which has been found by experience, greatly to simplify lubrication problems. A force feed lubricator of special design is supplied, which insures a positive delivery of oil to every bearing.

The ignition is accomplished by means of a spherical casting attached to the cylinder head, which projects into the combustion chamber. It is heated by a blow torch for a few minutes before starting the engine; after the engine is running, the ignition ball remains sufficiently hot to ignite the charge continuously, whether operating on full or on part load. The engines are equipped with a sight feed water valve, and while the engine is running, a slight amount of water is taken directly into the cylinder. This has the effect of keeping the engine cool and also eliminates the forming of carbon while using low grade oils.

The Stover company was prompted originally to develop this type of engine, through its knowledge of the foreign field. The company has for years supplied approximately fifty per cent of its output to the foreign market, and was thus closely in touch with advanced ideas there. They became convinced that the regular types of gasoline and kerosene engines would eventually suffer from the competition of new types of engines burning low grade fuel; and they made it their object to perfect a line of engines that would operate successfully on crude oil of 28 gravity, or better, and other low grade fuels, as well as kerosene and gasoline. The result is the present line of Stover oil engines, which are now furnished in either stationary or portable types, in capacities of 12, 20, 25 and 30 horse power.

Operating successfully and dependably upon low grade fuels, the efficiency of the engine is largely a matter of course; but the company is in possession of data on numbers of tests which give a remarkably superior showing for the engine operating on various grades of fuel, and compared fuel for fuel with engines of other types.



Stover Semi-Diesel Heavy Duty Engine.

The simplicity of the engine renders it as nearly "fool proof" as such things can be, a quality which makes it pre-eminently suited to many railroad purposes where the power must be under the care of a cheap attendant more or less isolated from supervision. Pumping stations and coaling stations are applications where the service often partakes of this character; but for many other purposes, in fact every application on the railroad system where power in small units is called for, if not of an intermittent nature, is efficiently served by the Stover oil engine.

The manufacturer of the engine is the Stover Engine Works, Freeport, Ill., a concern which has established a reputation in gasoline engines and kindred lines, during forty years of its existence. The representative of this concern for the railroad trade is the T. W. Snow Construction Co., 537 South Dearborn Street, Chicago.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, MAY 5, 1914.

Locking pin lifting mechanism for car couplings, 1,095,211—Eli H. Janney, Alexandria, Va.; Robert E. L. Janney and Gardner L. Boothe, assignors to American Steel Foundries, New York, N. Y.
 Safety device, 1,095,221—Arthur Montzheimer, Joliet, Ill.
 Coupler release rigging, 1,095,222—Walter P. Murphy, Chicago, Ill.
 Door operating mechanism for dumping cars, 1,095,241—Edgar Webster Summers, Pittsburgh, Pa., assignor to Summers Steel Car Co., Pittsburgh, Pa.
 Lock joint for rails, 1,095,243—Edgar L. Swindler, Palestine, Tex.
 Car seal, 1,095,271—Samuel F. Estell, Los Angeles, Cal.
 Brake mechanism, 1,095,286—Theodore W. Newburn, Cleveland, Ohio.
 Back for brake shoes, 1,095,297—James S. Thompson, Pelham, N. Y., assignor to American Brake Shoe & Foundry Co., Mahwah, N. J.
 Railway track switch, 1,095,301—John Vasko, Hutchinson, W. Va.
 Mechanism for delineating rail cross section contours, 1,095,317—Karl A. Edstrom, Denver, Colo.
 Tie plate, 1,095,305—Edward L. Adreon, Jr., St. Louis, Mo.
 Car construction, 1,095,348—Ausborn F. Old, Montclair, N. J., assignor to Hale and Kilburn Co., Philadelphia, Pa.
 Railway tank car, 1,095,350—Edward Posson, Chicago, Ill.
 Six-wheel truck, 1,095,351—Edward Posson, Chicago, Ill.
 Locomotive tender coal gate, 1,095,371—Arthur E. Bean, Greenville, Pa.
 Automatic engineer's signal, 1,095,388—Isaac L. Edwards, Aurora, Ill.
 Safety switch chain, 1,095,393—Harry C. Gerlach and Wilkie Hugh Thompson, Fort Worth, Tex.
 Railway cross tie, 1,095,412—Samuel Michaels, Illiopolis, Ill.
 Rail securing device, 1,095,432—Andrew Stark, Chicago, Ill.

Rail joint, 1,095,440—Samuel J. Watkins, Avondale, Colo.
 Drop-door rigging for hopper-cars, 1,095,443—Charles C. T. Willson, Altoona, Pa.
 Railway rail, 1,095,460—Michael Denis, Paradise, Mont.
 Car-coupling, 1,095,462—Joseph Kelso, Pittsburgh, Pa., assignor to McConway & Torley Co., Pittsburgh, Pa.
 Means for operating locomotive fire doors, 1,095,544—George W. Bashaw, William O. Cook, and Paul C. Withrow, Denver, Colo.
 Joint for crossing bars, 1,095,560—Johannes Degenhardt, Tempelhof, near Berlin, Germany.
 Six-wheel truck for railway cars, 1,095,582—William H. Lewis and John A. Pilcher, Roanoke, Va.
 Release rigging, 1,095,588 and 1,095,589—Walter P. Murphy, Chicago, Ill.
 Tie and rail fastener, 1,095,590—William O'Hare, Sharon, Pa.
 Brake arrangement for six-wheel trucks, 1,095,594—John A. Pilcher, Roanoke, Va.
 Metallic rail tie, 1,095,601—John W. Seaton and George W. Seaton, Fort Smith, Ark.
 Rail joint, 1,095,623—Webster Burrus and Flavers Burrus, Trenton, Ky.
 Car replacer, 1,095,627—Edward J. Fink, East Radford, Va.
 Apparatus for consuming smoke in locomotive furnaces, 1,095,629—Gustav de Grahl, Zehlendorf, near Berlin, Germany.
 Railroad switch, 1,095,639—Albert G. Johnson, Huntington, Ind.
 Tie spacing device, 1,095,658—Philip W. Moore, Evanston, Ill., assignor to The P. & M. Co., Chicago, Ill.
 Center bearing, 1,095,688—William White, River Forest, Ill.
 Side bearing for railway cars, 1,095,715—Harry E. Doerr, St. Louis, Mo., assignor to Scullin-Gallagher Iron & Steel Co., St. Louis, Mo.
 Journal box and lid, 1,095,737—William C. Reed, Chicago, Ill.
 Extensible platform for railway cars, 1,095,741—Ellwood H. Sickels, Philadelphia, Pa.
 Car diaphragm, 1,095,760, 1,095,761 and 1,095,762—Edward E. Whitmore, Chicago, Ill., assignor to The Curtain Supply Co., Newark, N. J.
 Tie holder, 1,095,781—Theodore J. Barck, Quincy, Wis.
 Railway crossing, 1,095,788—Benjamin F. Blake, Marion, O.
 Air hose coupling, 1,095,789—Charles A. Bluhm, Michigan City, Ind.
 Car door lock, 1,095,792—William J. Bohan, St. Paul, Minn.
 Rail joint, 1,095,809—Pietro Cardarelli and Aurelio Mercieri, Utica, N. Y.
 Cross arrangement for block signaling systems, 1,095,816—Mark Conrad, Adrian, Mich., and William G. Kelly, Winslow, Ariz.
 Draft gear, 1,095,818—John F. Courson, Pitcairn, Pa.
 Car vestibule diaphragm, 1,095,836—William H. Forsyth, Chicago, Ill., assignor to The Curtain Supply Co., Newark, N. J.
 Railway safety and recording device, 1,095,868—Frederick F. Hudson, Memphis, Tenn., assignor to Recording Safety Device Co., Phoenix, Ariz.
 Dumping car, 1,095,879—John Karhu, Calumet, Mich.
 Angle bar, 1,095,882—John H. Keister, Vicar Switch, Va.
 Nut lock for track bolts, 1,095,889—James C. Kleese, Denver, Colo.
 Car vestibule diaphragm, 1,095,909—Stanley W. Midgley, Chicago, Ill., assignor to The Curtain Supply Co., Chicago, Ill.
 Safety and signaling device for railroads, 1,095,915—Dimond C. Newton, Owego, N. Y.
 Nut lock for track bolts, 1,095,928—William Rudd and John Columbus Williams, Opelika, Ala.
 Rear suspension for locomotives, 1,095,929—Kenneth Rush-ton, Philadelphia, Pa., assignor to The Baldwin Locomotive Works, Philadelphia, Pa.
 Locomotive drifting valve, 1,095,931—William J. Saxon, Paterson, N. J.
 Electrically controlled air releasing valve for train-pipes, 1,095,935—Thomas H. Sheldon, Victor, Colo.
 Rail grinding machine, 1,095,963 and 1,095,964—William D. Gherky, Philadelphia, Pa.
 Railway block-signal and train, 1,095,982—George R. Guild, United States Army.
 Propulsion mechanism for rail grinders, 1,095,995—William D. Gherky, Philadelphia, Pa.
 Rail grinding machine, 1,096,005—William D. Gherky, Philadelphia, Pa.
 Rail grinding machine, 1,096,007—Henry B. Nichols, Philadelphia, Pa., assignor to William D. Gherky, Philadelphia, Pa.

RAILWAY REVIEW

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Canadian Railway Legislation.

It is now announced as being improbable that the bill for the revision of the Canadian railway act referred to editorially on page 509 of our issue of March 28, will be put through the Ottawa parliament during the present session. The joint committee of the two houses, which has the bill in hand, recently had a long and profitless discussion on what should be taken, and in the end decided to leave it to the members of the committee from the commons to decide. Pressure of other business appears to be such as to make the conclusion of this legislation impossible for want of time.

Tests of Employees.

Reports just compiled show that on twenty-two divisions of the Pennsylvania Railroad, not a single employee was found deficient in all of the 125,226 observations made in February, 1914, to determine to what extent employees were obeying the railroad's rules against the use of intoxicants by employees while on duty, the habitual use of intoxicants, or the frequenting of places where they are sold. One thousand and ninety-three observations were made to see if switches were left in proper position, and the result showed perfect obedience to the rules. Two hundred and sixty tests were made of the rule requiring a brakeman to take the place of the flagman when the latter goes back to protect his train, without a failure on the part of an employee. The aisles of 7401 passenger cars were inspected to see that they were free from baggage and handbags, and not in a single case were the rules of the company disregarded. In every one of the 11,979 tests made of the proper use of visible signals, the rules were obeyed fully. On the entire Pennsylvania Railroad East of Pittsburgh and Erie, 689,099 safety observations were made to ascertain the observance of train safety rules, and 99.9 per cent showed a perfect performance on the part of employees.

Pacific Coast Ties for Indian Railways.

The Railway Board of India, headquarters at Simla, has recently arranged for two shipments of Pacific coast timber for experimental use as ties on Indian railways. One shipment comprises creosoted Oregon pine ties, which cost \$1.44 per tie c. i. f. Calcutta, and the other shipment, California redwood, uncreosoted, which cost \$1.20 per tie. These ties are for broad-gage railways, and the dimensions are 9 ft. by 10 inches by 5 inches. Oregon pine imported is creosoted by the Rueping process. The recent advance in prices of Australian jarrah have caused railway authorities in India to give attention to the possibility of making use of less expensive American timber for ties required. Australian jarrah is now quoted at \$2.80 per tie (broad gage). The Oudh & Rohilkhand Ry., the East Indian Ry., the Assem-Bengal Ry., and the Bombay Baroda & Central India Ry., have already been experimenting with timber from the Pacific coast of the United States, with successful results. Generally speaking, the Indian railways purchase between 500,000 and 1,200,000 sleepers every year. It is necessary to make

use of timber which can successfully resist the white ants and also not show undue deterioration from tropical climate.

Decision in the Mail Rate Case.

On May 18, the court of claims at Washington handed down a decision reversing its previous decision in what are now known as the "divisor cases." A total of 720 railroads are involved in these suits and, under the original judgment, the United States would have been subject to claims for over \$31,000,000. The suits arose out of the weighing of the mails carried for the government by the railways. Until 1907 the government had been accustomed to having the mails weighed for a period of 105 days and having this total divided by 90 in order to get a general average of weight of mails for the year. Subsequent to 1907 the government weighed the mails for 105 days and divided by 105. The railroads claimed that this reduced the average by one-seventh and that, from 1907 on, the government should have paid one-seventh more than it did. The case was inherited from the previous Administration with a judgment against the United States. On motion for a rehearing by Assistant Attorney-General Thompson, the court of claims reversed the former judgment and entered judgment for the government, disallowing any claim on the part of the railroads and dismissing their petition.

Hardening the Surface of Concrete Floors.

The Chemical Trade Journal (of England) for April 18, describes a new hardening material for the surface of concrete floors. It contains 95 per cent of iron dust or iron flour. It is added to the dry cement in the proportion of 15 to 25 pounds to each 100 pounds, and one part of the mixture is used with two parts of sand. This preparation is applied as a top coat to a thickness of $\frac{1}{2}$ to 1 inch. It forms a hard and durable floor, claimed to be waterproof and not slippery, and is also used for making new concrete adhere to old concrete in repairing.

Use of Electricity on the Panama Canal.

A joint electrical meeting of the Electrical Section Western Society of Engineers and the Chicago Section, American Institute of Electrical Engineers will be held Monday, May 25, convening at 7:30 p. m., in the rooms of the Western Society of Engineers. Mr. D. P. Gaillard, who was until recently on the electrical work with the Isthmian Canal Commission, will describe the "Universal Use of Electricity on the Panama Canal." The lecture will be illustrated.

American Railway Association Meeting.

The annual meeting of the American Railway Association was held in New York on May 20. There were present 170 delegates, representing 240 railroads. The executive committee reported that the membership now is 403, representing 253,000 miles of road. A recommendation from the presidents of western railway companies with respect to the adoption of standard freight car equipment was adopted, and a special committee of seven presidents was appointed to investigate the subject. A resolution for the appointment of a committee of nine to investigate standard time, as adopted in the United States in 1883, was passed, including a request that all members of the association whose lines are in the section assigned to central time abstain from the use of eastern time until the report of the committee is made in November. The committee on maintenance recommended certain changes in specifications for carbon steel rails, which were approved by the association. This committee also reported that it found no demand for a change in the standard for inside dimensions of box cars. Mr. H. U. Mudge, presi-

dent of the Chicago, Rock Island & Pacific Ry., was elected president and Mr. R. H. Aishton, vice-president of the Chicago & North Western Ry., was elected vice-president of the association. The next meeting will be held in Chicago on November 18.

Pullman Tips.

Charges of underpayment of its porters and of resultant fostering of the tipping system by these employ  es are resented by the Pullman Company, and the statements of the officials of the company from its Chicago headquarters have led to the granting of a rehearing by the California railway commission. This commission, as reported in the Railway Review of May 20, recently scored the Pullman Company for its alleged treatment of the men on its cars. Further evidence will be heard by the commission in July. The company took exception especially to the commission's finding that employees were driven to depend largely on the benefactions of the traveling public for their livelihood. The commission's declaration that the company allows the tipping system to supply the difference between what it pays and a living income is based on misinformation, says the application for a reopening of the case. Instead of the average pay of a Pullman porter being \$27.50 a month it is \$32.85, says the petition.

The N. Y. N. H. & H. R. R. and the Workmen's Compensation Law.

The New York, New Haven & Hartford R. R. has accepted the provisions of the Connecticut workmen's compensation law. The precise issue arose in the case of the Fidelity Trust Co., administrator of the estate of John Manning, of Hartford, against the railroad, which came before George B. Chandler, one of the compensation commissioners. Manning, who was a car spacer employed in interstate commerce, was found dead in the Hartford yards on January 20. The question to decide was whether the dependents of the dead man could recover under the state act, inasmuch as he was engaged in interstate commerce. The representative of the railroad filed a plea to jurisdiction. The contention of the claimant was that the burden of proof rested on the railroad to prove that Manning was killed through the negligence of the railroad, the federal act being distinctly a negligence measure. It was further contended that there was no evidence to show that the man had been killed through the negligence of anyone, and that, consequently, his dependents were entitled to compensation under the state law. The attorney for the railroad subsequently withdrew his plea to jurisdiction on settling the case. Commissioner Chandler, of the compensation board, has endorsed the opinion of the attorney general that employers of less than five persons are subject to the provisions of the act. This is a question upon which a number of authorities have differed widely because of the uncertain wording of the law.

New Brooklyn Elevated Link Near Completion.

The physical connection between the Myrtle Avenue and the Broadway elevated lines, Brooklyn, according to construction reports of the New York Municipal Railway Corporation, probably will be ready for operation about the first of July. The work remaining to be done at this point is now only a small amount of reinforcement in the existing girders and the installation of track and signals which is already under way. With the completion of this physical connection, the second of the important rapid transit improvements in Brooklyn will have been accomplished, the first being the opening of the Center Street loop, which was equipped for operation by the New York Municipal Ry., immediately after the dual contracts were signed, in March, 1913. The Myrtle Avenue and Broadway connection will mean an important

relief to the people of the Ridgewood district, as it will eliminate the change of cars at Myrtle avenue for those who are going down on the Broadway line across the Williamsburgh bridge and through the Center street loop. This change of cars has produced in the morning and evening rush hours at the point of transfer one of the worst congested spots in the entire Brooklyn transportation field, and its elimination will be a great gain to those who use this line. The approach toward completion of the Lutheran Cemetery extension, which connects with the Myrtle Avenue elevated road at the upper end of the route gives indication that the existing congestion at the Ridgewood point of transfer will be the next to disappear when the Lutheran line is ready for operation.

Disagreement Over Tap Line Rebates.

The Pennsylvania public service commission, in a decision made public May 15, takes issue with a recent suggestion of the Interstate Commerce Commission that allowances or rebates be discontinued over what are known as industrial railroads or "tap lines" owned and operated by industrial corporations. Following the federal commission's suggestion the Pennsylvania and other large railroads filed tariffs cancelling rebates. The state commission in its decision virtually declares, and so orders, that the new tariffs shall not go into effect so far as intrastate traffic is concerned. It declines to entertain a conclusion in the federal commission's judgment at variance with the conclusion of the Pennsylvania supreme court. The subject matter involved has been before the state commission for some time. The issue was brought by the Monongahela Connecting R. R., the Union R. R., and shippers along these lines against the Pennsylvania, the Baltimore & Ohio and other roads. Charles McVeagh, general counsel for the United States Steel Corporation represented the "industrial lines" and George Stuart Patterson represented the Pennsylvania R. R. In its decision the public service commission says: "Although we have given to the opinion expressed by the Interstate Commerce Commission that consideration and respect to which it is properly entitled, and although we fully appreciate the "desirability of uniformity of federal and state regulations, so far as this may be maintained consistently with the laws of this commonwealth, the commission is of the opinion that a conclusion at variance with that of the supreme court of the state of Pennsylvania with respect to the legal status of the complainant railroad companies would not be justified."

Tie Preserving Plant for the G. R. & I. Ry.

A tie preserving plant has been built at Reed City, Mich., to treat ties for the Grand Rapids & Indiana Ry. The capacity is 200,000 ties treated annually. Beech, birch and maple ties will be treated with zinc chloride and substituted for cedar and oak ties, which have largely been used in the past but are now becoming scarce or high in price.

Large Car-Ferry for the Southern Pacific Co.

What is claimed to be the largest car ferry in the world, the "Contra Costa," was launched by the Southern Pacific Co. at its shipyard in West Oakland, Cal., on May 16. This vessel will ply between Port Costa and Benecia, Cal., to supplement the service already in effect between those points. The length of the boat is 433 feet 4 inches; its beam is 66 feet 6 inches, and its depth is 19 feet, 5 inches. It will carry four train tracks with a capacity of thirty-six freight cars and two engines, or twenty-four passenger cars and two engines. The vessel is provided with fourteen bulkheads, so arranged that any one of them might be punctured without sinking the vessel. Two million board feet of lumber, thirty tons of spikes, 76 tons of round iron and 16,000 trenails entered into

its construction. There are single timbers measuring twenty-six inches by sixty-six feet, and others eighteen inches by 116 feet. The boat was christened by Miss Kate Potwin, who entered the service of the company as telegrapher in 1882 and who now occupies the position of ticket agent at the Oakland pier.

Wreck on the Michigan Central R. R.

On Thursday morning, May 14, five all-steel cars of the Michigan Central R. R., westbound New York to Chicago train, the "Wolverine," were derailed near Buxton, Ont. While running at the rate of 50 miles an hour, the second from the last of the 12 coaches which made up the train, suddenly left the track. It dragged with it the observation car behind and three coaches preceding. The derailment set the emergency brake, bringing the train to a sudden stop. While all of the passengers were shaken up by the accident,

but two were injured, and these not seriously. The train after a delay of about an hour and a half, continued on its way, with seven cars, leaving the derailed ones behind, after taking up their passengers. The road is four-tracked at the place where the accident occurred and a high embankment skirts the right of way. Officials of the company have been investigating the cause of the accident.

Express Companies May Reject Liquor Shipments to Texas.

The right of express companies to reject C. O. D. shipments of liquor to points in Texas was sustained by the Missouri supreme court on May 20. The decision was in the case of Abram Rosenberger, of Kansas City, who sought to collect from the Wells-Fargo and the Pacific Express companies the value of liquors the companies had refused to deliver in violation of law. The action of the express companies was sustained.

Mallet Compound Locomotive for Hump Yard Service, L. S. & M. S. Ry.

Gravity or hump yard switching is constantly increasing in large and busy yards. At present there are in this country ninety-five gravity switching yards on thirty different systems. These yards represent an investment of many millions. Therefore as the road engine increases in size it becomes relatively important to provide means at these yards whereby the heavy trains may be economically handled.

When big road engines bring in their large trains it generally becomes necessary to divide the train before classification. This means more operating units and more congestion. The average yard conditions as they exist today will not permit a long rigid wheel base. This is a severe limitation to the simple engine and restricts the design as to size and power. Mallet engines, with their drivers arranged in two independent sets, readily meet these limitations and also permit the designing of a locomotive powerful enough to handle the road train in one unit.

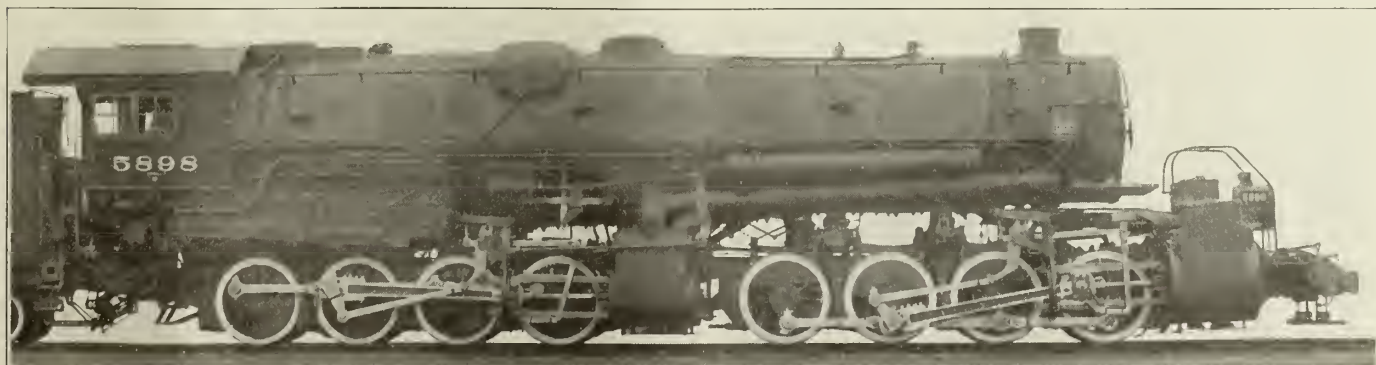
After carefully studying the conditions respecting this service on their road the official of the Lake Shore & Michigan Ry. placed an order with the American Locomotive Co. for three Mallet engines for hump service. Two of these engines are now in hump service at Elkhart, Ind., and one at Air Line Junction, O. Mr. A. R. Ayers, general mechanical engineer, advises as follows: "We find that these engines will handle the same trains that the G-5 and G-6 engines bring into the yard. It was formerly necessary to divide these trains in order to handle same with former power; this work was previously done by class M engines. (Class G-5 and G-6 are heavy Consolidations. Class M is a 10-wheel switcher.)

A comparison of some of the principal dimensions with the

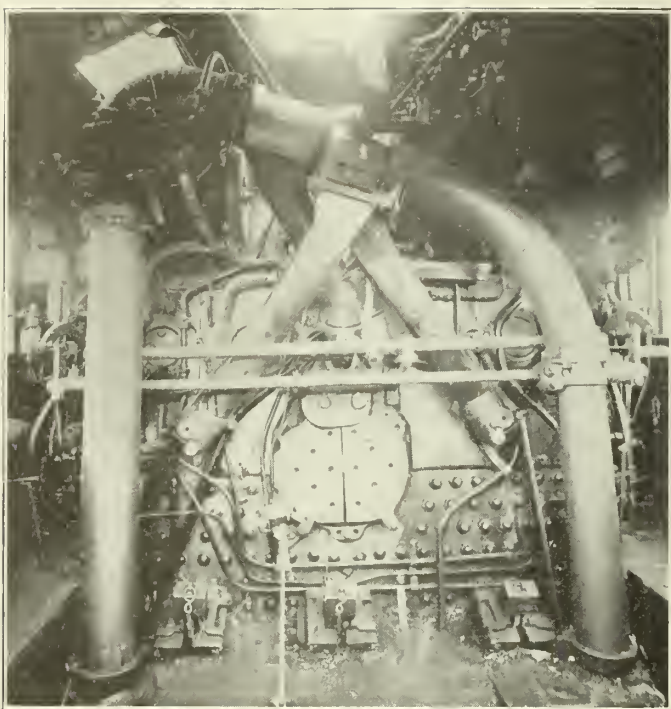
10-wheel switchers supplanted shows some of the advantages of the Mallet for this particular service. The 10-wheel switchers have a rigid wheel base of 19 ft., while the rigid wheel base of each of the Mallet units is 14 ft. 9 ins. Because of the many crossovers, this short rigid wheel base should be very desirable. The Mallet, with its tender, weighs 622,500 lbs. The 10-wheel switcher, with its tender, weighs 424,000 lbs. The Mallet has a tractive power of 100,500 lbs. working compound, and 120,600 working simple. The 10-wheel switcher has a tractive power of 55,400 lbs. With only 47 per cent increase in weight, the Mallet has 81½ per cent greater tractive power working compound, and 117½ greater tractive power working simple.

The boiler incorporated in this design warrants special attention. It is a conical connected type and is 88 ins. in diameter at the front end and 100 ins. in diameter at the largest course. The barrel is fitted with 255 tubes, 2¼ ins. in diameter and 45 flues, 5½ ins. in diameter and 23 ft. long. The firebox is 150⅞ ins. long by 94¼ inches wide, having a grate 121⅞ inches long. A Gaines combustion chamber combined with a Security brick arch and the railway company's arrangement of combustion flues are also included. This firebox provides a heating surface of 311 sq. ft. with a grate area of only 81 sq. ft.

A novel feature of this engine is the arrangement for its operation from either side. This was necessitated by the possibility of the engines being operated while headed in either direction. A specially designed bracket, one on each side of the engine backhead, holds the operating levers for the throttle and the power reverse gear. Both throttle levers are clamped



Mallet Compound Locomotive for Pusher Service, Lake Shore & Michigan Southern Ry.



Interior of Cab, Mallet Compound Locomotive, Lake Shore & Michigan Southern Ry.

to a hollow shaft which extends across the backhead and operates the throttle by a series of cranks. The throttle lever on the right hand side has a latch which locks on a quadrant. This latch is linked with the latch release handle which in turn is linked to the main handle and a crank. This crank is keyed to a solid shaft which passes through the main hollow operating shaft and is cranked and linked to the latch release handle on the left hand side. Thus either handle locks, unlocks and operates the throttle. A similar method is used in connecting the power reverse levers. Each side also has main and straight air brake valves, with the accompanying gages. The Street stoker, a radial buffer, the Ragonnet reverse gear and a pyrometer are among the specialties applied.

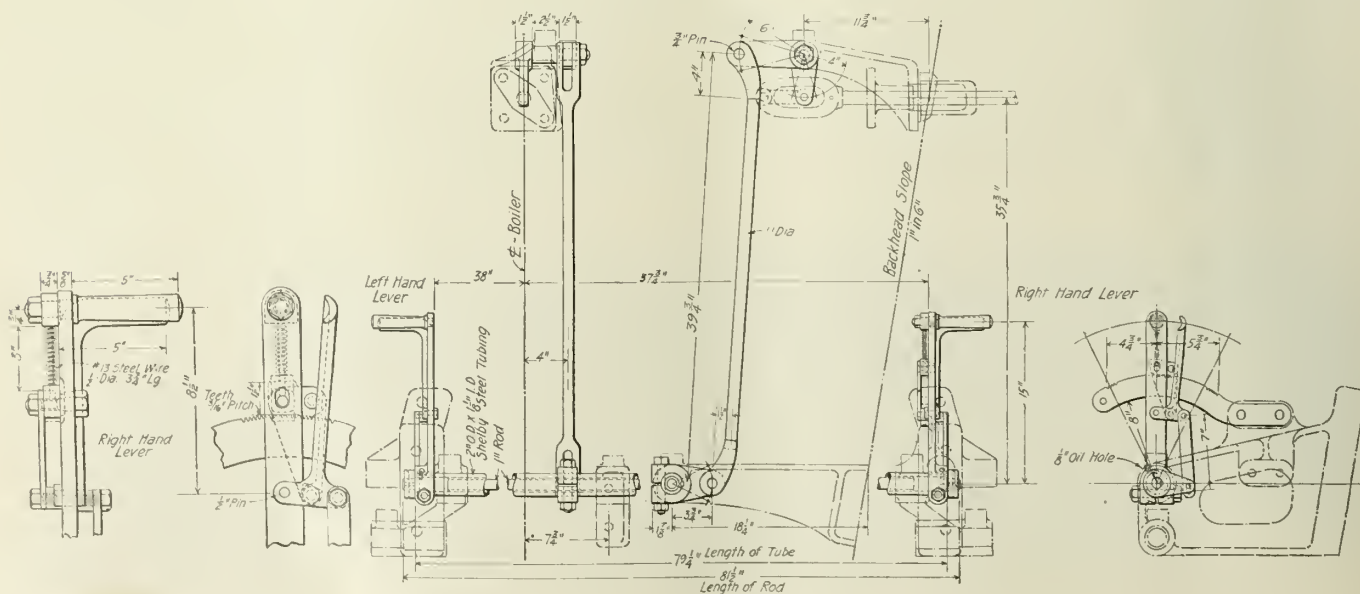
Additional strength with no increase in weight was secured through an extensive use of vanadium. A list of the parts constructed of this material includes engine frames, driving axles, main and side rods, rod straps, eccentric cranks, driving springs, tender elliptic springs and crosshead keys. The cylinder cast-

ings also were constructed of cast iron with vanadium content.

The leading features of these locomotives are indicated in the following table:

Type	0-8-8-0
Service	Pusher
Cylinders.....	26 and 40 by 28 ins.
Valves.....	High pressure piston; low pressure slide
Valve gear.....	Walschaert
Tractive power.....	105,800 lbs.
Boiler, type.....	Conical
Min. diameter.....	88 ins.
Working pressure.....	220 lbs.
Firebox, size.....	96¼ by 150 ins.
Grate area.....	81 sq. ft.
Kind of fuel.....	Soft coal
Tubes, number and diameter.....	255—2¼ ins.
Flues, number and diameter.....	45—5½ ins.
Length.....	23 ft.
Heating surface, firebox.....	311 sq. ft.
Tubes and flues.....	4924 sq. ft.
Arch tubes	54 sq. ft.
Total	5289 sq. ft.
Superheating surface	1235 sq. ft.
Driving wheels, diameter.....	51 ins.
Journals, main.....	10½ by 14 ins.
Journals, others.....	10 by 14 ins.
Weight on driving wheels.....	466,000 lbs.
Total, engine	466,000 lbs.
Total, engine and tender.....	622,500 lbs.
Wheel base, rigid.....	14 ft. 9 ins.
Total, engine	40 ft. 3½ ins.
Total, engine and tender.....	74 ft. 4¼ ins.
Tender, wheels, diameter.....	33 ins.
Journals	5½ by 10 ins.
Capacity, water.....	8,000 gals.
Capacity, coal.....	14 tons

In an effort to minimize accidents and death to trespassers and others on railroad property, and as another step in its "safety first" campaign, the Southern Pacific Co. is posting in conspicuous places on its properties everywhere along the Pacific system large placards appealing for the assistance of the public. The cards read as follows: "We solicit your co-operation in preventing death and injury to yourself, our patrons



Duplex Throttle Apparatus, Mallet Pusher Locomotive, Lake Shore & Michigan Southern Ry.

and the community at large. Stop to look and listen before passing over railway grade crossings. Refrain from and discourage trespassing upon railroad property. Be careful when waiting for trains or using the company's facilities. It is not safe to start over a railway crossing without first stopping to look and listen, to get on or off trains while in motion, to stand near edge of platform when trains are passing, to cross over head of an approaching train, or pass closely behind a train standing, to stand or walk upon tracks around stations elsewhere, to allow children to play around the station, tracks and cars."

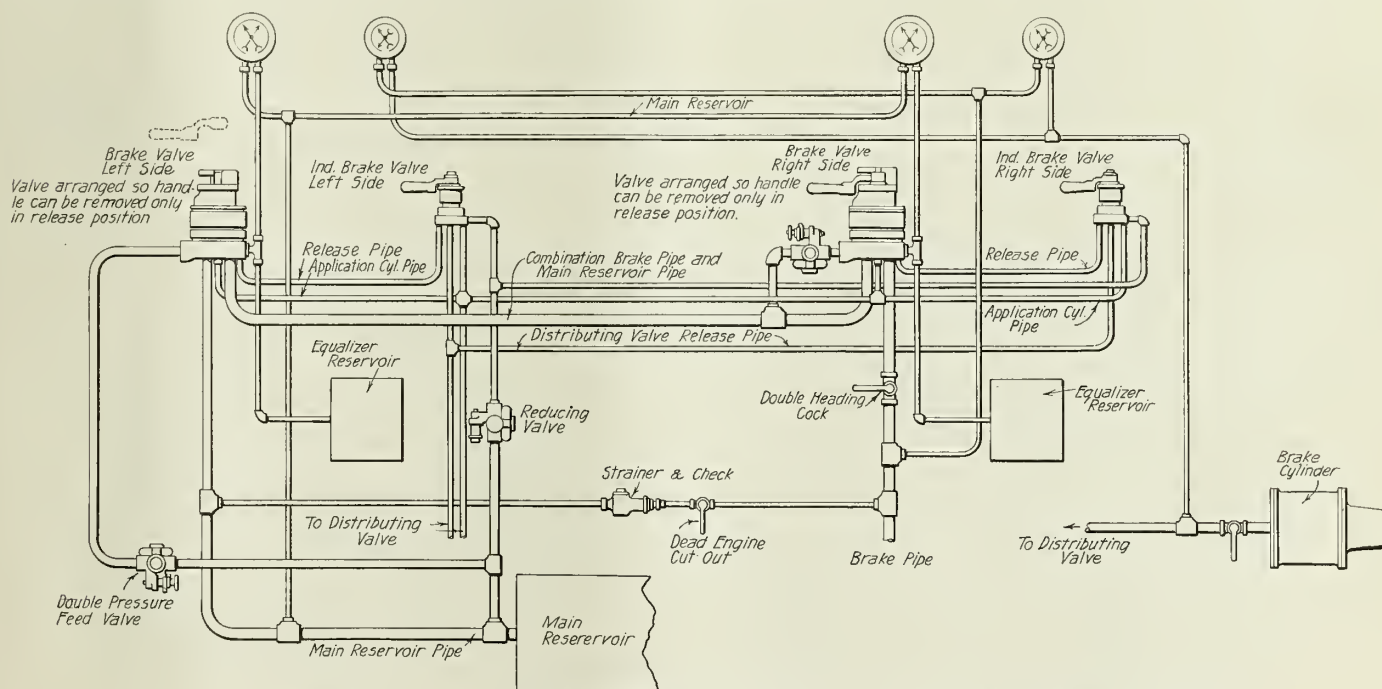
The Work of the International Railway Fuel Association.*

BY ROBERT S. COLLETT.

The result of the work of this association, in the brief period of six years, has been very gratifying, but its opportunities are so great that we should never feel satisfied. Enough cannot be said to express a proper regard for the

and others (men prominent in their profession) have said to us, have already made the records of your proceedings, of which 25,000 have been distributed, a valuable text-book, not only to busy railroad officials who are responsible to an exacting public for the safe and economical operation of trains, but to those engaged in the production and handling of coal. A few of the principal subjects that have been entertained are, proper methods of drafting locomotives; the use of oil for fuel; proper methods of firing, accompanied with stereopticon views; self-propelled passenger cars; the use of lignite; briquetting; modern methods of mining, and many other equally as important. To these are added the observations of those whose experience has made them recognized experts in these particular lines of work.

The annual average coal production in the United States for the ten years previous to 1907, the year of the origin of this association, was less than 300,000,000 tons; the production this year will be about 600,000,000 tons, and at a corresponding rate of increase, the average for the next ten years will reach the enormous figure of 750,000,000 tons per year. The average cost has increased about 10 per cent in



Duplex Brake Control Apparatus, Mallet Pusher Locomotive, Lake Shore & Michigan Southern Ry.

work of those few men whose keen appreciation of the needs of a greater co-operation of those responsible for conserving the world's fuel supply, and the advantages that would accrue therefrom, and who, at no small sacrifice of their time and energy, builded this organization, which, as its name implies, is international in scope; and this not in name only, for from across the seas has come some of the most valuable information we have had. These men gave us for a motto, "Progress and Efficiency," and as a result of these meetings a broader and more comprehensive view is had of the whole fuel problem, and we find that our neighbor, whom we once thought had designs on us, wishes to be our friend, and we, in turn, want to be his; and so, even the coal man and the railroad men, becoming better acquainted, actually grow to like one another.

Through the generous help of the University of Illinois, the railroads, and the zeal of the various committees, together with the practical things that railroad executives

six years. Mining labor disturbances usually bring about a decided increase in the cost of railroad fuel. However, except for the sadly strained relations now existing in Colorado, there has come about in the past few years a better feeling. Your association has worked diligently to this end, and it is hoped that, from out of the present difficulties in our western state, a more hopeful understanding may arise. Recent improvements in mining machinery, especially along the lines of electrical equipment, are giving us coal better prepared on the car. Some improvement has been made in handling through chutes, to secure more uniform fuel on locomotive tenders. We need to specialize more in this direction, and in arriving at the amount of fuel delivered to each locomotive. Improvements have also been made by the addition of superheaters, mechanical stokers and other locomotive appliances that either reduce labor or save fuel. Any permanent progress along the lines of improved drafting, or for increasing the feed-water temperature before reaching the locomotive boiler, or other devices that will result in causing the position of the locomotive crew to be more attractive, will justify themselves. Recent developments in car design, and in the air brakes, have made it possible to

*Extracts from the address delivered by the president at the opening of the sixth annual convention, held at Hotel LaSalle, Chicago, May 18-21, 1914.

handle very large trains; the physical ability of the fireman, however, imposes certain limitations on the speed and tonnage, and we would suggest that your committee reports on "Firing Practice" include the progress of the mechanical stoker, considering, especially, its adaptability for handling low-grade fuel.

The proper use of fuel on railroads depends also on other factors: Fuel should be properly prepared for delivery to the engine tank, and a uniform grade of fuel should be supplied where possible. It is fair to assume, where coal mines exist on railroads, that such coal will be used on its locomotives; first, because of lower cost and a constant supply, and second, to stimulate the industry. Efforts should be made to learn to use such coals rather than criticise the quality, as the source cannot be altered. Every semblance of waste should be avoided from the time the coal leaves the mine until it reaches the locomotive tender, otherwise there is not the incentive for the engineer and fireman to exert their best efforts. If railway managers are shown, concretely, what it costs to operate locomotives not in good condition, the locomotive will not be permitted to long remain in this condition. The proper distribution of engines to divisions to secure the best results, the correct loading of cars and trains, and train movement, should be carefully studied from the standpoint of fuel cost, quite as much as from any other angle. The makeup and schedule of trains is important; it is all along the line of co-operation, and needs to be emphasized.

One of the strongest characteristics of the American people is their forward-looking spirit in the adoption of improved methods that have shown themselves to be of practical value, but the railroads have been so busy selling transportation that attention to certain details has, perhaps, appeared a luxury that could not be indulged, and these seeming refinements as applied to fuel economy have not always been given the consideration they have deserved. The plans and specifications for the construction of the modern locomotive are worked out to the minutest detail and when it is completed it is a magnificent machine. But there lies more opportunity in the finished education of those who are to care for and operate this machine, and not those only, but all whose line of duty affects fuel costs, than was ever known to the builder's art.

"We should learn what coal is, and how to use it," is an

apt expression of a member of this association, and under his personal direction, that plan has been worked out to a practical conclusion. Please look, for a moment, at the work of the American Railway Association: Is any interpretation now sufficient for the flagging rule? Most emphatically, "no." Does an engineer accept the opinion of some one entirely inexperienced in the handling of a train order that might be to the engineer difficult of interpretation?—or does he find out its correct meaning before proceeding? Note the magnificent work of the Master Mechanics' and Master Car Builders' associations in the establishment of uniform practices. Is it not, then, equally as important to standardize methods for conserving fuel, and is it fair to presume that what one person can accomplish in his particular line of work, whether it be running or firing an engine, mining coal, or whatever the branch of service, another ought, within reasonable limitations, to accomplish? The time has come when we must conserve our fuel: Bulletin No. 35, by the State University of Texas, relating to fuel values and economies, is highly educational to its readers on fuel conservation. It is quite as important that the householder should know something of the subject, as the manufacturer and railroads. The personal equation is a most essential factor. It is important, in any undertaking, to select good employees; it is especially so in railroad service, and, having selected good employees, the education should be started along fundamental lines at the time of employment, and loyalty should be developed with the other qualifications.

This is an age of co-operation. We are fast learning the lesson that difference of occupation does not imply necessary hostility, and that if we want good service we should cultivate a just pride in duty well done, and should make working conditions as comfortable and, above all, as regular as possible; in other words, cause each employee to be in love with his work. Generally speaking, this is not a difficult problem. Considerable personal observation has convinced me that the average railroad employee desires to do his work in the most efficient manner, but it frequently occurs that he has never had the proper instruction to start him right; under which circumstances a willing man is liable to fail, and I believe this will apply to other occupation.

The International Railway Fuel Association can largely contribute toward this desired improvement. It has already done so, and I am confident that with continued effort in this direction beneficial results are bound to follow.

Des Moines River Viaduct, C. M. & St. P. Ry.

Continued from page 762

The floor over the entire viaduct is reinforced concrete deck slab construction, with ballast. The outer edge of the slabs is brought up to the elevation of the base of rail to give the deck a more substantial appearance. Refuge platforms formed by two special slabs having the outside parapet extended are provided about every 150 ft. The platforms are alternated, coming first on one side and then on the other.

The concrete bearing strip on the slabs previously referred

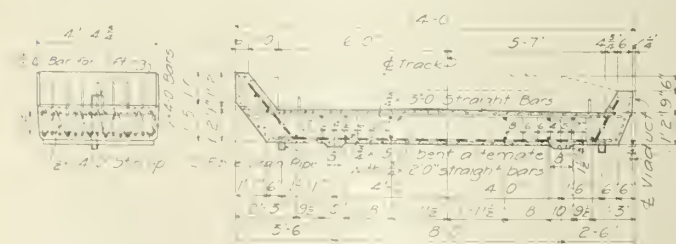


Fig. 8—Typical Slab, Des Moines River Viaduct, C., M. & St. P. Ry.

to, besides bringing the center of bearing over the center of the girder, instead of being out beyond the vertical leg of flange angle, as is the case where the web projects above the top flange angles and the slabs are notched, also permits the top lateral plates to be riveted to the top flanges of the girders by means of full-head rivets, and permits the lateral plates to be painted. The cover plate takes up any tension brought into the flange of the girder from the lateral system. Where the cover plate is not used, the laterals cause tension on the rivet heads in the vertical leg of the flange angles. The tendency of the slabs to lateral motion, which is very small, is taken care of by the rivet heads in the inner gage of the top flange.

Lift stirrups are provided in the slabs to facilitate handling. A 2-in. diameter fiber pipe was placed toward each side and the middle of each slab for drainage purposes. The slabs were all cast during cold weather. The forms were housed in and heated by means of steam pipes underneath the floor. The roofs of the slab houses were trap doors, through which the slabs were lifted after they had set.

the towers by keeping the derrick car supplied with material. However, the shipments of the steel work for the truss spans were delayed, so the work on the lower stories was continued and entirely completed before the erection of the truss spans was begun. The "mule" was then moved out a sufficient distance to clear the pedestals and run back to the truss spans to assist in the erection of the false work. The line diagram, Fig. 3, shows the "mule" erecting the lower stories of the towers in advance of the derrick car.

The truss spans were erected on a falsework trestle, shown in Fig. 12, supported on a pile foundation. The framed timber falsework bents, three stories high, were constructed of 12x12 in. posts, caps and sills. Longitudinal struts and all bracing were 3x12 in. Caps and sills were drift-bolted and

to the column section, prevented the lines from cutting and at the same time allowed the member to be swung to the correct batter. To guard against any outswing while lifting these heavy members, the derrick car track was temporarily curved out so that the end of the boom was nearly over the load with the boom on the center line of the car.

The maximum tonnage erected in one day with both derrick car and mule traveler amounted to approximately 200 tons. It is to the credit of those in charge that not a single fatality nor serious accident occurred during the work. Ground was broken July 10, 1912, and the last span of steel was completed July 12, 1913. Figure 13 shows a view of the viaduct looking east during construction.

The viaduct was designed in the engineering department



Fig. 11—View Showing Erection of Viaduct Towers with 50-ton Derrick Car.

the bracing spiked. Each story of the falsework was framed in units. The units for the two lower stories of the bents were framed on the pile caps and lifted into place by the mule traveler. The units for the upper story were framed at the west end of the bridge and together with stringers and blocking, were placed in position by the derrick car as the work advanced. After the west truss had been swung, the stringers and units in the upper story of the falsework were taken down and again used under the east truss.

The most difficult problem in connection with the erection of the steel was the handling of the 72,700-lb. middle sections of the rocker bents. In order to do this it was necessary to shorten the boom of the derrick car to 42 ft. The column sections were unloaded from the low level construction track previously referred to, placed on carriages, and run out on a trestle parallel to and 9 ft. west of the center line of the rocker bent. As nine strands of $\frac{3}{4}$ -in. diameter wire cable were required for the load line of the derrick, it was impossible to get sufficient line on the drum to reach the members 115 ft. below base of rail. A 70-ft. loop of 10 strands of $\frac{5}{8}$ -in. diameter cable was provided, passing over a 50-ton hook on the end of the load line and through an erection casting at the bottom. This casting when lashed

of the C., M. & St. P. Ry. Co., Mr. C. F. Loweth, chief engineer, and Mr. J. H. Prior, engineer of design. The entire construction was carried out by the forces of the railway company, with Mr. E. H. Howell in charge.

Decision of the Interstate Commerce Commission on Fourth Section Violations in the Southeast.

Brief mention was made in these columns, May 9, of the fact that the Interstate Commerce Commission has rendered a decision in the matter of application for relief from the provisions of the fourth section of the interstate commerce act, with respect to class and commodity rates from eastern cities, Ohio River crossings, and New Orleans, La., to South Atlantic and Gulf ports, certain points on navigable streams, and certain interior basing points in Southeastern and Mississippi Valley territory; with respect also to class and commodity rates from St. Louis, Mo., and Chicago, Ill., to Gulf ports, Mississippi River points, and to Meridian and Jackson, Miss.

This was an investigation undertaken by the commission with reference to the applications of carriers operating in

the territory south of the Ohio and east of the Mississippi rivers, who through their applications, asked authority to continue their present system of freight rates, which are, in many instances, in contravention of the provisions of the fourth section of the act to regulate commerce. Hearings were held at Atlanta, Ga.; Birmingham, Ala.; Chattanooga, Tenn.; New Orleans, La.; Chicago, Ill., and Washington, D. C. The railroad commissions of the southern states and the chambers of commerce of Atlanta, Ga.; Birmingham, Ala.; Chattanooga, Tenn.; New Orleans, La.; Macon, Ga.; Cincin-

veloped in the course of the testimony furnished at these hearings.

The commission's report upon the case, now issued, says:

"The position and conformation of the territory involved have brought about competitive transportation conditions therein to some extent unlike those existing in any other large section of the country. It is bounded on all four sides by navigable water and on the north also by strong lines of railroad of high traffic density maintaining rates materially lower than the southern lines can usually afford to accept.

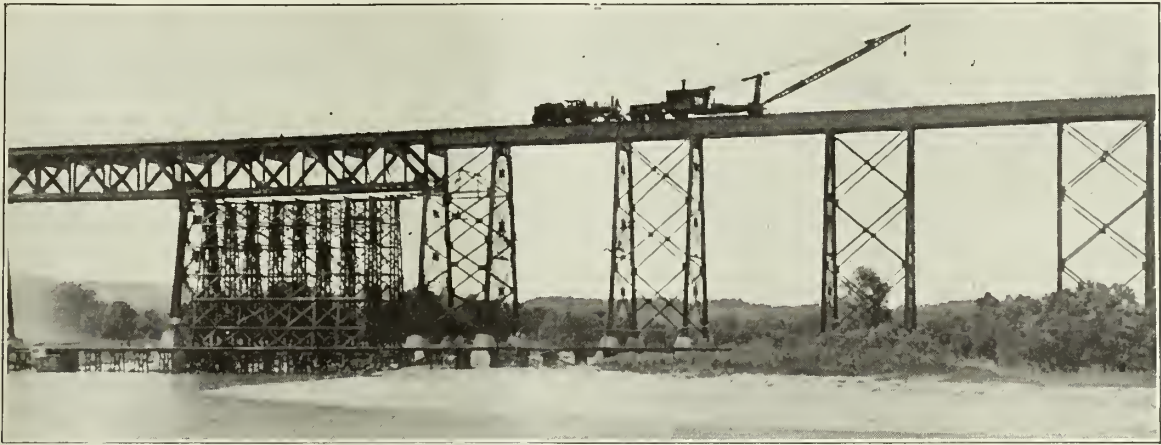


Fig. 12—View Looking North, Showing Truss Spans with False-work for East Span Still in Place, Des Moines River Viaduct.

nati, Ohio; Savannah, Ga., and many other cities were notified of these hearings. Representatives of some of the commercial interests of Greenville, Ala.; Hattiesburg, Miss.; Macon, Ga.; Knoxville, Tenn.; Chattanooga, Tenn., and a representative of the Alabama railroad commission appeared at some of the hearings, but offered little testimony in support of or in opposition to any of the applications.

These applications were very voluminous, and usually but one application, with respect to freight rates, was filed by each carrier. Such applications set forth with great particularity the reasons which were relied upon as justifying the methods of rate making and the systems of rates in force. The many different situations and rates were not described in the applications in detail, and these matters were de-

The territory is also pierced by numerous streams which afford means of transportation between various points that have had the effect of depressing the rates between such points to a level below what they might have been were it not for the influence of these streams. The railways serving these southern points, in seeking to meet the competition of the water carriers, have thought it necessary, in many instances, to depart from the rule of the fourth section and concerning such departures have sought at the hands of this commission relief from the strict application of that section. In other instances, at points where water competition does not exist, relief is sought upon the ground that the influence of rival markets and contending railroad and commercial interests have so reduced the rates to such points as to bring



Fig. 13—View of Des Moines River Viaduct, C., M. & St. P. Ry., During Construction, Looking East.

them below the level of fairly reasonable and remunerative rates for the service rendered.

"This report deals with class and commodity rates via defined routes between certain specified points, and the situations described are representative of many others in this territory, differing therefrom only in details and degree but not in principle. In many situations we have found the rates to the more distant points justified by the competition there existing and the rates to intermediate points bearing reasonable comparisons with other rates made for like distances in the same territory under fairly similar conditions. In the absence of complaint with reference to the rates to such intermediate points, we shall permit for the present the continuance of the lower rates to the more distant points and the present higher rates to the intermediate points. This, however, must not be construed as a finding that these rates to the intermediate points are just and reasonable. In other situations we have found the rates to more distant points justified by competition there existing, and the rates to intermediate points not bearing reasonable comparisons with other rates for like distances in the same general territory. In such cases we should permit the continuance of the lower rates to more distant points and higher rates to intermediate points, provided the rates to intermediate points do not exceed the scale of rates hereinafter named. This scale of rates is derived from an average of many rates made to noncompetitive points in the same general territory. The commission does not express any opinion with reference to the reasonableness of such rates as may be established to intermediate points in accordance with this report. Both the rates established and the rates continued to intermediate points in the situations herein described are subject to complaint, investigation, and correction if in violation of any provision of the act."

Following is a summary of the orders issued by the commission in the case:

1. Carriers authorized to continue all-rail rates via Potomac Yards, Va., and water-and-rail rates via Norfolk, Va., from New York to Charleston, S. C., Savannah, Ga., Brunswick, Ga., and Jacksonville, Fla., lower than to intermediate points.

2. Carriers authorized to continue all-rail rates via Potomac Yards and water-and-rail rates via Norfolk or south Atlantic ports from New York to New Orleans, La., Mobile, Ala., and Pensacola, Fla., lower than to intermediate points.

3. Carriers authorized to continue rates from New Orleans to Charleston, Savannah, Brunswick, Jacksonville, and Tampa, Fla., lower than to intermediate points. Rates to intermediate points on routes New Orleans to Savannah, Brunswick, and Jacksonville found unduly discriminatory.

4. Carriers authorized to continue rates from Cincinnati, Ohio, and Louisville, Ky., to Charleston, Savannah, Brunswick, and Jacksonville, lower than to intermediate points. Rates from Louisville to stations on the Seaboard Air Line between Cordele, Ga., and Savannah found unduly discriminatory. Rates from Cincinnati to points on the Southern Railway between Macon, Ga., and Jacksonville found unduly discriminatory. Rates from Louisville to stations on the Seaboard Air Line Railway between River Junction, Fla., and Jacksonville found discriminatory as compared one with another; their alignment prescribed.

5. Carriers authorized to continue rates from Cincinnati, Louisville, Cairo, Ill., St. Louis, Mo., Chicago, Ill., to Gulf ports, lower than to intermediate points. Rates from St. Louis to stations on Mobile & Ohio Railroad between Meridian, Miss., and Mobile, Ala., found unduly discriminatory.

6. Carriers authorized to continue rates from Cincinnati, Louisville, Cairo, St. Louis, and Chicago to Memphis, Tenn., Greenville, Miss., Vicksburg, Miss., and Natchez, Miss., lower

than to intermediate points. Rates from Cairo, St. Louis, Louisville, and Chicago to certain stations on the Yazoo & Mississippi Valley Railroad found unduly discriminatory.

7. Carriers authorized to continue all-rail and water-and-rail rates from New York to Augusta, Ga., Memphis, Macon, Milledgeville, Ga., Hawkinsville, Ga., Dublin, Ga., Columbus, Ga., Montgomery, Ala., Selma, Ala., Demopolis, Ala., and Tuscaloosa, Ala., lower than to intermediate points. Present rates to Macon and Milledgeville, Hawkinsville, Dublin, and Columbus found unduly preferential. Authority to continue lower rates from New York to Albany, Ga., than to intermediate points denied. Rates from New York to stations on the Central of Georgia Railway between Savannah and Augusta found unduly discriminatory. Rates from New York to stations on the Central of Georgia Railway east of Macon found unduly discriminatory. Rates from New York to stations on the Seaboard Air Line Railway between Cordele and Montgomery found unduly discriminatory. Rates from New York to stations on the Southern Railway between Demopolis and Selma found unduly discriminatory.

8. Carriers authorized to continue rates from New Orleans to Augusta lower than to intermediate points. Present rates, New Orleans to Macon, Columbus, Montgomery, Selma, and Albany, found unduly preferential. Authority to continue lower rates from New Orleans to Montgomery, Selma, Columbus, Macon, and Albany than to intermediate points denied.

9. Carriers authorized to continue rates from Cincinnati and Louisville to Augusta, Macon, Columbus, Montgomery, and Selma lower than to intermediate points. Authority to continue lower rates from Cincinnati and Louisville to Albany than to intermediate points denied. Practice of meeting competition of eastern carriers at Macon and not meeting this competition at intermediate points held to be unduly preferential to Macon, and unduly discriminatory against intermediate points. Rates from Louisville to stations on the Georgia Railroad between Atlanta and Augusta held to be unduly discriminatory. Rates from Cincinnati to stations on the Southern Railway between Atlanta and Macon found unduly discriminatory. Rates from Louisville to stations on the Central of Georgia Railway between Columbus and Macon found unduly discriminatory. Rates from Cincinnati to stations on the Southern Railway between McDonough, Ga., and Columbus found unduly discriminatory. Rates from Louisville to stations on the Central of Georgia Railway, Birmingham, Ala., to Columbus found unduly discriminatory. Rates from Cincinnati to stations on the Georgia Southwestern & Gulf Railroad between Cordele and Albany found unduly discriminatory. Rates from Cincinnati to stations on the Seaboard Air Line Railway between Montgomery and Albany found unduly discriminatory. Rates from Cincinnati to stations on the Atlanta & West Point Railroad found unduly discriminatory. Rates from Cincinnati to stations on the Southern Railway between Birmingham and Selma found unduly discriminatory. Rates from Cincinnati to points on the Cincinnati, New Orleans & Texas Pacific Railway, north of Chattanooga, found unduly discriminatory. Rates from Louisville to stations on the Nashville, Chattanooga & St. Louis Railway found unduly discriminatory.

10. Carriers authorized to continue water-and-rail rates from New York to Birmingham, Ala., Rome, Ga., Meridian and Jackson, Miss., lower than to intermediate points. Authority to continue rates from New York to Atlanta, Ga., Athens, Ga., and Cordele, Ga., lower than to intermediate points denied. Rates from New York to stations on the Central of Georgia Railway between Macon and Atlanta found unduly discriminatory. Rates from New York to stations on the Central of Georgia Railway between Savannah and Athens found unduly discriminatory. Rates from New York to stations on the Seaboard Air Line Railway between Savannah and Cordele found unduly discriminatory. Rates

from New York to stations on the Southern Railway intermediate to Rome found unduly discriminatory. Rates from New York to points on the Alabama Great Southern Railroad between Birmingham and Meridian found unduly discriminatory. Rates from New York to stations on the Alabama & Vicksburg Railroad between Jackson and Meridian found unduly discriminatory. Authority to continue water-and-rail rates from New York via Mobile and New Orleans to Meridian and Jackson, lower than to intermediate points denied.

11. Authority to continue rates from New Orleans to Atlanta, Birmingham, Athens, Rome, and Cordele, lower than to intermediate points via direct lines denied. Rates from New Orleans to stations on the Atlanta & West Point Railroad found unduly discriminatory. Rates from New Orleans to stations on the Seaboard Air Line Railway between Montgomery and Cordele found unduly discriminatory. Rates from New Orleans to stations on the Southern Rail-

way between Birmingham and Rome found unduly discriminatory.

12. Authority to continue rates from Cincinnati and Louisville to Atlanta, Birmingham, Athens, Cordele and Rome lower than to intermediate points denied. Authority to continue rates from Cairo, St. Louis, Chicago, Louisville and Cincinnati to Meridian and Jackson lower than to intermediate points denied. Rates from Cincinnati to stations on the Southern Railway, north of Atlanta, found unduly discriminatory. Rates from Louisville to points on the Seaboard Air Line Railway between Montgomery and Cordele found unduly discriminatory. Rates from Cincinnati to stations on the Georgia, Southern and Florida, north of Cordele, found unduly discriminatory. Rates from Cincinnati to points on the Southern Railway, north of Rome, found unduly discriminatory. Rates from St. Louis to stations on the Mobile & Ohio Railroad, north of Meridian, found unduly discriminatory.

The Chilled Iron Wheel and its Relation to Brake Shoe Durability.

By F. K. VIAL.*

An analysis is herewith given of a large number of brake shoe tests on wheels both of the steel and the chilled iron varieties to determine the relation of each to brake shoe wear. A summary of this study, which is shown in Fig. 4, accompanying the article, involves the following considerations, which appear to favor the chilled iron wheel: First, 20 per cent greater coefficient of friction; second, 20 per cent greater tangential pull; third, 20 per cent shorter stops; fourth, 25 to 50 per cent less metal loss from brake shoes for doing the same work; fifth, a greater number of stops per life of brake shoe; and sixth, combined efficiency of coefficient of friction, and low loss of metal results in a saving of several million dollars annually in brake shoe consumption.

A very extensive line of tests have been made at various times at Purdue University and by the American Brake Shoe & Foundry Co. for the Master Car Builders' Association, the As-

two or more variables were usually changed at the same time. For example: High braking pressures were used on the steel wheel at high velocities and the lower pressures on the chilled iron wheels at reduced velocities, yet an account of the large volume of tests with different brake shoes, it is possible to determine with a fair degree of accuracy the relation of each variable to brake shoe economy.

In general, when making brake shoe tests, the specifications formulated by the Master Car Builders' brake shoe committee are followed, namely:

"That on a cast iron wheel the loss shall be determined by making 100 applications of the shoe to the wheel under a pressure of 2808 pounds and at a constant speed of 20 miles per hour—at each application the shoe to be in contact during 190 revolutions and out of contact during the succeeding 610 revolutions. That under these conditions, the shoe shall lose in weight

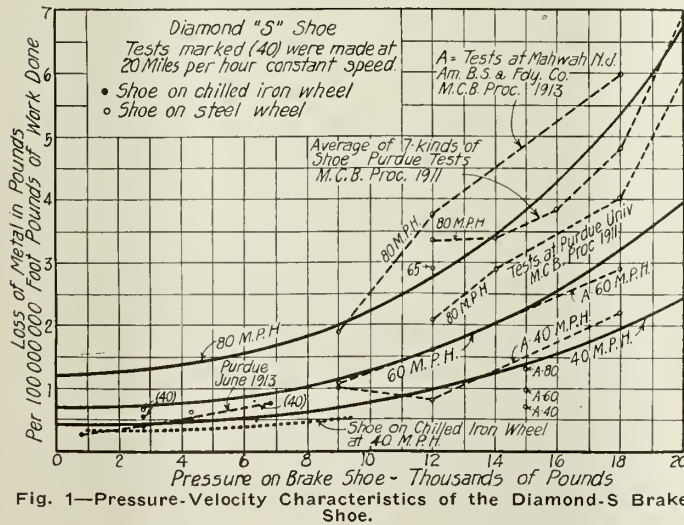


Fig. 1—Pressure-Velocity Characteristics of the Diamond-S Brake Shoe.

sociation of Manufacturers of Chilled Car Wheels, and for various railroad companies, to determine the durability of brake shoes under various operating conditions. Much information is available, showing conditions which result in a maximum brake shoe efficiency, but the independent effect of each variable such as pressure, velocity, etc., is not definitely established because, in making the tests, when changing from one condition to another,

*Chief engineer, the Association of Manufacturers of Chilled Car Wheels.

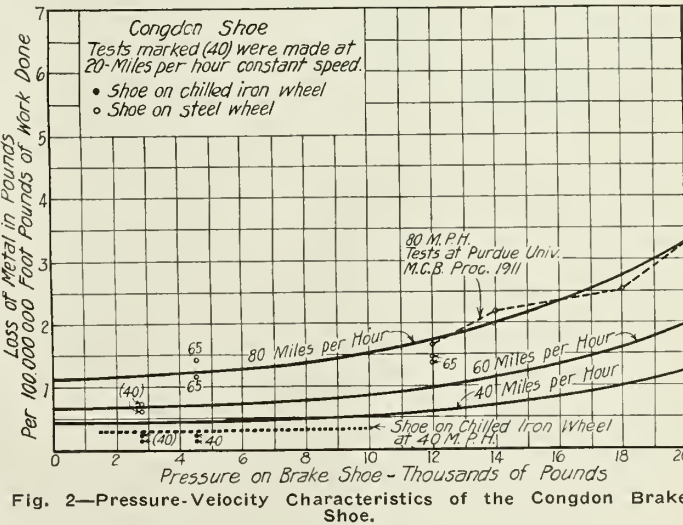


Fig. 2—Pressure-Velocity Characteristics of the Congdon Brake Shoe.

not more than 8/10 pound for each 100,000,000 foot pounds of work done.

"That on the steel tired wheel the shoe wear shall be determined by making 10 stops from an initial speed of 65 miles per hour under a shoe pressure of 12,000 pounds and that under these conditions, the shoe shall lose in weight not more than four pounds for each 100,000,000 foot pounds of work done."

In addition to these specifications, a number of tests have been made with varying shoe pressures under velocities as high

as 80 miles per hour. The results of a series of tests extending over several years show that the type of brake shoe, amount of pressure, velocity of the wheel and the character of the wheel metal have a very marked influence on the durability of the brake shoe. It will also be noted that the characteristics of various shoes are widely different and therefore no general law is applicable to all cases. However, there is a general similarity, and typical shoes may be chosen to indicate the extent to which various items influence brake shoe durability.

The characteristics of the Diamond "S" shoe, with reference to velocity and pressure, are shown in Fig. 1. While there may be some uncertainty regarding the location of certain parts of the curve, nevertheless, in general, the results of various tests indicate a very decided decrease in brake shoe durability as the amount of work per unit of time increases, because there is less resistance to abrasion when the particles in contact are heated to high temperatures. The factors which enter into the rate at which a unit of work is performed are velocity and pressure. Under ordinary operating conditions, these two items increase and decrease in unison, that is, high braking pressures are used under high velocities and the lower braking pressures under low velocities, which applies especially in making stops. The amount of shoe pressure on grades depends upon the percentage of grade and the load per wheel. The pressures used in controlling the velocity of trains on descending grades are small but are applied continuously for long intervals of time, whereas in making stops from high velocities the shoe pressure is heavy and is applied for a very short interval. The effect of increasing velocities and pressures on the rapidity of metal loss from the brake shoe for doing the same amount of work is clearly shown in Fig. 1, as follows:

Effect of Velocity: At 6000 pounds pressure, the loss in metal to be expected in making stops from 40 miles per hour is $\frac{1}{2}$ pound for each 100 million foot pounds of energy destroyed; $\frac{3}{4}$ pound at 60 miles per hour and 1.6 pounds at 80 miles per hour. It is thus seen that the loss of metal from this brake shoe is over three times as great for performing the same amount of work at the same shoe pressure from 80 miles per hour as from 40 miles per hour. Under 18,000 pounds pressure at 40 miles per hour, a loss of 1.9 pounds may be expected for each 100 million foot pounds of energy destroyed; 3.2 pounds at 60 miles per hour and $5\frac{1}{2}$ pounds at 80 miles per hour. Here again, the loss of metal from the brake shoe is almost three times as great from speeds at 80 miles per hour as from speeds at 40 miles per hour, indicating the rapid decrease in brake shoe efficiency from the standpoint of durability as velocities increase.

Effect of Pressure: The effect of increasing pressure at the same speed is also illustrated in Fig. 1. At 40 miles per hour the loss of metal under 6000 pounds shoe pressure is $\frac{1}{2}$ pound for doing the same amount of work that requires a loss of two pounds under 18,000 pounds pressure at the same velocity. The ratio in this case is four to one, indicating that the increased loss of metal on account of increased pressures follows approximately the same law as the increased loss under increasing velocities.

Effect of Combined Increases in Velocity and Pressure: The factor of increased loss of metal from the brake shoe when velocity and pressure are increased simultaneously, is the product of the factor of increased loss on account of velocity, multiplied by the factor for increased pressure. In the above examples it was shown that for a certain shoe, there is three times the metal loss at 80 miles per hour as at 40 miles per hour and four times the metal loss under 18,000 pounds pressure as under 6000 pounds pressure, hence the loss under 18,000 pounds pressure from an initial velocity of 80 miles per hour is 12 times as great as under 6000 pounds pressure at 40 miles per hour. Comparing this with Fig. 1, we find the quantity for metal loss under 6000 pounds pressure at 40 miles per hour is $\frac{1}{2}$ pound and under 18,000 pounds at 80 miles per hour the loss is 6 pounds or 12 times the quantity required for doing the

same amount of work at 6000 pounds shoe pressure in making stops from 40 miles per hour, thus indicating that the product of the velocity factor multiplied by the pressure factor is approximately the factor for combined increases.

Figure 2 shows the characteristics of the Congdon shoe under various velocities and pressures. For this shoe the curves are very much flatter, indicating greater durability. These two examples are given to indicate the general result that may be

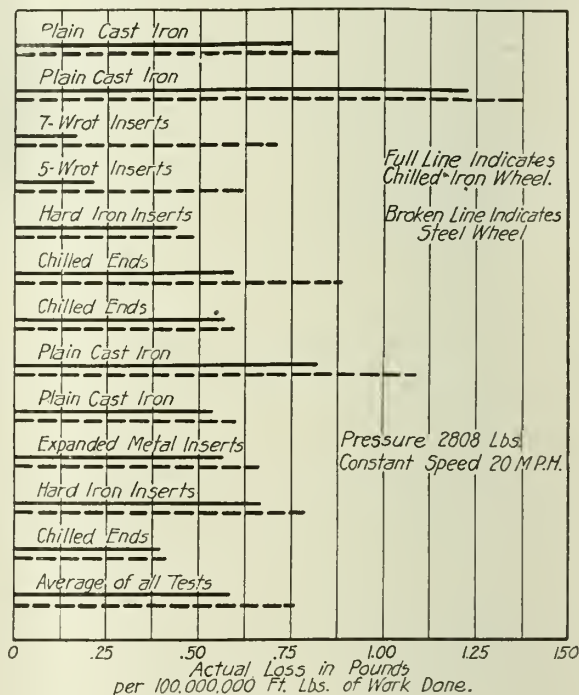


Fig. 3—Loss of Brake Shoe Material on Steel and on Chilled Iron Wheels.

expected from standard brake shoes. Some shoes have a higher and some a lower factor of increased loss for increasing velocities and pressures than is shown in Figs. 1 and 2.

Clasp Brake Shoes: The laws of increased brake shoe consumption under heavy pressures indicate a marked economy when two shoes are used on the same wheel, as in the clasp type of brake rigging. The reason for this is the very material increase in coefficient of friction combined with the smaller metal loss at reduced pressures. In making stops from 60 miles per hour for a shoe pressure of 16,000 pounds on a single shoe, the loss of metal is $2\frac{1}{2}$ pounds per 100 million foot pounds of energy destroyed. The same work will be accomplished with two shoes under 5000 pounds brake pressure, because the coefficient of friction is increased from 10 per cent to 16 per cent, and the metal loss under this condition is slightly under $\frac{1}{2}$ pound per shoe, or one pound per two shoes, thus showing an increased durability of 150 per cent. This item is only incidental in this type of brake rigging as other favorable conditions are responsible for the idea.

Effect of Chilled Iron and Steel Wheels: A very important item in wheel economy is the relation of the type of metal of which the wheel is composed to brake shoe durability. Figure 3 is a graphical illustration of the relative metal loss from brake shoes on chilled iron and steel wheels when doing the same amount of work under the same conditions. Twelve different varieties of shoes are shown under a pressure of 2808 pounds at a constant speed of 20 miles per hour. The results are the average from 10 to 300 applications of each shoe for approximately 200 revolutions at each application. The important point to be noted is the greater metal loss in every case when the shoe is applied to the steel wheel than when applied to the chilled iron wheel. In some cases the difference amounts to 300 per cent or more, whereas in others, the difference is as low as 10 per cent. The average loss from the 14 shoes was

.533 pound per 100 million foot pounds of energy destroyed on the chilled iron wheel, while it required .685 pound for doing the same work on the steel wheel, or an increase of 28½ per cent. It must be remembered, however, that in a great many cases the shoe having the greatest wearing value contains inserts, which cannot be used on the steel wheel on account of the scoring action, and that it is customary to use brake shoes on steel wheels having higher metal losses in order to protect the metal of the tread. This is also clearly indicated in laboratory tests, where explanations are always necessary, showing the destructive action of certain brake shoes on steel treads. An example is the report to the Master Car Builders' Association by Purdue University, dated Feb. 21, 1910, as follows:

"None of the 14 shoes tested damaged the surface of the cast iron wheels during the wearing tests. In the wearing test on the steel tired wheel at a constant speed of 20 miles per hour and at a pressure of 2808 pounds, two shoes scored the wheel. Shoe No. 286, which was given 300 applications, cut four V-

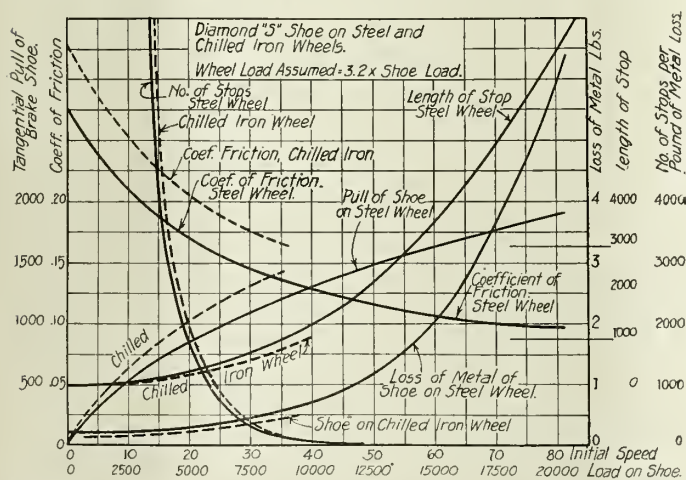


Fig. 4—Brake Shoe Performance on Steel vs. Chilled Iron Wheels.

shaped grooves about 1-32 inch deep and several smaller ones in the surface of the wheel around the entire circumference. After the test of this shoe, the wheel had to be ground with a revolving emery wheel in order to get a smooth surface for the next shoe. The other shoe that scored the steel tired wheel was No. 288. This shoe was given only 100 applications, for in that time it had cut five grooves similar to those cut by shoe No. 286."

This reference was to the use of two Congdon shoes, which had the very greatest efficiency when applied to the chilled wheel, the metal loss being in one case .163 pound and .212 in the other, which is less than one-third the loss from the average of all shoes tested on the chilled iron wheel, and less than one-half the loss from the most durable shoe tested on the steel wheel. Inasmuch as the use of the Congdon shoe is entirely consistent when applied to chilled iron wheels, it is entirely fair to assume 100 per cent increase in durability over any shoe which may be applied to the steel wheel. This result is not only established by the extensive tests covering several years, for the Master Car Builders' Association, but is also confirmed by investigations and practice by various railroads. Service tests under similar conditions indicate that the chilled iron wheel has the advantage of from 25 to 50 per cent in brake shoe consumption. In street car service under cars of identical construction, a pound of brake shoe metal has been worn away for each 1000 wheel miles when applied to the chilled iron wheel and for each 500 wheel miles when applied to the steel wheel.

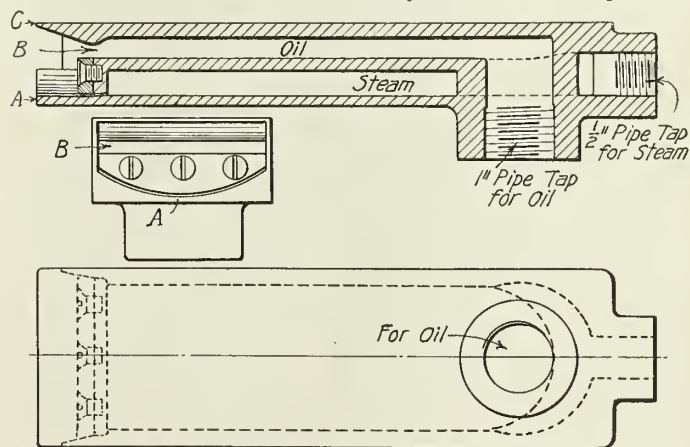
The final conclusion in regard to the relative effect of chilled iron and steel on brake shoe durability is that while no definite figure can be given, the range is from 25 to 50 per cent in favor of the chilled iron wheel. The economic value of this remarkable property of chilled iron results in a very material

brake shoe economy when we consider that the value of brake shoes manufactured annually is upwards of eight million dollars, and that the use of the chilled iron wheel represents a saving of two million to four million dollars annually in brake shoe consumption, which must be considered when comparing the relative economies of different types of wheels.

Structure of Chilled Iron and Steel: If the structure of chilled iron and steel be examined, much light will be thrown on the cause for the differences in coefficient of friction and metal loss from brake shoes. The grain of chilled iron is at right angles to the tread, hence the wearing is similar to that of the end grain of wood, which is greater than in the direction of the grain. The action between the shoe and surface of the wheel is purely frictional, whereas the tread of the steel wheel is more or less fibrous in the direction of the circumference, so that the surface is roughened by the sharp particles of fibers which produce a cutting action, reducing the coefficient of friction and increasing the metal loss from both wheel and shoe. In most brake shoe laboratory tests it is necessary to remove the steel wheel from the testing machine and grind the tread in order to get comparative results. This is not necessary in the chilled iron wheel. All the phenomena of brake shoe friction and rail friction are readily explained when the difference in the structure of the two metals is taken into consideration.

The Economy Oil Burner, Esquimalt & Nanaimo Ry.

The Esquimalt & Nanaimo Ry. is using the Economy oil burner, illustrated herewith, on twenty of its locomotives operating on Vancouver Island, B. C. The distinguishing feature of this burner is noted in the form of lip over which the steam passes and whereby the shape of the flame is determined. Instead of being straight, as on most burners hitherto tried, the orifice in this case takes the form of an arc of a circle which so shapes the flame that, in effect, a greater area is made available for radiation against the side sheets of the firebox. The extent to which this modification is beneficial is indicated by the fact that in a recent trial on the lines of the Canadian Pacific Ry. this burner evaporated



Economy Oil Burner as Applied to Locomotives of the Esquimalt & Nanaimo Ry.

ten per cent more water per gallon of fuel and consumed ten per cent less oil per 1000 ton miles than did the straight lipped burner against which it was tried.

In a case where goods were loaded on a freight car at a warehouse on a side track and the company was notified to take out the car and put in another, the Kentucky Court of Appeals held (*Nelson vs. Chesapeake & Ohio Railroad Co.*) that when that was done the railroad company did not become liable as a carrier for the contents of the loaded car until shipping directions were given, so that the railroad company might know to whom the car was to be shipped.

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Office of Publication	- - - - -	1407 Ellsworth Bldg., Chicago
WILLARD A. SMITH	- - - - -	President and Manager
HAROLD A. SMITH	- - - - -	Assistant Manager
W. M. CAMP	- - - - -	Editor
CLYDE F. BURNS	- - - - -	} Assistant Editors
JOHN M. LAMMEDEE	- - - - -	
H. H. WALL	- - - - -	

Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, MAY 23, 1914.

Mr. Mellen Opens Up.

The New Haven drama might be staged as a modern edition of Faust. The stockholders were the Marguerite; but whether Mellen was the Mephistopheles and the directors the Faust, or just the reverse, does not yet appear with certainty. Mellen was Morgan's office boy "for he himself hath said it." He "washed the windows and he scrubbed the floor and polished up the handle of the big front door" and he never—that is, hardly ever, dared to suggest that the boss was musing up things too much. When the safe door was left open and Tom, Dick, and Harry were helping themselves to New Haven assets, he did suggest to the boss that they ought to leave receipts, but the boss's answer was "abrupt," which hurt Mellen's feelings to such extent that he allowed that the boss was boss and dropped the matter. Mr. Morgan was as "brusque" as a certain other Morgan who once sailed tropical seas with a black flag at his mast head. Having "barked his own shins," Mellen suggested to certain directors who wanted to know, you know, that they "go and find out." But they "ducked." "Holy Cesarea Phillipi," said Skinner, "what have you been

doing here with eleven millions of New Haven money," and echo answered "what?" It is interesting to note, in passing, the familiarity of this "Sandhedrim" with scriptural words and phrases, showing how words may live in memory irrespective of any impression upon character.

When the Westchester road was purchased through a committee which used \$11,000,000 to acquire a property upon which work amounting to one million dollars had been done and which had four millions of dollars' worth of real estate, no detailed account of the transaction was made. Mr. Mellen and the other directors were not informed what became of the six millions paid out without apparent return. The road which is twenty-six miles long with four tracks, cost the New Haven, altogether, over \$35,000,000. It was splendidly built and equipped—far too well for such a proposition. The country it serves is not on main lines of traffic but will develop as a suburban district. It will be some years, however, before the road which is now losing one and a quarter millions a year, can play even and many years more before it can be made a profitable property. A road in such a territory should be cheaply built and then be developed and completed, with the development of this new territory. The traffic for an expensive four-track line is not there and will not be for years to come. The high character of the road may hasten development of the territory; but it is questionable whether an expenditure of a million and a third dollars per mile can ever be made to pay. The policy of buying and building on this scale is indefensibly reckless.

Mr. Mellen's testimony also shows that large sums were expended for political influence in New York City, through which desired modifications of the franchises were obtained. The testimony as published does not make a very complete or clear story, in the absence of the documentary evidence. The Commission will, however, be able, thanks to Mellen, to make a fairly complete record, provided it can trace the money to its ultimate recipients.

The public listens to this story with great interest. It smiles at Mellen's wit and his cool revelations; but it has no sympathy with the man who turns state's evidence. The power of a railway president may be quite limited; but no man can retain respect who in such position permits transactions of magnitude to be done without his knowledge or approval. If he holds his job, he accepts the responsibility. He may obtain legal immunity by confession, but he must not expect to retain public respect by throwing all the blame on the bankers and directors. The fair presumption is that he laid the schemes, although others may have dominated the actual transactions. The pirate captain and his mate are quarrelsome and prone to mutual abuse. But that does not relieve any of them who stay with the ship, of their mutual guilt, if they are caught.

Whether there is any possibility of punishing any

of these directors in either criminal or civil proceedings, or both, is comparatively unimportant. Publicity is all important and perhaps the greatest deterrent to similar actions in the future. But to public sentiment there should be added such legislation as will be effective. The common law is not sufficient and it is not easy to draw statutes which lawyers cannot get around. The details of such transactions as those which have well-nigh destroyed the New Haven property should be drawn out at almost any expense. The atmosphere will not be clear until other investigations, such as that ordered of the financing of the Rock Island system, are completed. There are many practices which the lawyers have claimed to be legal, but which ought to be made illegal and with penalties suited to the offenses.

Flood Control.

The great floods of last year in the Ohio and Mississippi valleys set the public to thinking on means for preventing in the future such disastrous results as then occurred. A great deal of opinion has been expressed as to the character of works or measures for flood relief, and a considerable amount of study on scientific lines has been given to the problem.

In a general way, theoretical discussion of such projects has taken two directions, one of these being along such lines as the enlargement and straightening of river channels, the building of levees, increase of clearance under bridges, bank protection, etc. The other proposed system of works is the construction of dams and reservoirs to impound flood waters at the source, to hold them back and control the rate of flowage. All of these are of the nature of engineering works, and are the concern of the general public as well as nearly all industries, from agriculture to transportation.

It was not expected that the policies which would govern the future situation in respect to floods would immediately take definite shape, but it is apparent to every thinking person that diligent attention should be given to the subject by public corporations, municipalities, and the state and national governments. The Dayton Flood Committee, composed of eminent engineers, has made extensive investigations, followed by a report, and the City of Columbus, Ohio, employed consulting engineers, who, also, have reported, with recommendations.

Some of the general principles recommended by these committees to govern the design of projects for flood control are the enlargement of channels, in order to reduce the elevation of high-water marks, especially above and through populous districts; reduction of grade or rate of fall to $1\frac{1}{2}$ feet per mile, maximum, so as to reduce the mean average velocity of flow to six or eight feet per second, using dams, if necessary, in order that the flood level may be dropped without damage within certain limited areas where the bottom may be favorable to such a method or where the banks may admit of the

required protection; the paving or riprapping of banks in exposed locations or in bends or at levees, where high-velocity flow cannot be prevented; increase of the minimum height of levees above high-water mark to six feet; bridge openings widened or deepened sufficiently to reduce the maximum velocity of flood flow to ten feet per second; minimum clearance under bridges to be at least six feet, as a precaution against the formation of obstructions by floating debris or ice.

All of these recommendations are pertinent to widely distributed situations which came under observation at the time of the floods. In a number of places it was noticeable that the excessively high flood level in the built-up sections of cities was caused by the backing up of waters by obstructions in the channels, usually of the character of floating buildings or debris lodging against bridge piers or against girders, arches or the lower chords of trusses, where there was insufficient clearance. At some places, in fact, both steel and arch bridges were completely submerged by the floods in channels too much restricted. In order to provide channels of adequate capacity it will undoubtedly be necessary in many cases to remove embankments or abutments at bridges to afford room for an additional span or more; or, perhaps, to increase the length of span of bridges in order to effect the removal of piers or trestle bents which constitute undesirable obstruction to passage of flood waters. The bridges of railroads and other highways are not, however, the only structures which have unduly encroached upon stream channels in populous districts, for manufacturing interests may frequently be found to have built plants or retaining walls for extra ground space too far into the natural channel of streams.

As between the plan of increasing the clearance above flood waters by raising the level of bridges, and that of increasing the width or depth of channel, obviously the latter is preferable, it always being desirable to keep the high-water mark as low as possible. In order to improve conditions it will undoubtedly be found necessary in many places to rearrange, move or remove existing structures, in some cases at large expense, possibly; and it can hardly be expected that public interests can be properly safeguarded in all situations without incorporating certain of the principles or limitations here discussed into legislation. It will, however, contribute largely to such desired improvements if these principles can always be kept in view in cases of new construction or in bridge renewals, railroad relocations and grade revisions.

Convention of the International Railway Fuel Association.

The International Railway Fuel Association met for its sixth annual convention at the Hotel LaSalle, Chicago, May 18, 1914, President Robert Collett presiding. Immediately following the convocation, the president proceeded with his address reviewing, in a general way, the purposes and the general history of the association, and calling attention to the valuable work which it has accomplished during its brief existence. The proceedings of the association

hitherto published were cited as a useful and authoritative source of reference on such subjects as the drafting of locomotives, the value of lignite and oil as locomotive fuels, locomotive firing practice, modern methods of mining, etc. The importance of the work of the association in conserving the resources of the country was indicated by quotations of figures showing the output of various classes of fuels during recent years. For example; in the year 1907, the output was given as 300,000,000 tons; in 1914, the output bids fair to be 600,000,000 tons and a conservative estimate of the average output per year for the next decade is given as 75,000,000 tons.

Considering the vast extent of this industry and the fact that since the organization of the association an average increase of 10 per cent in the cost of fuel has been observed, the opportunity for practicing real conservation methods by this association is evident. Other factors bearing on this subject in a general way, and which are such as deserve the attention and study both by the association and by its members individually, are those having to do with the later innovations in locomotive construction, and especially the adaptability of low-grade fuel for locomotive use. These also include matters pertaining to the physical condition of locomotives, the distribution of power and its relation to the traffic to be handled, make-up and schedule of trains, and the education of those employees whose duties bring them in contact with the fuel problem and with the operation of motive power equipment. The importance of taking into consideration the personal element in handling and educating individuals along these lines was emphasized, as was also the importance of cultivating loyalty and intelligent co-operation among these forces.

The president's address concluded, Dr. W. F. M. Goss, dean of the schools of engineering, University of Illinois, was introduced. Dr. Goss addressed himself to the association in an elementary and yet strikingly impressive manner by exhibiting a cube of coal of the proper dimensions to represent a weight of one pound. With this as a basis, the results of various computations were given to indicate the vast proportions of the coal mining industry, and the consequence of applying intelligence in the consumption of fuel for transportation, manufacturing and like purposes. Following this exposition of the magnitude of the coal mining industry and proper methods of fuel utilization, Dr. Goss gave a brief resume of the work which has been undertaken by a committee of the Chicago Association of Commerce, investigating the subject of smoke abatement and electrification of railway terminals.

The statement was made that the committee's investigations indicate that some 21,000,000 of tons of fuel are being consumed annually in Chicago, this quantity being approximately 5 per cent of the total annual production of the country. Of this amount 2,000,000 tons are accredited to locomotive service, which service is charged with approximately one-fifth of the total air pollution of the city in the form of visible smoke. That progress has been made in improving atmospheric conditions from the standpoint of air pollution by locomotives, was shown by the statement quoted from city smoke inspection department to the effect that locomotives operated within the city limits do so with at least 50 per cent less production of smoke than is to be observed on those operating outside of the city limits.

The secretary of the association next read the reports of the secretary and treasurer, these being a digest of the minutes of last year's meeting, and statements as to the present standing on the basis of finance and membership. With respect to the latter items, the association had, on May 18, 1914, a total of 642 members and a cash balance of \$885.25.

HONEYCOMB AND CLINKER FORMATION.

The first of the technical papers presented before the convention was one by Prof. S. W. Parr of the department of

applied chemistry, University of Illinois, who presented a treatise on the subject of honeycomb and clinker formation.

Professor Parr's treatment of this was based on the chemical aspect of the question, it being shown that for Illinois and Indiana coals especially, an average of possibly 8 per cent of iron pyrites is found and that this material, under conditions of partial combustion, becomes highly plastic and is very conducive to the formation of clinker and honeycomb. In view of the very great amount of work devolving upon the fireman of a modern locomotive. Professor Parr regards it as being rather more than should be expected of him to absolutely control the combustion of fuel in such manner that these formations can be prevented. However, as he was able to show, the more favorable the conditions are for efficient combustion, the less likely is it that trouble from this source will be experienced. These conditions include ample air supply through the grates and involve also, to a large extent, proper manipulation of the fire, it being essential that grate shaking, the use of the fire hook and the development of an uneven fuel bed, be avoided. Other foreign substances frequently appearing in the fuel are admittedly sources of trouble of this nature, notably a high lime stone content, although this and similar factors are not likely to be as troublesome as the iron pyrites above mentioned.

The discussion of this paper by the members on the floor had to do more with the practical than with the theoretical phases of the question, there being brought into the argument, instances wherein it was known that coal of very low sulphur content on certain engines was very troublesome, owing to honeycomb formations. Likewise, fine coal, against the use of which Professor Parr advised (because of the likelihood of its including a high percentage of foreign matter gathered up from the floor of the mine) was shown, under some conditions, to be quite free from clinker formations, while just the reverse was also found to be true of a seemingly good grade of lump coal. These discrepancies seem to be accounted for through improper methods of handling the fire and through faulty conditions in the locomotive. Respecting the latter, the lack of ample air space through the grates, as previously mentioned, was recognized as a very conspicuous fault, and, in addition to this, the condition of the flues was stated to have an important bearing on the subject. While exceptions to the rule could be freely cited, it was stated to be generally true that new flues gave no trouble of this kind, whereas old flues were very likely to do so. A suggested reason for this was that it is less a question of the age of a boiler than of the conditions of the joints made by the flues in the flue sheets, or by the crown bolts in the crown sheets, since when these joints become leaky the conditions for honeycomb formation are much more favorable. The very high temperatures in the firebox of a locomotive serve to make various small leaks of this kind invisible, since the water leaking through is immediately evaporated and promotes the trouble on what appears to be a perfectly tight flue sheet.

The question of wetting the fuel was brought into the discussion together with its possible relation to the matter of clinker and honeycomb formation. As explained by Professor Parr in his closing remarks, the advisability of this practice depends entirely on the conditions of the fire. A very hot fire will suffer no detriment from the application of wet fuel, or even from the introduction of water in limited quantities on the fuel bed, this being because the intense heat serves to dissociate the hydrogen and the oxygen in the water, permitting these elements to be consumed and thus actually increasing the temperature in the upper portions of the firebox. On the other hand, a comparatively cool fire is further cooled by the introduction of water or dampened fuel and the conditions favoring the formation of clinker and honeycomb are more pronounced. In appreciation of Pro-

fessor Parr's contribution to the proceedings of the association, the convention bestowed upon him the privilege of honorary membership.

FRONT END DESIGN.

The next subject taken up by the convention was that of relation of front end design and air openings of grates and ash pans to fuel consumption and sparks, a paper relative thereto being read by M. C. M. Hatch, superintendent of fuel service of the Delaware, Lackawanna & Western R. R. The author in dealing with this subject, considered individually, three factors having an important bearing on economy in the use of fuel; these being the front end, the grates, and the ash pans. Various modifications and arrangements of each were discussed, together with conspicuous test data tending to show the importance; first, of a front end arrangement which serves as a vacuum producing agent of the highest possible efficiency; second, that grate bars must, of necessity, be uniform, freely acting and such as to admit as large a quantity of air as the nature of the fuel will permit; and third, that the ash pan, in addition to performing its primary functions, must also be arranged as to admit large volumes of air without restriction. In concluding his discussion, Mr. Hatch made the suggestion that the association bespeak the aid of the Pennsylvania R. R., of Purdue University, and the University of Illinois, requesting them to collaborate with a committee to be appointed from the fuel association, with a view to determining and finally enunciating what, for modern practice, should most efficiently govern the design of details considered in his paper. The association, by formal vote, accepted this suggestion.

Factors brought up in the discussion of the foregoing paper had to do with the form of exhaust nozzle, the area and arrangement of netting in the front end, and the favorable results to be expected from the use of the combustion chamber, notably that of the Gaines' type, which involves a bridge wall and means for the admission of heated air over the surface of the fire. As for the design of nozzle tip, the results of certain experiments in the testing laboratory of the Pennsylvania R. R., at Altoona, Pa., were cited, these showing that very considerable improvement over the circular nozzle may be attained, notably with the judicious use of bridges, the value of which, in this connection, has just lately been demonstrated. The possibility of securing excessive netting area was mentioned, although the belief that this area could be made too great was not generally concurred in. Figures were quoted showing the greatly improved economy attained on certain roads as a result of the use of the combustion chamber, which, also, was accredited with greatly improved conditions as respects the mileage attainable with a given set of flues, improvements as great as 300 or 400 per cent on this basis being cited.

UNIFORM METHODS OF FUEL ACCOUNTING.

The day's proceedings were concluded with the reading and discussion of a paper by C. F. Ludington, chief fuel supervisor, Atchison, Topeka & Santa Fe Ry., on the subject "The Uniform Method of Computing Locomotive Fuel Consumption for Office Statistics and Trip Performances," this paper being in effect and account of the methods employed under Mr. Ludington's direction in keeping fuel accounts on the Atchison, Topeka & Santa Fe Ry. In discussing Mr. Ludington's paper, the very many difficulties attending the satisfactory accounting of locomotive fuel with the object of individual records were commented on, one of the chiefest of these being the methods of handling shortages in fuel accounts. The methods generally employed in compensating for these discrepancies are known to be a serious injustice to those enginemen who take sufficient interest in coal accounting to submit fuel tickets each time they receive fuel from the coaling station, and because of this most of the speakers seriously objected to many of the plans discussed.

It was explained by Mr. Ludington that the matter of fuel shortages in the operation of his system, is constantly agitated; their records being such that an engineer's neglect to leave a ticket can be readily detected whereupon the fuel foreman has sent a request for same. By constantly striving to overcome this tendency to carelessness by enginemen, it has been possible on the Santa Fe to reduce fuel shortages from an average of 2000 tons per month to less than 15 tons per month, which, on a system of railways as extensive as this, indicates that very close records can be kept if sufficient attention be given. One speaker referred to the matter of comparisons between individual records, calling attention to the fact that in most cases it is possible to make use of these records between the crews operating in the same kind of service on the same divisions only. The impracticability of applying these comparisons on other divisions arises largely from the difference in grades, possible differences in the quality of fuel supplied, nature and volume the traffic, variations in the make-up of passenger trains, etc. However, discouraging an attempt at fuel accounting may be at the start, it is evident, from Mr. Ludington's experience on the Santa Fe, that the benefits accrued are rapidly cumulative after two or three or four years, it being found in his work that interest in the subject constantly grows, and that the work becomes less arduous from the fact that newly promoted engineers already have had a considerable schooling in the movement by the time they assume their greater responsibilities. Some advantage also arises from the fact that newly employed firemen are brought at once into an atmosphere of co-operation with the fuel accounting movement, and consequently take to it more readily than did the older men who had been accustomed to less careful practices. The discussion on this subject was brought to a conclusion with a formal vote of thanks to Mr. Ludington for his instructive contribution to the proceedings of the convention.

President A. L. Mohler, of the Union Pacific R. R., was introduced to the convention during the Tuesday morning session, whereupon he took occasion to highly commend the association for its efforts in behalf of improved methods in the utilization of locomotive fuel. This to Mr. Mohler's mind is one of those accounts in which past existing conditions and the known possibilities for improvement, demand that just the attention be given it that is being bestowed by the association. Appreciation of the compliment paid the convention by the presence and remarks of so prominent a railway official as Mr. Mohler, was duly expressed by formal vote.

THE STORAGE OF COAL.

The next subject brought up for consideration was covered in a paper on the storage of coal, by C. G. Hall, fuel agent, Chicago & Eastern Illinois R. R., and secretary of the association. In handling this subject, Mr. Hall gave consideration to the problem from the standpoint of its feasibility and its advantages to the producer, to the carrier and to the consumer. The varying conditions in the mining industries throughout the year were shown to be very detrimental to all concerned, inasmuch as slack times through the summer constitute periods of idleness for the mine operatives and these, followed by the rush season in the fall and winter, were conducive to congestion and car shortages on the railroads, and frequently to insufficient supply and abnormally high prices to the consumer. It was shown in Mr. Hall's analysis that the domestic consumer is no more a negligible factor in bringing about these results than are the large users, such as the manufacturers and the railroads; and likewise that it would be a matter of very considerable economy to the householder to secure his fuel supply in the early spring, inasmuch as fuel prices, owing to the plentiful supply and the slack demand, are at those times lower than at any other throughout the year.

The proposed remedy for these conditions is the practice of operating mines continuously throughout the year, transporting the fuel mined during the summer season to a point convenient to the territory demanding it for subsequent use, and there storing it until such time as that demand may develop. Various types of coal-handling apparatus adapted to the piling of large quantities of fuel in storage yards were discussed and illustrated, each having some definite advantage in its relation to the conditions for which it is adapted, but all showing marked possibilities for profit to those wishing to engage in the enterprise of storing fuel under the conditions mentioned.

Other factors coming in for consideration by Mr. Hall were: storage at the mines, sizes of coal available for storage, weathering properties, deterioration, briquetting slack resulting from storage, use of powdered coal, spontaneous combustion, and the coking of coal for storage. The general conclusions arrived at are that:

"The storage of bituminous coal can only be made feasible by the producer, carrier and consumer co-operating closely to carry on the work in a systematic and economical manner:

"One million dollars spent by producers for storage facilities will afford more relief to the coal industry than five million spent in the development of new mines;

"One million dollars invested in storage facilities by railroads would go further toward relieving operating tangles and prevention of car shortages than three million invested in cars and locomotives;

"The purchase of coal by the industrial and domestic consumers, during the dull periods, will result in a saving of a very high per cent on the investment;

"The storage of coal carried on successfully means:

1. More regular working of the mines, resulting in—
 - (a) Lower cost of production.
 - (b) Better satisfied labor.
 - (c) More efficient mining methods and a greater percentage of coal extracted.
2. Equalization of movement, enabling carriers to provide equipment and handle same at minimum cost.
3. Avoidance of the spasmodic demands for certain sizes, resultant car shortages, boom prices, sharp practices to escape contract obligations, and the general dissatisfaction resulting from the various causes enumerated.
4. The consumer to receive sufficient concessions from producer and carrier to offset the expense and deterioration incident to storage and withal enjoy a reduction in the ultimate cost.
5. Confine coals to proper distance zones and enable operators to work out nearby fields more thoroughly instead of mutilating them to get out a little cheap coal to meet the keen competition, leaving a greater percentage of coal in the ground in such shape that it can never be recovered.
6. Accomplish more in the conservation of our coal resources than any other one agent."

It developed from the discussion of Mr. Hall's paper that many of the members have already had experience with the storage of fuel in open piles, the results generally being attended with more or less disadvantage from the slacking of the coal, the loss of volatile content and consequent reduction in heating value, trouble from gathering up dirt and other deleterious matter by the clam-shell when cleaning up areas where storage had been effected, and in some cases, serious trouble and loss from spontaneous combustion. The losses in heating value and also the expense of handling appear to be appreciable factors and yet not such as to preclude the advisability of storing coal in districts remote from the mines, where business and traffic conditions period-

ically bring on the car and fuel shortages and the abnormal prices that it is desired to avoid. The nature of the coal to be stored has an important bearing on the extent to which its value is affected by the storage process. Some coals, such as tested recently by the University of Illinois, showed practically no deterioration after several years storage, while others are so friable as to become almost unusable after a few months. Given a coal that will endure the storage process, it appeared to be the fixed opinion that such matters as dirt in the coal, spontaneous combustion, etc., could be controlled by providing concrete or other suitable floors for the storage piles, and by judicious segregation of the slack from the lumps and better provision for ventilation, respectively; also that under a great many of the existing conditions, the investment necessary to make possible these results would net a very satisfactory return.

SIZING COAL FOR LOCOMOTIVE USE.

A. G. Kinyon, locomotive fuel engineer for the Clinchfield Fuel Co., next presented an oral discussion of a paper which he had prepared on the "Sizing of Coal for Locomotive Use." The influence of uniformly sized coal to efficient combustion was explained as was also the influence of the different sizes of coal. Some effort to determine the limiting factors as regards the fineness of the coal were made, these being assumed to be the normal force of the draft through the grates, and the tendency of the fine coal to become compacted, forcing more than normal draft pressure to pass through the thinner spots in the fire and thus carry off quantities of the fine coal through the flues. While this line of reasoning might be thought useful in determining the smallest practicable sizes of coal, it was the writer's opinion, based on experience, that best results are to be obtained with coal in lumps approximating lumps about the equivalent of two-inch cubes. This opinion was substantiated by a member who stated in the discussion, that recent tests on stoker fired locomotives on his road had demonstrated that fuel of such size as to pass through a 1½-inch screen showed a considerably higher rate of economy than did that passing through a ¾-inch screen.

Other comment offered in the discussion of the question of sized coal for locomotive use was offered to emphasize the importance of the preparation of coal for this purpose. In passenger service the demand for heavy fast trains, steam heated and electrically lighted puts a strain on the locomotive that should be relieved as much as possible and which can be materially relieved by providing coal of a nature that can be depended on to submit to ready and uniform combustion. Drag tonnage is an analogous condition in freight service that demands fuel whose condition has been given care and attention. It was pointed out that a relatively poor grade of coal if clean and of uniform size is superior from the service standpoint, to high grade coal of mixed sizes and containing even a small percentage of dirt. Practices that need immediate attention in order that the condition of coal as delivered to the engines, may be improved, are the use of certain types of coaling stations in which the fuel is badly disintegrated by excessive vertical drops, and the injudicious use of powder in blasting coal in the mines.

While the Tuesday's session was concluded with this discussion, there were two notable occurrences during this session, aside from the regular program, these being an address by A. L. Mohler, president of the Union Pacific R. R., and the formal proffer of an invitation to a committee of western railway general managers, then in session at Chicago, to visit the convention. On Tuesday afternoon, the convention was the guest of the Lake Shore & Michigan Southern Ry., in a visit to the Englewood engine terminal of that road, where there was exhibited in operation, the very interesting smoke-washing apparatus described in the *Railway Review* for February 14, 1914.

FUEL STATIONS.

The discussion of the paper on the sizing of coal for locomotive use was carried over into the Wednesday morning session, and at its conclusion was followed by consideration of a committee report on the subject of "The Modern Locomotive Coaling Station, Its Design, Construction, Operation and Maintenance," this report being read by T. W. Krausch, a member of the committee. The committee presented its subject by giving consideration to the following subdivisions: location, design, arrangement, construction, and operation. Under the heading of location, such factors as source of fuel supply, density of population, grade conditions, etc., were brought into consideration. Under the heading of design, there were mentioned three particular types, with the various accessories characteristic of each, these types being gravity chutes with inclines, the balanced bucket, and the bucket-conveyor type. The accessories referred to include breaker bars, track openings, storage bins, deflectors, angularity of floors, gates, and weighing devices. Respecting the matter of arrangement, there were submitted sketches of thirteen individual types of stations, all of which, with the exception of the gravity car-haul type, are operative either on the balanced bucket or the bucket-conveyor principle. Steel and concrete were recommended as materials that should be used in construction, steel being regarded as best adapted for supporting purposes and concrete for use for those parts coming in contact with the fuel.

Under the heading of maintenance, there was emphasized the advisability of carrying in stock a full line of repair parts so as to avoid, as much as possible, enforced idleness of the plant. The practice followed by some roads of having coal facilities inspected, maintained and operated by a single department was not regarded with favor, it being thought that maintenance features can be handled more economically by co-operation between the maintenance of way and the mechanical departments. With regard to operation, the committee recommended that some care be used in the selection of men for the operation of coal plants, it being believed—in the interests of economy, to pay, if necessary, a higher rate of wages than is usually allowed for this work.

A prominent feature in the discussion of the foregoing report had to do with the advisability of installing extensive weighing facilities, and likewise covered the difficulty of properly supervising the use of such facilities and of keeping them in condition to produce accurate results. In view of the fact that weighing apparatus in this service is subjected to most unusual hardship and cannot always be kept in the best repair, discrepancies of as much as 20 per cent in the accuracy of the scales have, on some lines, been noted. The committee did not generally endorse the use of weighing facilities, not so much because of the inadequacy of equipment of this nature that is already on the market as because of the difficulties above cited in connection with their use. The experience of a number of roads on which the quantities of coal issued to locomotives are estimated by the station attendants, were reported as being generally satisfactory, the attendants at these points becoming quite expert in making their estimates. Various devices for volume measurements of fuel were reported as being in use and apparently with fairly satisfactory results. A feature of design that was given consideration in the discussion is that of the slope of the bottoms of the bins, it having been found that to secure a thorough mixture of slack and lump coal, an angle of between 50 and 55 degrees is usually necessary. Most hopper bottoms are made with a much less degree of slope than this and it is very generally found that slack coal will accumulate on the slopes, sometimes packing under such conditions as to induce spontaneous combustion. To avoid the latter difficulty periodical and thorough cleaning of the coaling stations was advised. As an example of what may be expected in conducting this work, an instance was cited wherein, from a coaling station of 200

tons' capacity, 70 tons of lodged fuel, representing an accumulation of something over two years, were removed.

FIRING PRACTICE.

The report of the committee on firing practice was next presented by D. C. Buell, chairman of the committee. The committee, at the last convention, presented a report which, in the main, was accepted by the association. Some few items however, were referred back to the committee for further consideration and revised recommendations with respect to these items were re-submitted with the miscellaneous recommendations adopted by the association at last year's convention. These items had to do particularly with the subject of scoops, it being the committee's recommendation, in this instance, that No. 3 scoops be adopted as standard and this, after a spirited discussion, was acted upon favorably by the association, the committee being charged with the duty of amplifying its specifications for scoops so that no difficulty may be had in ordering scoops according to their specifications.

Other appurtenances described and recommended by the committee were coal picks, slice bars, and shaker bars, designs being submitted in each case and favorably acted upon by the association. Respecting the matter of rakes, the association is on record as disapproving the use of this implement, and reference to the committee's proposed design of rake was, after considerable discussion, eliminated from the proceedings. Amplification of last year's recommendations was made by inserting the following: Under manipulation of grates, the committee recommended that "the grates should be kept in good condition and examination made for broken fingers on arrival at terminals to prevent waste of fuel and damage to ash pans." Under drafting appliances; "firemen should understand the fact that if the front end is stopped up with cinders, or if the netting becomes clogged, the engine will not steam. There should be no excuse for an engine failure from this cause." Under the heading of flues; "A good bright fire should be kept against the flue sheet at all times." Under systems of firing (hand firing); "While the fire should be light, it should have sufficient depth to prevent an excess of air being drawn through the bed of fire." Under attention to the grade of coal used, the committee advised and was sustained by the convention, in the contention that it is not necessary to change the drafting of an engine to successfully burn the varying grades of fuel that may be found on any given division.

The final recommendation of the committee was that the fully revised report adopted at this convention "serve as an introduction covering, particularly, the practice of firing and that thereto should be added such parts of the paper on proper methods of firing locomotives presented at the meeting 1912 as covering the details of firing practice with such other additions as may be necessary, the whole to form a complete manual on locomotive firing," this recommendation with others, irrespective of a prolonged discussion of a minority report, being adopted by the convention. Interesting features of discussion on proper size of scoop included information to the effect that percentages of economy vary from 20 to 40 per cent had been demonstrated as being possible with the No. 3 scoop as against the No. 5. The average weight of coal per scoop, on certain tests in exceptionally heavy freight service, was given as from 11 to 12 pounds. Inasmuch as the normal capacity of the No. 3 is from 14 to 15 pounds, the necessity for the larger No. 5 having a capacity of from 18 to 19 pounds was regarded as being not only negligible but a matter of actual detriment in properly manipulating the fire.

COAL SPACE AND ADJUNCTS ON LOCOMOTIVE TENDERS.

A paper on the above subject was next read by L. R. Pyle, traveling fireman, Minneapolis, St. Paul & Sault Ste. Marie Ry. In the presentation of this paper, Mr. Pyle discussed the form and shape of coal space on tenders, emphasizing the very great importance of having these so arranged as to relieve the fire-

man of the necessity of raking down coal, the argument being that firing practice, under present day conditions, is so exacting as to demand the fireman's entire time, and that when interfered with by the necessity of raking down coal by hand results in unwarranted waste of fuel. The value of the mechanical coal-passer for use under these conditions was dwelt upon, experience having shown that this apparatus, particularly the more recent design involving the reciprocating plunger, serves not only as a means of economy by allowing the fireman to pay more strict attention to his work, but has also been found a means of improving train schedules by saving the expense of coaling station operation through the fact that stations near the terminals can frequently be dispensed with. The demand for these stations, under present conditions, is not so much because of the want of fuel on the locomotives as it is through the fact that enginemen persist on stopping at these points in order to spare themselves the necessity of raking it down from the backs of the tenders, which function the coal-passer has been designed to perform.

Other adjuncts mentioned in Mr. Pyle's paper were coal gates, fenders, and the squirt hose, the latter being a feature that is unusually prolific in injury to the occupants of locomotive cabs because of its disposition to blow off the fastenings and subject the men to the effects of scalding water and steam. Possible improvements on the prevailing methods of attachment of this hose were cited by different roads, one method especially, that in use on the Chicago & Northwestern Ry., appearing to have merit. On this road the scheme is to make the hose attachment at a point outside of the locomotive cab, bringing the hose into the cab through a suitable opening in the front or the floor. Under these conditions, when the hose blows off, all discharge of water and steam is entirely outside of the cab. A further advantage of the coal-passer and other adjuncts designed to make less arduous the work of the firemen was cited, that being the fact that this work has become so strenuous that men of the proper degree of intelligence are not as readily available for the service as might be desired. When conditions are made more tolerable by the use of such equipment as herein referred to, it may reasonably be expected that a better grade of employees can be enlisted in the service.

PREHEATING FEED WATER FOR LOCOMOTIVE BOILERS.

After the conclusion of the discussion on coal space and adjuncts of locomotive tenders, a paper on the subject of "Preheating Feed Water for Locomotive Boilers" was read by Monro B. Lanier, the author's treatise comprising a theoretical demonstration of the economies to be expected by this practice, and also a description of several devices used for the purpose mentioned. Conspicuous among these is that employed on the locomotives on the New Orleans Great Northern R. R., with which the author had had personal experience, and which, in a series of tests, was shown to offer an average of about six per cent economy over the usual practice.

Among those participating in the discussion of this subject was J. A. Carney, superintendent of shops, Chicago, Burlington & Quincy R. R., Aurora, Ill., who described an apparatus being used experimentally on his road in which the boiler is fed by means of a pump, exhaust from which, together with that of the air pump, is conducted to the tender. This scheme was reported under certain conditions as being productive of a 12 per cent saving. Other members discussing this subject pointed out that while feed water heating is an attractive proposition, it is attended with serious drawbacks in that the apparatus employed frequently involves serious complication, its operation involves back pressure on the feed pump and air pump, back pressure being especially detrimental in cases where a portion of the steam for heating is derived from the exhaust of the main cylinders. Furthermore, quantities of oil are likely to be induced with the feed water which, also, has a detrimental influence. However, it was not the sense of the convention that

these difficulties should be regarded as insurmountable and the opinion was freely expressed that one of the greatest fields for further economies in the use of fuel lies in the direction of feed water heating practice.

FUEL AND FAILURES.

Prior to the adjournment of the Wednesday afternoon session, there was brought up a paper by Raffe Emerson, on "Fuel and Failures; a Brief Study of Some Results on the St. Louis Southwestern Ry." This paper which did not appear on the regular program of the association, was presented by Mr. Emerson in the form of an analysis of the methods employed on the above road in attaining the very unusual record for locomotive performances which T. E. Adams, superintendent of motive power of that line, has brought about through the application of the methods which he has been advocating before the Fuel Association since the first year of its organization. Mr. Emerson's analysis proved highly complimentary to Mr. Adams, both on the results he has been able to accomplish on his own road and through appreciation of the very great value of his example and efforts before and in behalf of the membership of the association. The occasion for the remarkable improvements brought about on Mr. Adams' road were accounted for by Mr. Emerson from the following elements and practices:

1. Elimination of the words "Poor Coal" as an engine failure excuse. Mr. Adams maintains that no coal is poor—that all kinds of coal may be successfully fired if the peculiarities are understood, and sufficient skill is used in handling the fire. Neither engineer nor fireman can hide behind the coal in trying to explain what was the reason the engine (or maybe the men!), fell down.

2. Attempts to eliminate all causes of mechanical failure, by redesigning and replacing every kind of a locomotive part that breaks or fails. Mr. Adams has practically rebuilt most of the details of his locomotives in the past ten years, so that today, about one-half his failures are flue failures, the rest all other causes, and he is going after the flues.

3. A rigid system of inspection of the engine on arrival at terminal. No such inspection has been seen anywhere else in America, although it is common in Europe—where also engine failures are regarded as curiosities, and engines run hundreds of thousands of miles without a mishap. This rigid inspection is not costly; it is certain in its operation and results; and it pays.

4. Thorough understanding and co-operation between mechanical officials, shop men, roundhouse men, and road men.

This paper and the very interesting and complimentary discussion following same were accepted by a formal vote to constitute a portion of the proceedings of the sixth annual convention of the association.

ECONOMIES IN ROUNDHOUSE AND TERMINAL FUEL CONSUMPTION.

In the concluding session of the convention on Thursday morning, there was taken up the subject "Economies in Roundhouse and Terminal Fuel Consumption," a paper dealing with that subject being presented by F. W. Foltz, fuel supervisor of the Missouri Pacific Ry. It was apparent from the discussion of this subject that one of the very great opportunities for reduction in fuel expenses lies in connection with the handling of engines at terminals, and that in order to make any very appreciable progress in connection with the elimination of the extravagant use of fuel at terminals, the very close co-operation of the transportation department is necessary. It was argued that a great deal of fuel is unnecessarily wasted because of the indiscriminate interruption of freight train progress by dispatchers.

The discussion dealt also with the matter of firing up cold engines at the roundhouse, which operation, if not intelligently carried out, also is conducive of much loss of fuel, so much so that unsatisfactory fuel performances on certain locomotives operating on a western road were traced directly to this cause, the fault not being with the manipulation of the fire while the

engine was on the road as at first supposed. Yellow pine shavings were highly recommended as material with which to start locomotive fires, their use being especially suitable from the fact that oil need not be used in connection therewith. A seemingly important suggestion was offered that locomotives standing in the engine house or elsewhere with varying amounts of fire and steam pressure, be provided with stack covers to prevent the escape of heat from the boilers. An interesting practice was reported as being in vogue on the lines of the Atlantic Coast Lines R. R., it being the rule on that system to knock out and rekindle the fires on all engines required to lay over for periods of ten hours or more. The amounts of fuel saved by this practice are understood to be sufficient to warrant the additional trouble.

At this juncture in the proceedings, which marked the closure of the technical program, Eugene McAuliffe introduced H. L. Cole, assistant secretary of the Indian State Rys., who, at present, is engaged on a four months' tour of the United States and Canada investigating railway methods and practices, from which to prepare a report for the benefit of the supervising officials of the line with which he is connected. Mr. Cole had taken advantage of the opportunity to attend the various sessions of the convention, and in the course of remarks which he made announced himself as being very favorably impressed with the work that the Fuel Association is accomplishing. A very interesting and entertaining discussion was given by Mr. Cole citing a comparison of the conditions under which the roads of the North American continent and those of India are required to operate, and enumerating a number of the more prominent impressions which he has gathered from his observations during the past few weeks of his visit. At the conclusion of Mr. Cole's remarks, a formal vote of thanks was extended him out of consideration of the compliment which he had seen fit to pay the association by devoting so large a portion of his valuable time to attendance at their several sessions.

M. D. Franey, master mechanic, Lake Shore & Michigan Southern Ry., at Elkhart, Ind., was next introduced and proceeded to enlighten the convention on the operation of the smoke-washing installation, which his road has in operation at the Englewood engine terminal, and which had been visited by the members of the convention on the preceding Tuesday afternoon. Mr. Franey reviewed the circumstances prompting the development of this apparatus and gave a very interesting account of the difficulties which had to be surmounted in placing it in successful operation, as well as a statement of the very material benefits which have been found to accrue therefrom. With reference to the latter and aside from the matter of a suppression of objectionable smoke in the residence district in which the Englewood engine house is located, tests have demonstrated that the beneficial influence of the exhaust system, operated in connection with this plant, is such as to eliminate between 40 and 50 per cent of the power and fuel required in the use of the blower and smoke consumer in firing up engines at this terminal. This saving was considered sufficient to very largely offset the expense of upkeep and operation in connection with this installation.

Mr. A. W. Pearly, special representative of the mechanical department of the Oregon-Washington R. R. & Navigation Co. and a former member of the Washington State Railway Commission, occupied the floor for a few minutes to impress upon the members the importance of acquainting themselves with current railway statistics in order that they may be fortified against the wave of adverse criticism and legislation that has, for some time, held so prominent a place in the public mind. Mr. Pearly cited figures to show the very great injustice of the popular attitude and made a strong appeal for more general activity along the lines which he suggested.

Having arrived at this point of the proceedings, the president called for the reports of the temporary and standing committees, the first of which was that of the committee on constitu-

tion and by-laws which recommended changes in the constitution providing for a membership admission fee of \$5.00, this fee to allow the new member the privilege of one convention, and no change being made with respect to the amount of the annual dues hitherto prevailing. A second change provided out of consideration of the rapidly growing membership, for the election of an additional vice-president so that a wider range of representation in the elective offices might result. Other proposed changes were of a minor nature, being such as to harmonize other sections of the constitution and by-laws with changes already mentioned. The action of the convention on the report of this committee was to approve of the individual changes and to adopt the committee's report as a whole.

A report by special committee on locomotive fuel tests was rendered by J. G. Crawford, of the Chicago, Burlington & Quincy R. R., who announced the results of the efforts of his committee in securing data, the purpose of which was to show the relative steaming values of varying sizes of coal procured from the same mine. While the returns which the committee was able to secure were not voluminous, the results by experiments of this nature on the Chicago & Alton R. R. were reported. On that line, taking into consideration the price of the fuel and taking coal from the Springfield district, with egg coal as being 100 per cent efficient, lump coal was found to be 98 per cent efficient, and run of mine to be 97.6 per cent efficient. Seventy-four of seventy-nine roads reporting on this subject had made no tests to determine this point. The committee made a recommendation to the effect that a standing committee of seven members be appointed to draw up rules for locomotive fuel tests for the benefit of the association at subsequent conventions. The committee's report was accepted and the above-named recommendation adopted. Other committees' reports at this juncture were the committee on thanks, the auditing committee and the committee on subjects to be considered at next year's convention.

The convention next proceeded to the election of officers to serve during the ensuing year, and the result of the ballot being as follows: President, D. R. MacBain, superintendent of motive power, Lake Shore & Michigan Southern Ry., Cleveland, Ohio; vice-presidents, D. C. Buell, Union Pacific R. R.; J. G. Crawford, Chicago, Burlington & Quincy R. R., and B. P. Philippe, Pennsylvania R. R.; secretary-treasurer, C. G. Hall, Chicago & Eastern Illinois R. R., 922 McCormick building, Chicago, Ill.; and as newly elected members of the executive committee, W. L. Robinson, Baltimore & Ohio R. R.; C. M. Butler, Atlantic Coast Lines; R. R. Hibben, Missouri, Kansas & Texas R. R.; E. W. Pratt, Chicago & Northwestern Ry., and J. T. Lowe, Canadian Northern Ry.

The registration at this convention showed that approximately 325 members were in attendance. Entertainment features provided for the benefit of members and guests included a theater party on Tuesday evening and banquet in the convention hall on Wednesday evening, same being followed by an address on "Coal Mining in Illinois," by Francis S. Peabody, president, Peabody Coal Co., whose remarks were illustrated by means of moving pictures of interior and exterior mine operations. T. Duff Smith also illustrated by means moving pictures, some of the methods employed on the Grand Trunk Pacific Ry. in the education of its enginemen in fuel economy and advance practice in locomotive operation. These gentlemen, together with Dr. W. F. Goss and President A. L. Mohler, of the Union Pacific R. R., were especially referred to by the committee on thanks for the unique and instructive entertainment which their respective discourses afforded. Chicago was decided upon as the city in which to hold the next annual convention, the dates selected being May 17-20, 1915.

Pursuing the campaign which the railroads of the country are waging against trespassers and others who use the property unlawfully, the Baltimore & Ohio R. R., has adopted a plan of impressing upon town and country authorities the

toll of human lives sacrificed needlessly because people remain impervious to danger. Agents of the Baltimore & Ohio are asked to discuss with justices of the peace and other town and county authorities, to acquaint those entrusted with the enforcement of the law with the facts pertaining to the loss of life due to trespassing. The authorities are being asked

to co-operate with the railroad in the campaign it is conducting, to the extent that when tramps, unlawful train riders and others are apprehended they be taken in charge by the agents of the law. Suggestions are being requested from the authorities consulted and their recommendations will be forwarded to the railroad officials for due consideration.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

A Government-Owned Railway.

In answer to queries and criticisms which have been received regarding conclusions drawn from the experience of Canada in the government ownership of railroads, the New York Commercial has obtained from the Department of Railways and Canals at Ottawa, Canada, official figures that tell the tale. At the close of the Canadian fiscal year on March 31, 1913, the Intercolonial Railway was shown on the books of the department to have cost the Dominion of Canada \$97,137,807 for construction and equipment, of which sum \$2,391,987 had been spent in the preceding twelve months.

The Minister of Railways had reorganized the service of this railroad with considerable success and he was able to report earnings in excess of operating expenses amounting to \$777,863. Every cent of this amount was appropriated for renewal of equipment, and none of it was turned in to the Dominion treasury. In the fiscal year ending March 31 last the net earnings fell to about \$300,000 and were also appropriated for the purchase of new equipment. The Dominion also spent on the property last year and charged against its capital account the sum of \$7,239,650. This brings the total cost of the railroad to the people of Canada up to about \$105,000,000, the interest charge on which must exceed \$4,000,000 a year.

The Dominion treasury does not receive and never has received from the Intercolonial Railway a single cent to be applied in payment of interest or principal, representing the cost of the railroad. These figures are official and their correctness cannot be doubted, because it is in the interest of the Department of Railways and Canals not to exaggerate and not to make the case against government ownership any stronger than it really is. The New York Commercial, therefore, submits them for the consideration of Congress and of the people of the United States with perfect confidence that they form an unanswerable argument against the extension of government ownership to the railroads of this country.

"Mellen's Creed and Maitland's Prayer."

"All I was after was results for the New Haven road, and I would have done business with the devil himself, if necessary." Charles S. Mellen here put into words the spirit of a day that is gone. Set over against it an incident of the day that is coming. At the annual meeting of the United States Steel Corporation three weeks ago, Chairman Elbert H. Gary presided. But among the stockholders all were not of the type that this powerful name suggests. There were in the crowd stockholders in the United States Steel Corporation where were 'pullers' and 'heaters' and 'rollers' in the company's mills.

"One of these was Samuel Wilkinson, who is a workman in the Elwood City plant. He came as the representative of 921 stockholders who work in that plant. He brought no complaint, no grievance. 'The funniest thing, he said, 'is

that not one of the workmen has come to me since I was chosen by them to come here and told me to say anything. They just put their confidence in me to tell what the workmen think of the corporation.'

"He told it. He said that the men thought 'a good deal' of the corporation. And he told why. He told how the company's sanitation campaign saved its workers from being exposed to swarms of insects, to foul drinking water, to the rain and the snow. He was 'not here to praise the company,' but its accident-prevention work made it safer for him and his fellows to go to work without taking their chances in crossing unguarded tracks. He said that the 'safety devices' on the machinery were 'working fine.' Chairman Gary had pointed out that this campaign had cut down the accident roll until it was 38 per 1000 men less than in 1906. 'This means that 2273 men who might have been injured under earlier conditions were saved from serious injury during the year.' In 1913 the corporation spent \$600,593 in this work.

"Samuel R. Maitland, stockholder and 'water tender at 3 and 4 boiler-house' in Newcastle, Pa., took up the story that Wilkinson began. 'The workers at Newcastle are pleased with conditions.' The vacant lots had been cleaned by the corporation and made into parks. There were playgrounds for the children. There were visiting nurses. There was the safety campaign, which kept the 'mothers from having their boys crawl home to them cripples.' And there was the pension system. 'An old man meets me on the street and says: "I am on the pension roll." I say: "You ought to thank God for that." He is not a pauper.'

"Then came the most moving incident of all. This simple workman said in closing: 'We ought to look up and thank God for this great corporation, which is taking care of humanity in this large way. And now, if you will just bow your heads, we will offer up a little prayer, if that will be all right.' 'Of course, there is no objection,' said Mr. Gary. And the workman prayed:

"Our God, we thank Thee for these officials and these good men who have taken such an interest in the welfare of humanity, and rejoice in our hearts for the blessed privilege of looking up to Thee in thankfulness for it. And we would pray for the man who works and for all who keep us together as one great family and organization. In Thy name we ask it. Amen.' The simplicity of the man's assumption that nothing could be more fitting than a religious interpretation of this new spirit of 'big business' was a finer tribute to the Steel Corporation's sincerity than all the approval of scientific sociologists. To him, these men whom Mr. Gary personified were but carrying on the work of the Lord. They were applying on earth His gospel of justice and mercy. It was but proper to offer thanks to the Source of All Good.

"When Mr. Mellen grates out the harsh gospel of the old order, a watchful press dramatizes it before the people. When a workman phrases in dramatic surroundings the new spirit of the industrial age, a strange perversity makes us ignore it and keep it out of our headlines. Yet, to our mind, the words of Samuel R. Maitland, 'water tender,' are

more significant today than those of Charles S. Mellen, the former chieftain of the New Haven. The one breathes the appeal of unscrupulous selfishness to the devil himself. The other lifts up its eyes unto the hills from whence must come the help which will solve for us the troublous problems of industry.

"Today, as the country faces in the New Haven probe a drama that may be as great as that of the Hughes life insurance investigations, Maitland's prayer should find in the consciousness of the public as firm a place as Mellen's malignant creed. The one preaches despair, the other hope. It is the old against the new, as we measure economic eras. But in the larger measure of time the 'new' is itself as old as the world."—Chicago Evening Post.

New Freight Terminal Warehouse of the B. & O. R. R. in New York City.

A photographic view of the new reinforced concrete terminal warehouse of the Baltimore & Ohio R. R., not available at the time of the preparation of the general account of the construction of this building as published in the Railway Review of May 16, is shown herewith. The building presents a very substantial and massive appearance. It is 352 ft. long, 67 ft. wide and 10 stories high, including a mezzanine floor and basement. From the level of the street floor to the roof the height is 110 ft. 9 in., and from foundation to the level of the top of the penthouses the height is 143 ft. The building is served with two switch tracks which run inside and there is a team track yard of 75 cars' capacity. There are 15,000 cu. yds. of concrete and 675 tons of reinforcing steel in the building and foundation, the latter



Reinforced Concrete Warehouse, B. & O. R. R., in New York City.

resting upon about 3600 wooden piles. Detailed drawings and a full description of the construction were given in the article above referred to.

The Railway Supply Man's Point of View

One principal purpose of this department is to elicit discussion on subjects which are of importance to the railway supply industry and to enable those who have opinions to express them. There are manifestly reasons why men engaged in business do not always want, openly, to take ground in opposition to prevailing ideas or customs. It is entirely proper, therefore, that they have the opportunity to express their views anonymously. The view itself is the real thing and it should be considered on its merits independently of the standing or peculiar situation of the writer.

We want railway supply men to avail themselves of these columns in every proper way. We want also hints as to subjects which should receive editorial attention. There are many incidents narrated among friends in the railway supply business, which would make good reading. The essential thing is truth—not identification of the parties involved, but the real truth of the story. No business was ever developed to a high standing, except through study, criticism and development of opinion. If we are coming to a merit basis of business, let us have light and free discussion.

The attempts of some people in the advertising business to befog things under the pretext of clarifying them, are amusing. Just now a lot of them are talking of advertising as a "commodity." This is an absolutely meaningless proposition. A commodity is "anything moveable that is bought and sold." So much printed matter may be a commodity—but a service which carries a message to the party it is desired to reach cannot be sold by the bushel, the yard, or the ton. Mr. Mellen speaks of the stock of the Westchester road as worth ten cents a pound. That was a commodity value; yet a single

sheet certificate may be worth many millions of dollars. There are some things which cannot be weighed in scales or measured by yard-sticks—and yet are of very real value.

If you are hiring a salesman do you measure his height and put him on the scales? Do you judge him by the number of people he claims a speaking acquaintance with, or by the influence he has with a fair number of them? You pride yourself on your ability to judge character?—that ability is the most important factor in placing advertising.

"Crop Prospects Good and Brilliant in Spots."

Quite a number of people who have been in the habit of attending the June conventions at Atlantic City, are "not going this year." They will probably be there just the same.

There is an old, old story about a sermon on the text "An Angel came down from heaven and took a live coal from the altar." A boy in the congregation who was required by his parents to remember the text, quoted it: "An injun came down to New Haven and took a live colt by the tail and jerked it out of its halter." As B. L. T. would say, there ought to be some kind of a "wheeze" in this anent what has happened in the New Haven stall.

The Iron and Steel Industry.

The undertone of the steel market is stronger though the week's business declined. Pig iron is looking up under numerous inquiries for large blocks, especially basic for third and fourth quarter delivery. Heavy steel plate in large blocks has been further slightly shaded. Rails are quiet.

Shapes maintain activity in small lots. Bars and nails are duller; tin plate, exceptionally active. Mill capacity is being fractionally reduced. Car builders figure out large early summer orders. Locomotive builders report many roads as almost ready to enter the market in a large way.

Correspondence.

ARE THERE TOO MANY CONVENTIONS AND EXHIBITIONS?

Editor, Railway Review:

Around many a lunch table every day groups of railway supply men discuss matters of mutual interest. A small group last Thursday was discussing conditions in the railway supply business, and very naturally "retrenchment" was the subject that came up. One of the gentlemen present, one of the brightest in the railway supply business, has had a number of years of practical experience in railroading, in the manufacturing end of the railway supply business, and also in the sales department. What he had to say is worth repeating. Not that what he brought out was entirely new, but rather something which has been discussed from time to time by numbers of railway supply men. It is important enough to warrant further consideration.

With present-day conditions naturally suggesting retrenchment, and with the Atlantic City conventions in the immediate future, the possibility of retrenchment in connection with conventions, and the value of exhibitions, were not for a conventions and exhibitions logically came up. The value of moment questioned nor minimized. Their value is apparent. It is the larger question of so many exhibitions,—so many conventions. If the average railway supply manufacturer were called upon once or twice a year to attend a convention or make an exhibition, probably the question of retrenchment in connection with them would never arise. However, the average manufacturer of railway supplies is not called upon to exhibit simply at Atlantic City; he is not asked to exhibit once or twice a year, or to attend one or two conventions a year,—but to our own personal knowledge, one certain railway supply manufacturer was called upon to participate in an even dozen railway conventions and exhibitions, all of them national, during the year 1913.

It would appear at first glance that there was economic waste somewhere in a manufacturer going around to twelve different cities in order to keep in touch with the men of one industry. It is needless to say that most companies believe too thoroughly in a retrenchment policy to exhibit on an average of once a month. It is quite usual that a good thing, by becoming too much of a good thing, develops into something which is positively detrimental. Has this not become the case with railway exhibitions? They have grown up because of a real need for them, and a positive good in them, but undoubtedly they have been overdone.

An exhibition of railway supplies primarily should be held at a time and place where it is possible to show railway appliances, and especially new ones, to the greatest advantage, and to the largest number of railway officials who are interested in purchasing. An exhibition is an expression of co-operation in business, which is one of the most valuable tendencies in modern business life, and such co-operation should be fostered and not hindered. However, co-operation can be carried too far, just as anything else. Possibly one exhibition visited by all railway men interested would accomplish more than a dozen different exhibitions,—accomplish more in the way of giving information to the buyer, and more in the way of getting suggestions from the buyer. Certainly a large amount of unnecessary waste in exhibiting might be eliminated.

There is another phase of the subject to be considered, and that is the question of the desirability of holding one or more exhibitions annually. Isn't the policy of the International

Railway Congress, which meets once in five years, worth studying? Isn't the idea of the five year period a good one, or possibility a three year period? Any way, the idea of a longer period between exhibitions is worthy of consideration. While there are some new appliances exhibited each year, there number is small in proportion to the number of appliances exhibited. The larger railway supply manufacturers, who take the majority of the exhibit space, make very little change in their product from one year to the next. Many concerns year after year go to the railway conventions with their exhibits, no change being made in them whatever.

A successful concern is one that has established standard appliances, the value of which is unquestioned,—appliances that have been demonstrated successful in service, and while a few minor improvements may be added from time to time, a year rolls around pretty fast. An exhibition every other year would certainly be often enough for all concerned. The value to the exhibitor would be greatly enhanced if the exhibition were held at two year periods rather than at one year periods. Greater interest would be shown by those who attend, and very likely the attendance would be larger.

Possibly some good method could be worked out whereby it would be advantageous to railroad men themselves to hold conventions every two years, putting more work upon committees between times, which would make the work of the committees more important, and possibly the work would be more thorough. A railway official is a busy man, and twelve months for investigation is often all too short, as is evidenced by the continuing of committees on certain subjects to give them more time. In order that matters may be given all the consideration necessary, the letter ballot is always available, and is even used now.

When all is said and done, there is possibly in railway conventions and exhibitions a good opportunity for retrenchment. Expenditures for railway exhibitions and conventions run each year into many thousands of dollars. It is a mistaken idea to suppose that the railway supply manufacturer is paying for this expense. It is part of his overhead, and the overhead in a business must be taken care of in the sale of the article manufactured, so that, in the final analysis, it is the railroad that pays the cost of conventions and exhibitions.

It is not to be assumed by anything that has been said in the foregoing that railway conventions and exhibitions are an unnecessary expense. They are of tremendous value in railroad operation. They result in saving thousands of dollars to railroads. The question to be determined is whether it is not possible to obtain the same value for the railroad from exhibitions, but at a lesser cost. Certainly the question of holding exhibitions and conventions once in two years instead of annually, and of reducing the number of conventions and exhibitions that are held is worth a whole lot of consideration.

Retrenchment is sometimes looked upon as a necessary evil. It can be, and should be, considered in the light of a necessary good, in what it accomplishes in the way of minimizing economic waste in business.

* * *

Exhibitors at the Convention of the International Railway Fuel Association.

The following named manufacturing firms and agencies maintained representation and exhibits at the recent convention of the International Railway Fuel Association held at the Hotel LaSalle, Chicago; G. L. Simonds Co., Chicago, Vulcan soot cleaner and gas analysis apparatus; Manistee Iron Works, Manistee, Mich., Returbo tank pump and chain grate stokers; American Arch Co., New York, firebrick arches; Franklin Railway Supply Co., the Franklin fire door; Locomotive Superheater Co., New York, Schmidt firetube superheater; Roberts Schaefer & Co., Chicago, coaling stations; Manning Maxwell & Moore, New York, locomotive special-

ties; Locomotive Stoker Co., New York, the Street locomotive stoker; United States Graphite Co., Saginaw, Mich., boiler graphite; McClave Brooks Co., Scranton, Pa., grates, Argand blower; the Williams Patent Crusher & Pulverizer Co., coal crushing apparatus; Bird Archer Co., New York, boiler compound; Link Belt Machinery Co., Philadelphia, coal handling machinery; Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., mine locomotives; Ottumwa Iron Works Co., Ottumwa, Ia., mine hoists; Gurley & Schroeder Co., Chicago, coaling stations; Justrite Mfg. Co., Chicago, mine illuminating apparatus; Frank Prox Co., Terre Haute, Ind., coal mining machinery; Geo. B. Carpenter Co., Chicago, railway and mining supplies; Morgan Gardner Electric Co., Chicago, coal mining machinery; Barry Ivor-Turner Mfg. Co., Economy kerosene carburetor; Dearborn Chemical Co., Chicago, boiler compound; Sullivan Machinery Co., Chicago, coal mining machinery; Locomotive Arch Brick Co., Chicago; the Economy brick arch; Hamler-Eddy Smoke Recorder Co., Chicago, smoke recorders; Macomber Whyte Rope Co., Chicago, wire rope; Hawkes Boiler Co., Chicago, steam boilers; Pneumelectric Machinery Co., Syracuse, N. Y., Atlas Car & Mfg. Co., Cleveland, O., storage battery locomotives; Ortenstein-Arthur Koppel Co., Pittsburgh, mine cars; Electric Storage Battery Co., Philadelphia, Pa., storage batteries; the Dickerson Mfg. & Supply Co.; Chicago Pneumatic Tool Co., Zerbee safety valve blow-off recorder; Ridgway Dynamo & Engine Co., Ridgway, Pa., steam engines and generators, compressed air machinery; National Graphite Lubricator Co., Scranton, Pa., graphite lubricator for locomotive valves; General Electric Co., Schenectady, N. Y., electric mine equipment; Parsons Engineering Co., Wilmington, Del., Combustion system; Ryan Galloway Co., Chicago, coal pushers; T. W. Snow Construction Co., Chicago, coal and water stations; Ogle Construction Co., Chicago, coaling stations; Mudge & Co., Chicago, Mudge-Slater locomotive front end; Goodman Mfg. Co., Chicago, mining locomotives; and National Railway Devices Co., Chicago, Shoemaker fire door.

SUPPLY TRADE NOTES.

—The United States Light & Heating Co. announces the establishment of a sales office in Washington, D. C., in the Evans building, 1420 New York avenue, with W. G. Davis in charge. Mr. Davis, who was formerly connected with the sales department at New York city, will have under his direction the sales of U-S-L storage batteries, electric starter and lighter, and axle electric car lighting equipment in this territory, which includes the states of Florida, Georgia, South Carolina, North Carolina, Virginia, Maryland, Delaware and part of Pennsylvania.

—Flint & Chester, Inc., 237-239 Lafayette street, New York, have been appointed selling agents for the National Graphite Lubricator Co., for the east, including the railroads in the territory north and east of Buffalo and Baltimore. The National Graphite Lubricator Co. is located in Scranton, Pa., and C. D. Simpson is president.

—The National Tube Co., Frick building, Pittsburgh, Pa., is exhibiting in the large cities of the country, a series of motion pictures, illustrating the manufacture of "National" pipe from the iron ore to the finished product. They will be shown before the Chicago Architects' Business Association, in Chicago, May 26. These films were taken under the direction of National Tube Co., after eight months' work, and the expenditure of thousands of dollars. They are educational, and are stated to be so realistic that even a novice after seeing these pictures may feel that he has started at the Mesaba ore ranges, in Minnesota, and followed the iron ore, step by step, until it is shipped out as finished "National" pipe.

—William H. Donner, president of the Cambia Steel Co., has been elected also chairman of the board of the Pennsylvania Steel Co.

RAILWAY NEWS.

Baltimore & Ohio.—The recent issue of \$35,000,000 4½ per cent gold one-year notes of the Baltimore & Ohio R. R., it is said, were largely over subscribed. With reference to these notes President Williard, of the Baltimore & Ohio, has been quoted as saying: "The present offered the most favorable opportunity to provide for the retirement of the maturing notes of the company and for its current requirements. The issue provides for all present requirements, and the arrangement is made for one year only, for the reason that the company has in preparation a broad financial plan, which it is believed will effectively care for requirements in the future. This plan will probably take the form of a general mortgage, combining a single indenture of all of the properties of the system, including the company's Chicago and New York terminals. In addition to providing for existing indebtedness it will make ample provision for additions to road and facilities which may be found to be necessary from time to time in the future. With this in view, the company has for some time past been proceeding with the unification of its various properties. The company recently took over the direct ownership of all of its lines in West Virginia and has combined the principal properties in Pennsylvania in a single company, known as the Baltimore & Ohio R. R. Co., in Pennsylvania. It is expected that these arrangements will have been completed in the near future and it was therefore deemed inadvisable at that time to arrange for temporary needs for more than one year."

Canadian Northern.—A press report states that engineers of the Canadian Northern Ry. are again surveying for a line of railway from St. Peters to Sydney, N. S. The report assumes that it is the purpose of Mackenzie, Mann & Co. to develop the ports of Sydney and Louisburg and at one of these established Atlantic terminals for the transcontinental line of the Canadian Northern. Several months ago another report stated that negotiations were then in progress for the acquiring of the Cape Breton Ry. by the same interests. This line extends from Tupper to St. Peters, N. S., 31 miles. The Inverness Ry. & Coal Co., with a 61-mile line from Point Tupper Junction to Inverness, N. S., is controlled by Mackenzie and Mann interests.

The Canadian Northern Ry. agreement, whereby the government guarantees a further issue of \$45,000,000 bonds, to be issued by the company upon the completion of its system, has been approved in the Canadian parliament by a vote of 111 to 64. The chief features are summarized as follows:

The union of all the companies (31 in all) in the Canadian Northern system by the transfer to the Canadian Northern Ry. itself of the stock of all the others, including railway and steamship lines, express, terminal and telegraph companies, and all other interests.

The reduction of the capital stock of the companies thus united from about \$145,000,000 (of which about \$70,000,000 is Canadian Northern stock and \$68,000,000 is stock of subsidiaries, both lots held by Mackenzie & Mann of Can., Ltd., and \$7,000,000 is Canadian Northern stock held by the Dominion government) to a total of \$100,000,000.

The transfer to the Dominion of Canada of \$40,000,000 of stock (inclusive of \$7,000,000 already owned by the Dominion government) as compensation for the bond guaranty.

The government is protected by a mortgage from the Canadian Northern on its entire assets and from each of the other companies on which money shall be spent on its assets as security against its liability as guarantor.

Provision is made for supervision of the proceeds of the guaranteed securities to the end that they must be applied in the completion and betterment of the system, the government also to have representation on board and examination of accounts.

Should the company make default either in respect of the securities now guaranteed or of any prior encumbrances, the government has power immediately to take over the road as an absolute property of the Dominion of Canada, subject only to bonded indebtedness.

Mackenzie, Mann & Co. and Mackenzie and Mann individually, release absolutely all claims against the Canadian Northern for construction, profits, commissions, etc., representing, it is said, a saving of over \$15,000,000.

Mackenzie, Mann & Co. bind themselves that the floating indebtedness will be reduced to normal figure within one

year without recourse to proceeds of guaranteed securities.

The government takes also as additional security the interest of Mackenzie, Mann & Co. in Canadian Northern townsites, consisting of \$10,000,000 bonds and \$10,000,000 or \$12,000,000 stock.

Special provision is made that all traffic arising on the Canadian Northern Ry. shall be transported over Canadian lines and if for export shall be conveyed to Canadian ports.

The plan furthermore provides that for three years after the opening of the through line between Montreal and the Pacific Coast the government, if requested by the company, will pay the interest on the \$45,000,000 guaranteed bonds, but the interest so paid must be repaid by the company to the government with interest thereon from time to time. In other words, the three years' interest if so paid by the government will be added to the principal and will be secured equally with the principal by the mortgage trust deed.

Chesapeake & Ohio.—See Kanawha & Michigan Ry.

Chicago & North Western.—The Chicago & North Western Ry. has applied to the railroad commission of Wisconsin for authority to issue \$29,715,000 general mortgage bonds of 1987. Of this sum \$22,905,000 is to be used for refunding bonds due 1915, 1916 and 1917, and \$810,000 to be used from 1915 to 1920 in retiring sinking fund bonds of 1879, and \$6,000,000 is to be issued at the rate of not more than \$1,000,000 a year to cover improvements and additions to the company's property from 1915 to 1920.

Grand Trunk.—The Grand Trunk Ry. has been asked by the board of railway commissioners of Canada to prepare revised plans for track elevation in Montreal, Que. According to plans prepared in 1912 the proposal work will require an expenditure of about \$5,000,000.

Illinois Central.—The construction of second track between Clinton & Wapella, Ill., a distance of eight miles has been authorized by the Illinois Central R. R.

Kanawha & Michigan.—The directors of the Chesapeake & Ohio Ry. on May 14, ratified the agreement to sell 40,292 shares of the Kanawha & Michigan Ry. stock, comprising the entire holdings of the Chesapeake & Ohio in the company, to the Lake Shore & Michigan Southern Ry. at par—a price which nets the Chesapeake & Ohio a profit of \$1,128,176. The sale is yet to be conformed by the United States district court which will hear the case on June 2.

Lake Shore & Michigan Southern.—See Kanawha & Michigan Ry.

New York, Chicago & St. Louis.—The report of the New York, Chicago & St. Louis Railroad Company for the year ended December 31, 1913, shows net earnings of \$2,688,660, against \$3,527,129 in 1912. The balance after preferred dividends was \$27,574, or equal to 0.19 per cent on the common stock, as compared with 6.3 per cent earned in 1912. The income account compares as follows:

	1913.	1912.
Gross earnings	\$12,343,000	\$12,226,238
Expenses	9,653,340	8,699,108
Net earnings	2,688,660	3,527,129
Outside operations, debt.....	29,622	23,858
Total net revenue.....	2,659,038	3,503,272
Taxes accrued	443,793	389,133
Operating income	2,215,245	3,114,138
Other income	224,944	219,192
Total income	2,440,188	3,333,337
Interest, rentals, etc.....	1,612,164	1,551,470
Surplus	827,574	1,781,860
Preferred dividends	800,000	800,000
Common dividends .....	.....	560,000
Surplus	27,574	421,860
Previous surplus	2,021,334	2,071,008
Total surplus	2,048,908	2,492,808
Miscellaneous credits	4,788	99,000
Sundry accounts	*179,494	471,534
Surplus	1,874,203	2,021,334

*Includes \$175,000 for additions and betterments.

Norfolk & Western.—The Norfolk & Western Ry. has awarded contract to the Mason & Hanger Co., Richmond, Ky., for construction of second track between Disputanta and Waverly, Va., a distance of ten miles.

Northern Pacific.—The stockholders of the Northern Pacific Ry. will meet in New York June 11 to act on a recommendation of the directors for the creation of a new mortgage on the property, not only to refund the \$10,000,000 short-time notes due July 1, but also for issues of bonds falling due

during the next few years, and for improvements and further developments over a long period.

Oregon Short Line.—Track laying on the Payette Lakes extension of the Idaho Northern line of the Oregon Short Line R. R. has been carried to within about 12 miles of the Lakes and will be finished within a few weeks.

Pennsylvania Company.—The following is taken from the annual report of the Pennsylvania Company for the year ended December 31, 1913:

On the Pittsburgh, Fort Wayne & Chicago Ry., work was continued throughout the year on the track elevation in the Chicago district and at Fort Wayne, Ind., and the new passenger station layout at the latter point was practically completed; the overhead bridge at Washington street, Chicago, was opened for traffic in May; the shop facilities at Conway yards were increased by the alteration and extension of the original machine shop and by the addition of two new shops; work is under way upon a large car repair plant at Indiana Harbor, Ind.; additions were made to the power plant at Fort Wayne; a portion of the third track from Mansfield to Toledo Junction, Ohio, was completed; and additional tracks were constructed in the eastbound receiving yard at Crestline.

On the Cleveland & Pittsburgh R. R., substantial progress has been made upon the track elevation work and other related improvements, including the remodeling of the Euclid avenue passenger station in the Cleveland district; a new freight house at Wason street, Cleveland, and a combined freight and passenger station at Homeworth, Ohio, were completed; a coaling trestle was erected at New Philadelphia, Ohio; subways were constructed at Ravenna, Ohio, to secure elimination of two road crossings at grade; additional tracks were laid in the westbound storage and classification yards at Bedford, Ohio, passing sidings were extended, and very good progress made upon the second track work from Bayard to Kensington, Ohio.

On the Pittsburgh, Youngstown & Ashtabula Ry., the principal expenditures were for the acquisition of right of way for the low grade line from Kenwood to Rochester, Pa., purchase of land at Ashtabula, Ohio, and construction of additional tracks between Youngstown and Brier Hill, Ohio, passing sidings at Detour, East Orwell and Champion, Ohio, yard facilities at Austinburg, Ohio, and new station building at Koppel, Pa.

On the Cleveland, Akron & Cincinnati Ry., an extension to the freight house at South Akron was completed, additional passing sidings were constructed at various points, an undergrade crossing was built at Sunbury, Ohio, and additional shop facilities were provided at Mt. Vernon, Ohio.

On the Toledo, Columbus & Ohio River R. R., the construction of a second track from Grogan, Ohio, to Bridge No. 98, a distance of about two miles, was completed, various passing sidings were built or extended, additional yard facilities were provided at Carrothers and Bay Junction, Ohio, a coaling station and two coal storage tracks were constructed at Carrothers, Ohio, the shop facilities were increased at Toledo, Ohio, a new interlocking plant was erected at Bay Junction, Ohio, and work is under way upon the reconstruction of the important bridge over the Maumee river at Toledo, and upon the furnishing of additional coal handling facilities on the docks at Sandusky, Ohio.

The income account compares with that of the previous year as follows:

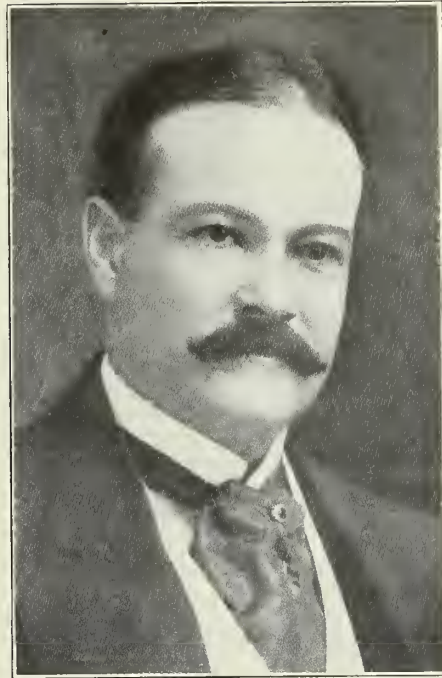
Operating Revenues—	1913.	1912.
Freight	\$49,557,922	\$47,526,730
Passenger	10,137,110	9,545,608
Mail	1,134,440	1,100,351
Express	1,630,174	1,573,032
Other transportation revenue.....	2,055,178	2,085,326
Non-transportation revenue	1,320,554	1,119,378
Total operating revenue.....	\$65,835,378	\$62,950,425
Expenses—		
Maintenance of way and structures...	\$10,613,189	\$ 9,440,847
Maintenance of equipment.....	12,569,663	11,161,332
Traffic	1,078,469	982,746
Transportation	24,874,403	21,906,260
General	1,329,990	1,152,227
Total	*\$50,465,714	\$44,643,412
Net operating revenue.....	\$15,369,664	\$18,307,013
Outside operations—deficit	98,928	32,205
Taxes	3,123,160	2,738,020
Operating income	\$12,147,576	\$15,536,788
Other Income—		
Dividends and interest received.....	\$11,814,743	\$12,754,723
Joint facilities, rents.....	323,222	338,492



W. J. Towne, Appointed General Superintendent of the Chicago & North Western Railway.



S. G. Strickland, Appointed General Manager of the Chicago & North Western Ry.



W. D. Cantillon, Retired as General Manager of the Chicago & North Western Railway.

Miscellaneous rents	218,760	280,984
Hire of equipment, balance.....	.....	178,006
Sundry other income.....	824,696	423,549
Gross income	\$25,328,997	\$29,512,542
Deduct—		
Interest on bonds.....	\$ 5,355,437	\$ 5,298,188
Other interest	389,556	267,127
Lease of other roads.....	8,919,911	10,423,441
Joint facilities, rents.....	613,375	681,941
Hire of equipment, balance.....	108,654	.....
Miscellaneous	148,962	139,205
Dividends, 7%	5,600,000	5,600,000
Additions and betterments.....	2,200,000	3,000,000
Appropriations sinking, etc., funds....	1,896,803	3,286,139
Car trust—principal .....	.....	84,133
Total deductions	\$25,232,698	\$28,780,174
Balance	\$96,299	\$732,368

*Operating expenses include in 1913 \$1,518,328 expended in repairing and replacing tracks, bridges and other property destroyed or damaged by the floods of March 1913.

Pennsylvania Railroad.—The Pennsylvania Railroad has awarded a contract to James McGraw & Co., Commercial Trust building, Philadelphia, Pa., for constructing about one mile of track elevation in Camden, N. J.

Seaboard Air Line.—The Seaboard Air Line Ry. has sold to the Guaranty Trust Co., of New York, \$2,325,000 first mortgage 25-year 6 per cent gold bonds of the Charleston Northern Ry., and \$1,250,000 of the first mortgage 50-year 6 per cent gold bonds of the North & South Carolina R. R.; principal and interest of both issues guaranteed by the Seaboard Air Line.

Wabash Railroad.—Among the improvements contemplated by the reorganization committee of the Wabash Railroad, as outlined in plans submitted to the public service commissions of Missouri, Illinois, Michigan & Ohio, are extension of second track, reduction of grades, elimination of grade crossings, installation of more automatic block signals, additional telephone dispatching system and purchase of additional equipment at the rate of an annual expenditure of approximately \$2,000,000 for the next five years. The program of proposed expenditures includes 50 freight locomotives, 6 passenger locomotives and 2000 freight cars annually.

The plan contemplates a reduction of \$10,192,877 in the capital of the company and an assessment of \$20 per share on all stockholders. Preferred stockholders are to receive the new stock at par and common stockholders at 88, after each has surrendered his old stock and paid the \$20 assessment. There is to be no preferred stock in the new issue. Holders of unsecured claims will receive 50 per cent. The present capital of the company is \$219,793,877. After reor-

ganization the capital will be \$209,601,000, comprised of \$64,585,000 in undisturbed securities, and \$145,016,000 in new securities. At present the total annual fixed charges are \$5,761,017. After reorganization this item will be reduced to \$3,792,470. It is estimated by the reorganization committee that \$30,280,000 cash will be needed to perfect the reorganization. This amount they plan to realize from the \$20 assessment on present stock and from a contemplated issue of \$14,000,000 of 50-year 5 per cent refunding bonds.

PERSONALS.

Ralph Peebles has been appointed general manager of the Tavares & Gulf R. R., with headquarters at Tavares, Fla., succeeding C. A. Carpenter, resigned to take service with another company.

Stanton Ennes, general superintendent of the Western Maryland Ry., has moved his headquarters from Baltimore, Md., to Hagerstown, Md.

W. D. Cantillon, general manager of lines east of the Missouri river of the Chicago & North Western Ry., after forty years of continuous and faithful service with the company, has by reason of illness requested relief from active duties. Effective May 18, S. G. Strickland, assistant general manager, has been appointed general manager; W. J. Towne, general superintendent of lines in Illinois, Iowa, Wisconsin and Michigan, with headquarters at Chicago, succeeds Mr. Strickland as assistant general manager, and G. B. Vilas, assistant general superintendent, has been appointed general superintendent, succeeding Mr. Towne.

W. D. Cantillon, whose resignation as general manager of the Chicago & North Western Ry., is announced, was born at Janesville, Wis., August 5, 1861. He received a common school education and in 1875 entered the service of the Chicago & North Western as a freight brakeman. He served in that capacity and as conductor until 1891 when he was made trainmaster at Milwaukee, Wis. From 1893 to 1897 he was assistant superintendent at Milwaukee. Mr. Cantillon was appointed superintendent at Winona in 1897 and four years later became assistant general superintendent. He was made general superintendent July 1, 1902, on January 24, 1906, was promoted to assistant general manager and since November 1, 1910, has been general manager of lines east of the Missouri river.

Samuel G. Strickland, who has been appointed general manager of the Chicago & North Western Ry., lines east of the Missouri river, effective May 18, 1914, was born August 15, 1859. He was educated at collegiate institute and grammar schools at Port Hope and Peterboro, Ont. He entered railway service in 1877 as a telegraph operator on

the Canadian Pacific Ry. From 1878 to 1880 he was operator and clerk with the St. Paul, Minneapolis & Manitoba Ry., now the Great Northern Ry., and from 1880 to 1892 he served as telegrapher, clerk, agent and general agent with the Chicago, St. Paul, Minneapolis & Omaha Ry. He was agent and superintendent of terminals for the same road at Minneapolis, Minn., for two years and he then became chief clerk to the general superintendent of that road. From 1898 to 1900 he was trainmaster and assistant superintendent; 1900 to 1905, superintendent at Omaha, Neb., and 1905 to 1908, general superintendent at St. Paul, Minn. Mr. Strickland was appointed assistant general superintendent of the Chicago & North Western at Chicago in 1908; general superintendent, November 1, 1910, and since April 1, 1912, has been assistant general manager of that road.

W. J. Towne, whose appointment as assistant general manager of the Chicago & North Western Ry. is announced was born at Leavenworth, Kan., November 28, 1867. He was graduated from Rensselaer Polytechnic institute, Troy, N. Y., in 1895. He had been with the Atchison, Topeka & Santa Fe Ry., from 1886 to 1891 as rodman, instrumentman and assistant engineer. He was assistant engineer, New York State Canals from 1896 to 1899; 1899 to 1902, assistant engineer of construction of the Chicago & North Western Ry., at Boone, Iowa, at Kaukauna, Wis., and at Escanaba, Mich. Mr. Towne was made division engineer at Baraboo, Wis., in 1902, division engineer at Escanaba, Mich., in 1904 and from October, 1904, to 1906, was division engineer at Chicago. From March, 1906, to July, 1906, he was engineer of permanent improvements and from July, 1906, to April, 1912, engineer maintenance of way. Mr. Towne has been general superintendent since April 1, 1912.

C. B. Heiserman, general solicitor of the Pennsylvania Lines West of Pittsburgh, with office at Pittsburgh, Pa., effective May 1, has been appointed general counsel, succeeding J. J. Brooks, deceased, and E. H. Seneff, general solicitor of the Chicago & Eastern Illinois R. R., at Chicago, succeeds Mr. Heiserman, effective June 1.

F. T. Dickerson, effective May 16, has been appointed assistant to president of the Central R. R. of New Jersey, with office at 143 Liberty street, New York.

R. J. Lockwood, manager and chief engineer of the New Iberia & Northern R. R., has been elected vice-president, with headquarters at New Iberia, La., in place of J. M. Burguieres.

T. U. Young has been appointed assistant to the vice-president and general manager of the Jonesboro, Lake City & Eastern R. R., with headquarters at Jonesboro, Ark., effective May 1.

Agnew T. Dice, vice-president and general manager of the Philadelphia & Reading Ry., and subsidiary companies, has removed his office from Reading, Pa., to the Reading terminal, Philadelphia.

Samuel L. Kamps, formerly assistant to the operating vice-president of the Chicago Great Western R. R., was recently appointed assistant to the chief executive officer of the Pere Marquette R. R., with headquarters at Detroit, Mich.

S. P. Henderson, superintendent of the Northern division of the Chicago & Alton R. R., with headquarters at Bloomington, Ill., effective June 1, is also given authority over the Southern division, the two divisions being consolidated.

F. F. Whittlesey has been appointed acting general manager of the Tennessee Railway, with headquarters at Oneida, Tenn., in place of B. A. Newland, deceased.

J. H. Nelson, superintendent of transportation of the Florida East Coast Ry., at St. Augustine, Fla., has resigned to take service with another company.

John Dickson, general master mechanic of the Oregon Electric Ry., Oregon Trunk Ry. and Spokane, Portland & Seattle Ry., with headquarters at Portland, Ore., has had his jurisdiction extended over the Spokane & Inland Empire R. R. J. W. Hungate has been appointed electrical superintendent of the latter road, with headquarters at Spokane, Wash.

TRAFFIC.

F. E. Waters has been appointed traveling freight agent of the Atlanta, Birmingham & Atlantic R. R., with office at Atlanta, Ga., succeeding Jos. H. Banks, resigned.

C. A. Carpenter, hitherto general manager of the Tavares & Gulf R. R., at Tavares, Fla., has been appointed assistant general freight agent of the Seaboard Air Line Ry., with office at Jacksonville, Fla., succeeding A. J. Fox, promoted.

H. C. Bush, member of the Western Classification Committee, has been appointed a member of the Committee on

Uniform Classification, with office at Chicago, succeeding R. C. Fyfe, chairman of the former committee.

Bryan Snyder, traffic manager of the Marshall & East Texas Ry., has been appointed also traffic manager of the New Iberia & Northern R. R., with office at New Iberia, La., succeeding S. S. Butler, resigned. Mr. Snyder's duties will include those of general freight agent and general passenger agent heretofore handled by J. A. Brown and C. W. Strain at Houston, Tex.

ENGINEERING.

E. D. Flad has been appointed assistant supervisor of division No. 32 of the Pennsylvania Railroad, with office at Earnest, Pa., succeeding C. S. Hager, promoted.

M. C. Cleveland, engineer of maintenance of way of the Chicago, Indiana & Southern R. R., at Gibson, Ind., has been appointed valuation engineer of the Lehigh Valley R. R., with office at 90 West street, New York.

George H. Frazine has been appointed master carpenter, Cleveland carpenter department, of the Lake Shore & Michigan Southern Ry. and Dunkirk, Allegheny Valley & Pittsburgh R. R., with headquarters at Cleveland, Ohio, effective June 1, vice F. A. Beeman, deceased.

D. H. Maples has been appointed superintendent of building construction of the Canadian Pacific Ry., with headquarters at Montreal, Que., succeeding F. L. Ellingwood, resigned.

MECHANICAL.

R. J. Greiner has been appointed general foreman of the Missouri, Kansas & Texas lines at Smithville, Tex., succeeding Max Chase, resigned.

W. T. Lovell has been appointed master mechanic of the Oregon-Washington R. R. & Navigation Co., and the San Francisco & Portland Steamship Co., with headquarters at Portland, Ore., succeeding James Healy, resigned.

H. C. Griffin has been appointed general car inspector of the Canadian Pacific Ry., Eastern lines, with headquarters at Montreal, Que., succeeding L. C. Ord, promoted.

OBITUARY.

Thomas R. Limer, superintendent of transportation of Hocking Valley Ry. at Columbus, Ohio, died May 19, aged 50 years.

A. A. Sinclair, superintendent of bridges and buildings of the Duluth, Missabe & Northern Ry., was run down by an engine in the Proctor yards near Duluth, Minn., May 14. He was taken to a Duluth hospital, but died within a short time.

Edward Hogan, roadmaster of the Lake Erie & Western R. R., at Tipton, Ind., died May 13, at Bloomington, Ill.

J. P. Hayden, auditor of the Texas State R. R., was suddenly killed in an automobile accident May 14, at Rusk, Tex.

NEW ROADS AND PROJECTS.

British Columbia.—The promoters of the Pacific, Peace River & Athabasca Ry. are sending out reconnaissance parties. The route of the proposed line will be determined and a thorough survey will be made of the natural resources of the Peace, Athabasca, Mackenzie and Slave River districts. The proposed railway as stated in the Railway Review of April 11 will run from a point near Naas Bay in British Columbia, north and east to the Peace river, through northern Alberta and southeast to Prince Albert, Sask., about 1500 miles.

The Pacific Great Eastern Ry. has awarded contract to A. E. Griffin & Co., Fort George, B. C., for constructing a line from Mile 30 to Mile 63 south of Fort George.

California.—See New Roads and Projects under Idaho.

Florida.—A. F. Langford, Bartow, Fla., who has the contract for an extension of the Seaboard Air Line Ry. from Bartow to east of Lake Wales, about 26 miles, is reported to have let subcontracts as follows: Clearing right of way, to J. E. Portersfield of Bartow; to the Hall-Parker Contracting Co., Macon, Ga., 140,000 cu. yds. of steam-shovel work; to J. R. Chublis of Tampa, Fla., 2500 ft. of trestling.

Idaho.—Articles of incorporation were filed at Boise, Idaho, May 14, by L. O. Leonard for the Boise, Butte & San Francisco, R. R., which purposes to build a railroad from Butte, Mont., to San Francisco, Cal., via Boise. The capital stock is \$125,000,000. This is the project formerly known as the Butte-Boise & Winnemucca Ry. See Railway Review of February 28. The route of the road is from Butte via Silver Bow and Anaconda to Salmon and then southwest to

Chalis, across Custer and Blaine counties to Moore's creek, the Boise river to Boise, east via Caldwell to Jordan valley, following Crooked river to Goose lake, down the Pitt river into Sacramento valley to Woodland and on to Napa Junction to Sausalito, Cal.

Montana.—See New Roads and Projects under Idaho.

Nova Scotia.—See Railway News under Canadian North-eastern Ry.

Ohio.—The Chesapeake & Ohio Ry. received bids at New York last week for building the proposed new 93-mile line from Columbus, Ohio, to the Ohio river at Portsmouth, Ohio, previously mentioned in the Railway Review of March 14 and April 25. Extensive revisions in the line that are now under way may make it necessary to ask for new bids. Final determination as to when construction work will begin will not be made for probably 30 days. Bids for the bridge at Portsmouth which will take about 15,000 tons of steel have been asked for June 2.

Ontario.—The general contract for the construction of the St. Polycarp Junction-Corwall line of the Glengarry & Stormont R. R., has been awarded to the Glengarry Construction Co., Montreal, Que. The work will include 275,000 cu. yds. of earth excavation and 10,000 cu. yds. of rock excavation, 300,000 cu. yds. of embankment and 320 cu. ft. of steel. About 7200 cu. yds. of masonry will be involved. M. J. Omeara is secretary and treasurer of the construction company. C. L. Hervey is chief engineer.

Oregon.—See New Roads and Projects under Idaho.

The Sutherlin, Coos Bay & Eastern Ry. will construct a railroad from Sutherlin, Ore., on the line of the Southern Pacific Co., eastward a distance of 27 miles. Those interested in the company are W. L. Roach, of Muscatine, Iowa. C. M. Crego, of Spokane, Wash., and F. B. Waite and J. F. Luse, of Sutherlin, Ore.

Texas.—Negotiations for financing and construction of the proposed Gulf & Pecos Valley Ry. are said to be under way with favorable prospects of a contract being entered into soon. The Interstate Development Co., Col. P. A. McCarthy, secretary and chief engineer, Lufkin, Tex., is promoting this line of railway from some port on the Gulf of Mexico, via Beaumont, Lufkin, Palestine, Dallas, Fort Worth and through the Panhandle of Texas to some point in New Mexico.

The Galveston, Harrisburg & San Antonio Ry. has awarded contract to Garvin & Davis, Houston, Tex., for construction the proposed loop line from Strang to Seabrook, 12 miles, via Morgans Point, La Porte, Sylvan Beach, Point Pleasant and Red Bluff.

The Texas Midland R. R., according to report, will construct its own track between Terrell and Commerce, Tex., 14 miles. The road at present uses the St. Louis Southwestern Ry. tracks between those points. A new line will also be built to Dallas, it is said, and an extension made from Ennis to Waco, Tex.

Virginia.—The Virginia Blue Ridge Ry., a 25-mile lumber line, will be built, according to report, from the Tye river, on the Southern Railway, to Massie's Mills, Va. Bids for construction have been asked.

Electric Railways.

The Michigan Railway Co., Jackson, Mich., at a recent meeting elected the following officers: J. F. Collins, general manager; G. B. Dobbin, secretary; J. B. Glendenning, treasurer, and G. W. Mechem, B. C. Cobb, W. A. Foote and Frank Sullivan, vice-presidents. The company plans to connect Chicago, Detroit, Grand Rapids, Bay City, South Bend, Battle Creek and other cities by electric lines. The railway company controls the line running between Flint and Bay City, formerly known as the Saginaw & Flint Ry., 46 miles of interurban railway between Flint and Saginaw and on through to Bay City, 13 miles of which is a new third rail road put into operation May 1 of this year. The trolley construction has also been rebuilt and the entire line is now being operated as a 1200 volt road, with the exception of in the cities. The Michigan Railway Co. will eventually include the new line being constructed between Grand Rapids and Kalamazoo, a distance of 49 miles, and from Allegan to Battle Creek, a distance of 42 miles. These lines it is expected will be put into operation on or about September 1 of this year, and are to be operated on 2400 volts, the equipment for which is now being built at the shops of the General Electric Co.

The Lafayette & Northwestern R. R. has been incorporated to build an electric railway between Lafayette, Wolcott, Remington, Goodland, Ruesslaer and Morocco, Ind., and Illinois state line. The capital stock is \$100,000; directors: G. J. Thomson and O. A. Cummins.

The contract for the extension of the Winnipeg, Selkirk & Lake Winnipeg Ry., from Stony Mountain to Stonewall, Man., eight miles, has been awarded to Kelpin Bros., Wilson Phillips is acting manager of the railway.

The Fort Worth-Denton Traction Co. has contracted with Stone & Webster Engineering Corp. for the construction and operation of the proposed 34-mile interurban line from Ft. Worth, Tex., to Denton, Tex.

The McKinney, Bonham & Paris Interurban Ry. has been formed to construct an interurban line connecting these towns in Texas. The road will run via Blue Ridge, Leonard, Bonham and then paralleling the Texas & Pacific Ry. to Paris, a total of 74 miles. The officers of the company are: L. A. Scott, president; R. L. Waddill, chairman; J. W. Russell, of Bonham, treasurer; Mark McMinns, of Bonham, secretary.

The Arkansas Valley Interurban Ry., it is said, contemplates an extension of its line from Newton to Salina, Kan., about 60 miles.

Application has been made for a charter by Parker, Colorado River Valley Electric Ry., to build railway and other public utilities in Parker, Ariz., through the Colorado River Indian reservation and along Colorado river, 35 miles. The capital stock is \$250,000. The incorporators include Thos. Taylor, Jerome and W. H. Tharpe, Parker.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Public Belt R. R., of New Orleans, it is reported, has ordered 2 locomotives from the Baldwin Locomotive Works.

—The Baldwin Locomotive Works has delivered to the Baltimore & Ohio R. R. one Santa Fe type (2-10-2) locomotive for experimental purposes.

—See Railway News under Wabash Railroad.

—The New Orleans & Northeastern R. R. has ordered 3 mikado (2-8-2 type) and 5 Pacific (4-6-2 type) locomotives from the Baldwin Locomotive Works.

—The Laurel River Lumber Co., Jennings, W. Va., has ordered one mogul (2-6-0 type) locomotive from the Baldwin Locomotive Works.

Freight Cars.

—A report which has been widely circulated during the past week with reference to the purchase by the Union Pacific R. R., of 500 all-steel box and 400 all-steel automobile cars from the Bettendorf Company is authoritatively denied.

—The Great Northern Ry., according to report, has ordered 1400 cars to be built in its own shops.

—The Union Pacific R. R., it is said, has ordered 900 freight cars. The report is not confirmed.

—The St. Louis, Brownsville & Mexico Ry. has about completed negotiations for the purchase of 800 box cars and 20 caboose cars. Financing is yet to be arranged.

—The Chicago & North Western Ry. is asking for prices on 250 ballast cars.

—The Canadian Pacific Ry. has ordered 18 steel frame box, one stock, one refrigerator, and 2 caboose cars to be built at its Angus shops, also 40 all-steel Otis dump cars from the Canadian Car & Foundry Co.

—See Railway News under Wabash Railroad.

Passenger Cars.

—The Electric Short Line Ry., Minneapolis, Minn., has recently ordered an additional gas-electric motor car from the General Electric Co.

—The Missouri & North Arkansas R. R. recently ordered one gas-electric motor car from the General Electric Co.

—The Illinois Central R. R. recently asked for prices on one private car.

—The Canadian Pacific Ry. is building 2 steel mail and express cars in its Angus shops.

—The Union Pacific R. R. has ordered 107 steel passenger cars from the Pullman Company.

Iron and Steel.

—The Louisville & Nashville R. R. has increased a recent order for rails to the Tennessee Coal, Iron & Railroad Co., 1500 tons.

—The Chicago & Western Indiana R. R. has ordered 2000 tons of rails from the Illinois Steel Co.

Bridges.

—The Grand Trunk Ry. has ordered 400 tons of structural steel for track elevation work at Detroit, Mich., of the Lackawanna Bridge Co.

—The Western Maryland Ry., it is said, has awarded contract for 1000 tons of bridge steel.

—The Boston & Maine R. R. is taking bids on 2500 tons of steel for a bridge over the Hudson river at Mechanicsville, N. Y.

—A resolution was introduced in the Canadian house of commons May 16 to authorize the Dominion government to construct three bridges across the St. John river on the St. John Valley Ry.

—The Illinois Central R. R. has petitioned the war department for authority to construct steel bridge across the Tradewater river at Blackford, Ky.

—Contracts have been awarded for the combination railroad and wagon bridge to be built by the Houston & Brazos Valley R. R. and Brazoria county, Texas, across the Brazos river connecting Velasco and Freeport, Tex.

—The Oregon-Washington R. R. & Navigation Co. recently awarded contract for the erection of a steel bridge across the Spokane Falls and the Monroe street bridge at Spokane, Wash., to Robert Wakefield and A. C. O'Neel, Portland, Ore. The bridge which will cost about \$400,000 will be 700 feet long, and will require 4600 tons of steel.

—The Seaboard Air Line Ry., it is said, will construct a bridge at Tampa, Fla.

—The Chicago Rock Island & Pacific Ry. has placed an order for 300 tons of structural steel for subway work at Chicago with the Morova Construction Co.

—The Southern Railway is reported as having prepared plans for two steel bridges across Atkins and Cherry streets, Charlotte, N. C., to cost \$35,000.

Buildings, Terminals, Etc.

—The plan of the Pennsylvania Railroad to establish new freight yards between Fifty-second street and Malvern avenue, Philadelphia, is held up, at least temporarily, on account of the objections of Overbrook residents who fear the smoke nuisance which might result. The plans of the company were outlined in the Railway Review of May 2.

—The Illinois Central R. R. is preparing to add to its facilities at Clinton, Ill. New and enlarged shop buildings and addition to yards are planned, and \$700,000 will be expended including eight miles of second main track.

—The Great Northern Ry., according to report, contemplates building a new station at Hibbing, Minn.

—The Union Terminal Co., Dallas, Tex., has received bids to erect union passenger station and terminal at cost of about \$5,000,000. The main building will be 282x135 ft., 70-ft. high; Italian renaissance style; solid rock foundation; Texas granite base; upper portion brick. C. H. Dana is chief engineer, F. D. Griffin, construction engineer, and Jarvis Hunt, Chicago, is the architect.

—The Toledo & Ohio Central Ry. is reported as purchasing land for additional shops and yard facilities at Bucyrus, Ohio.

—The Norfolk & Western Ry. has awarded contract to the Virginia Bridge & Iron Works for steel for shop additions at Roanoke, Va.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, MAY 12, 1914.

Car stake holder, 1,096,028—Casper Faust, Oshkosh, Wis.

Metal cross tie, 1,096,032—Harry S. Gover, Bel Air, Md.

Locomotive spark and cinder arrester, 1,096,035—Alfred L. Johnson, Ashtabula, Ohio.

Grain door for railway cars, 1,096,037—Charles M. Kemper, Kansas City, Mo.

Railroad tie, 1,096,046—Oliver P. Megahan, Westerville, Ohio.

Cattle guard, 1,096,082—Hazen Wardlow, Naylor, Mo., assignor to Hugh T. Goddin, Naylor, Mo.

Derailing device, 1,096,093—John A. Bodkin, New York, N. Y.

Automatic stoker, 1,096,106—William C. A. Henry, Columbus, Ohio.

Draft rigging for railway cars, 1,096,120—John F. O'Connor, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.

Rail clamp wheel stop, 1,096,121—Thomas Oliver, Toronto, Ontario, Canada.

Car door, 1,906,139—Richard Thalheim, Gretna, La.

Emergency brake, 1,096,167—Kalman Haas, New York, N. Y.

Rail joint chair, 1,096,178—Jesse Mattern, Tyrone, Pa.

Concrete railway bridge, 1,096,183—William E. Moore, Pittsburgh, Pa.

Antifriction bearing for railway cars, 1,096,210—Albert G. Welch, executor of Edwin S. Woods, Chicago, Ill.

Railway mower, 1,096,236—Peder Furuseth, Edmore, N. D.

Car coupling, 1,096,241—Charles C. Hogen, Cleveland, Ohio.

Rail fastening, 1,096,301—Alexander B. B. Harris, Chicago, Ill.

Tie plate, 1,096,308—Edward Laas, Shawnee, Okla., and Hiram H. Sponenburg, Gurnee, Ill., assignors to Laas & Sponenburg Co.

Cross tie for railways, 1,096,315—Lawrence C. Mooney, Montgomery, Ala.

Air brake setting device, 1,096,334—John H. Watters, Augusta, Ga.

Car truck, 1,096,340 and 1,096,341—Walter S. Adams and Arthur F. H. Head, Philadelphia, Pa., assignors to The J. G. Brill Co., Philadelphia, Pa.

Dump car, 1,096,351 and 1,096,352—Richard Webb Burnett, Montreal, Quebec, Canada.

Railway signal torpedo, 1,096,358—Frank Dutcher, Versailles, Pa., assignor to Central Railway Signal Co., Pittsburgh, Pa.

Track adjuster or indicator, 1,096,357—George Dupes, Knoxville, Tenn.

Car truck, 1,096,366 and 1,096,367—Arthur F. H. Head, Philadelphia, Pa., assignor to The J. G. Brill Company, Philadelphia, Pa.

Shipping tag, 1,096,370—James G. Hughes, Newark, Ohio.

Journal box lid, 1,096,383—John S. McWhirter, New York, N. Y.

Railroad spike, 1,096,403—Paul Szydlowski, Boston, Mass.

Drag brake for railway cars, 1,096,418—Michael F. Fagan, Altoona, Pa.

Rail joint, 1,096,425—Albert C. Gee, St. Thomas, Ontario, Canada.

Railway rail gage and guard, 1,096,432—Gustav Komarek and George R. Schleier, St. Louis, Mo.

Track structure, 1,096,433—Jeff N. Lamar, Dannemora, N. Y. Carline, 1,096,462—Thomas N. Russell, Chicago, Ill., assignor to Chicago-Cleveland Car Roofing Co., Chicago, Ill.

Railway switch, 1,096,469—Robert J. Steele, Jenkintown, Pa.

Roller side bearing, 1,096,472 and 1,096,473—Arnold Stucki, Pittsburgh, Pa.

Tank car, 1,096,497—Max Epstein, Chicago, Ill.

Gas or smoke washer, 1,096,501—Oliver M. Foster, Elkhart, Ind., assignor to American Smoke Washing Co., Cleveland, Ohio.

Car seat, 1,096,518—Grant Steinbeck, Warren, Ohio.

Weather guard for car windows, 1,096,557—Alfred H. Newpher, Chicago, Ill., assignor to The Adams & Westlake Co., Chicago, Ill.

Tongue switch, 1,096,600—Connor C. Chambers, Chicago, Ill.

Railway track construction, 1,096,608—Reimer N. Dithmer, Chicago, Ill.

Double slide valve gear for locomotives, 1,096,614—Lucien Faisant, Paris, France.

Railway track structure, 1,096,628—Walter Carl Huebner, Johnstown, Pa.

Car seat, 1,096,678—Edward G. Budd, Philadelphia, Pa., assignor to Hale & Kiburn, Co., Philadelphia, Pa.

Rail joint, 1,096,696—Nathan Durbin, Taylorville, Ill.

Car door, 1,096,700—Emil Emmert, Superior, Wis.

Automatic railway gate, 1,096,711—Harry Gormley, New York, N. Y.

Reinforced concrete tie, 1,096,746—Asa Earl Parmeter, Logansport, Ind.

Railroad crossing, 1,096,757—Marion M. Roberts, Gossett, Ill.

Railway safety appliance, 1,096,766—Mark M. Thomas, Rifle, Colo.

Rail Fastener, 1,096,768—Walter Carter Toney, Princeton, Ala.

Car door lock, 1,096,770—John Turke and Benjamin F. Reil, Boston, Mass.

Air brake control valve mechanism, 1,096,777—Andrew J. Allard, Richmond, Va.

Car door operating mechanism reissued, 13,725—Charles A. Lindström, Pittsburgh, Pa.

Metallic tie, reissued, 13,729—Burton S. Rupp and Jesse W. Johnson, Salt Lake City, Utah, assignors to Universal Metallic Tie Co.

RAILWAY REVIEW

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Signs of the Times.

Emigration of foreign-born labors from the Pittsburg district to their old homes in southwestern Europe is said to be abnormally heavy at present. Figures obtained at railroad and steamship companies since the movement started during the winter show that at least 30,000 laborers have left the Pittsburg district for their native lands. Railroad men remark that movement of the foreign laborers is a good barometer of the existence of industrial condition in this country. Most of those leaving Pittsburg carry their picks and shovels with them, wrapped in bundles of clothes, explaining that they intend to use the tools at home, and that such tools are more expensive in Europe than in America. The Pennsylvania R. R. has increased its daily immigrant train from five to eight coaches and the Baltimore & Ohio R. R. has made a similar increase.

New Railroad Y. M. C. A. Building in New York.

The Railroad Branch of the Young Men's Christian Association of the City of New York will open a new building at 309 Park avenue on the evening of June 4. Addresses are expected from prominent men and there will be an informal reception from 7:30 to 8:15 p. m., to be followed with the exercises of the evening.

Car Surpluses and Shortages.

The current bulletin of the American Railway Association giving a statement of car surpluses and shortages shows a larger surplus than for any date since 1909, the number on May 15, being 239,406 cars. The number for the corresponding date in 1913 was 61,269 cars. Similarly the shortage for May 15, 1914, is merely nominal, the number of cars being 764 cars. The shortage for May 15, 1913, was 10,975 cars. These conditions are the most extreme that have existed at any time during the past five years.

The Government to Secure the Vanderbilt Forest.

The national forest reservation commission has just approved the purchase of the Pisgah forest from the estate of the late George W. Vanderbilt, at an average price of five dollars an acre. The tract consists of 86,700 acres, including portions of Transylvania, Henderson, Buncombe and Hayward counties, in North Carolina. It covers the entire eastern slope and portions of the northern and western slopes of the Pisgah range, one of the most prominent of the southern Appalachians. Its forests influence, for the most part, the tributaries of the French Broad river, which unites with the Holstein river at Knoxville, Tenn., to form the Tennessee river. The government purposes to make the reservation a game refuge for the preservation of the fauna of the eastern mountains. It is particularly well suited to this purpose since it is already well stocked with game, including deer, turkey, and pheasant; and in the streams are rainbow trout and brook trout, with which they have been systematically stocked from year to year. On approximately four-fifths of the area there is a timber contract which provides for the moving of certain portions of the

merchantable stand. It is already provided, however, that this removal shall be in accordance with the best forestry practices, so that there is not only no danger of forest destruction but provision is made for a natural restocking which should be an improvement on the present stand. The area contains improvements in the form of buildings, roads, and trails, which will greatly help in the administration of the forest by the government. The forest is considered to be in the finest possible condition, and less than three-tenths of one per cent can be classed as burned-over land. The price is lower than the average paid for all lands which have been acquired heretofore. With this purchase, and with others just approved, the total area approved for purchase under the Weeks law in the eastern mountains is 1,077,000 acres.

Trial Trip of the "Matt H. Shay."

The "Matt H. Shay," the large triplex articulated locomotive constructed by the Baldwin Locomotive Works for the Erie Railroad, recently made a trial trip in actual service over the Baltimore & Ohio R. R. from Baltimore to Philadelphia, with a train of 55 coal cars containing 4012 tons. The engine left Baltimore at 6:10 a. m. and arrived at Philadelphia at 4:30 in the afternoon, making the 90-mile trip in 10 hours and 20 minutes. This engine, described in the Railway Review for May 2, weighs 426½ tons in working order and has a total wheel base of 90 feet. In reality, it constitutes three engines in one, having three sets of driving wheels and cylinders, and a "pony" truck forward and a trailer truck in the rear. The third set of drivers and cylinder are located under the tender, which carries 10,000 gallons of water and 16 tons of coal. After the engine has been tested and accepted it will be delivered to the Erie Railroad for use in pusher service on the grades at Susquehanna, Pa.

New Dining Cars, Southern Pacific Co.

With the recent purchase of six new dining cars, the Southern Pacific Co. claims the distinction of owning and operating more diners than any other railroad in America, and the record probably holds good for the world. The company now owns 105 diners, five more than its nearest rival in America, and forty more than its nearest rival in the United States for the same distinction. The new cars were built by the Pullman Company especially for the Southern Pacific and cost in the neighborhood of \$20,000 each. In addition to these 105 diners, the company now possesses one lunch car, which, when experimented with, proved a marked success; and two cafe cars.

Statistics on Railway Earnings.

Records for the current fiscal year were broken in March, when the total railway mileage of the United States scored the first gain in net operating revenue, compared with the corresponding month of the previous year, reported since the opening of the fiscal period. With a rise of \$1,277,000 in gross business, expenses fell \$1,894,000 behind those of March, 1913, leaving for net an increase of \$3,171,000. The figures apply to the total of more than 253,500 miles of operated railway in the country and are based by the Bureau of Railway News and Statistics on those of the Interstate Commerce Commission, which cover only roads earning more than \$1,000,000 gross, operating 225,636 miles. The improvement is largely accounted for by the fact that March, 1913, saw the beginning of the excessive burdens caused by floods in Ohio and Indiana, which entailed not only a temporary suspension of a large traffic between East and West, thus decreasing gross earnings, but also added heavily to operating expenses, so that it is a greatly depleted net in comparison with which the net for March,

1914, makes its gain. Compared with March two years ago there is a rise in gross business carried of \$11,723,000, but an advance in expenses of \$13,001,000, leaving a net loss of \$1,278,000. Outside operations in March resulted in a deficit of almost half a million dollars, while persistent expansion in taxes, amounting in this one month to an increase of almost \$1,000,000 cut approximately one-third off the gain in net operating revenues, leaving a gain for net income after taxes of \$2,029,000. During the nine months of the fiscal year ended with March it has cost the railroads \$59,184,000 more to do a business \$26,777,000 less than in the corresponding months the year previous, resulting in a loss for net operating revenues of \$85,961,000. A loss of \$3,275,000 in outside operations and a rise of \$9,280,000 in the taxes for the nine months left net income after taxes \$98,516,000 under the nine months' total of the year before. This is a slightly smaller loss than that accumulated to the end of February, due to the later month's gain in net.

Missouri Rate Case Thrown Back on State.

In 1907 the Missouri legislature passed the two-cent fare law and a law fixing freight rates. The railroads were defeated in suits subsequently brought in the state courts to prevent the laws becoming operative and appealed to the United States supreme court, which remanded the suits for trial without prejudice. By an opinion handed down at Kansas City, Mo., on May 25 by Judge A. S. Van Valkenburgh of the United States district court the suits, which John T. Barker, attorney-general, brought against railroads in the state asking a refund of \$24,000,000 for alleged excess fares and freight rates collected during the period of adjudication, are referred back to the state courts for settlement, and the status of these cases becomes the same as when the suits were begun in 1906. Judge Van Valkenburgh held that the questions involved are those which the state must handle, as no diversity of citizenship has been shown.

A Bureau of Station Service.

The N. Y., N. H. & H. R. R. has organized a "bureau of station service," to give assistance to station agents and to

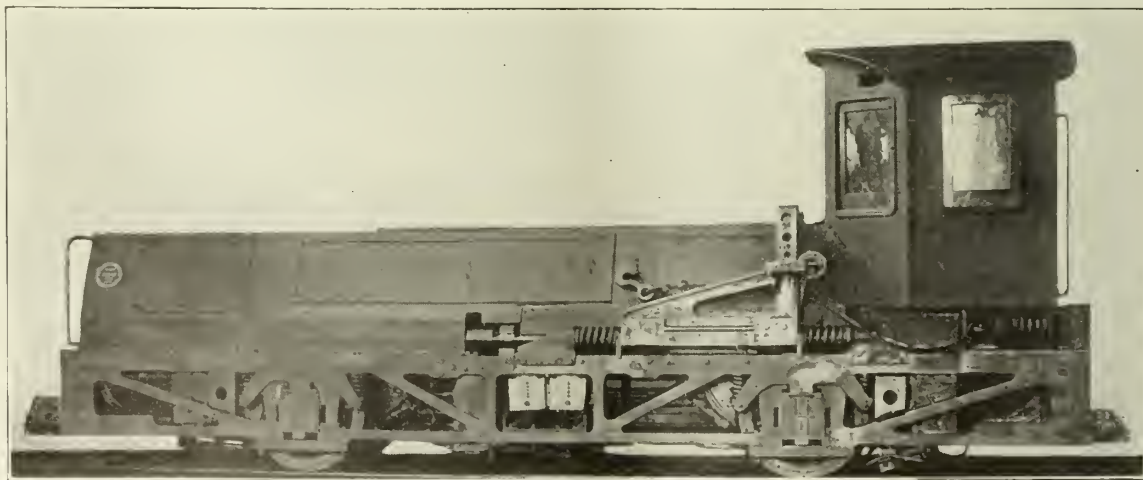
particular territory and to apply the classification requirements impartially and effectively to all traffic. One of the principal aims of the new bureau is to see that all weighing is done properly and that the agents understand the classification of freight and are kept informed of all changes in the rules affecting their own territory. Another object of the bureau will be to reduce the number of claims by increasing the efficiency of the force and also to reduce the amount of freight carried astray. Another aim of the bureau will be to expedite the movement of unloading and loading freight cars.

Postponement of Spotting Charges.

Applications have been made to the Interstate Commerce Commission by the Baltimore & Ohio, the Pennsylvania and the Philadelphia & Reading railroads to postpone from May 27 to July 1 the effective date of their tariffs levying a charge upon shippers for the "spotting" of cars. Other railroads which have filed similar tariffs to become effective on various dates from May 27 to June 6 also are expected to make applications for extension to July 1. These applications will be granted by the commission, as it has been represented that many roads have not been able yet to get their "spotting" tariffs into shape for filing. It also is regarded as probable that the commission after all of the tariffs are filed, will suspend them as a whole, so as to bring up the reasonableness of a "spotting" charge for consideration.

Abolition of Allowances to Industrial Lines.

Reaffirming its decision that the allowances made by trunk lines to industrial railways were substantially rebates on freight rates, and hence unlawful, the Interstate Commerce Commission on May 20, ordered the discontinuance of these allowances, aggregating millions of dollars, and heretofore made to iron and steel industrial railways by trunk line railroads in the territory east of the Mississippi and north of the Ohio and the Potomac rivers. The commission refused to rehear the industrial railways case on the application of companies representing the United States Steel



Electric Switching Locomotive Used by Pennsylvania Lines West at Ore Docks, Cleveland, Ohio.

exercise general supervision of the work at all stations, particularly with reference to the weighing and classification of freight. Instead of having the weight and classification of shipment inspected and checked at common points where railroads meet, the New Haven now undertakes this work at all of its stations. Traveling agents are assigned to each division to study the traffic conditions in that par-

corporation and other iron and steel manufacturers. Recent estimates are to the effect that the amount of the allowances paid to the United States Steel corporation alone aggregate approximately \$9,000,000 a year; and the total of the allowances paid by the trunk lines to all iron and steel industrial roads in the eastern territory was about \$13,000,000 a year. These allowances are said to

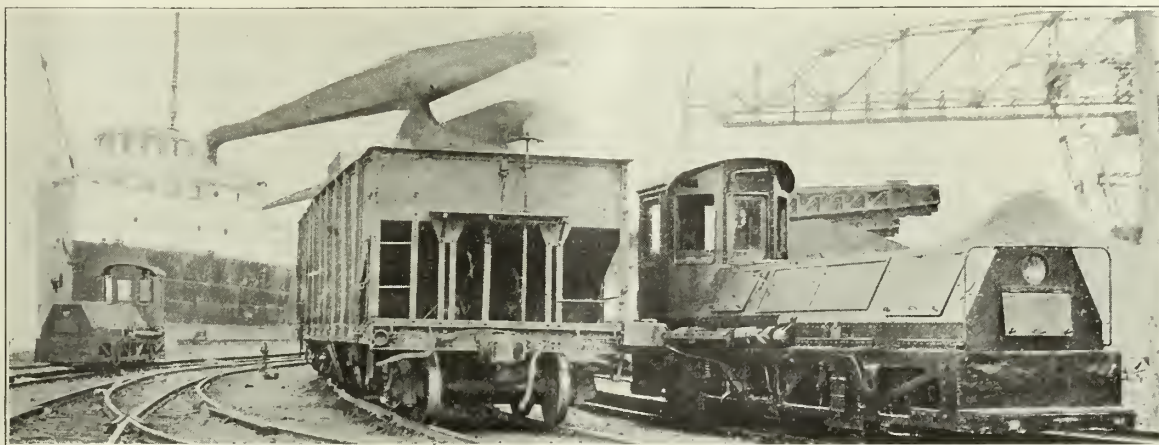
have figured conspicuously in the pending advance rate case, it being contended that if they were eliminated, the railroads would be able to increase their net income by the amounts of the allowances heretofore paid, and thus diminish the urgency for the general freight rate advance to that extent.

Permanent Railway Terminal Commission, City of Chicago.

The railway terminals committee of the Chicago city

graph operators having to do with the dispatching trains, for more than eight hours a day. The federal law applying to men performing the same work places the maximum hours of work per day at nine. The Erie Railroad contended that the federal law was exclusive and the Supreme Court has upheld the railroad in this stand.

The Oklahoma reciprocal demurrage law has been annulled as unconstitutional by the United States Supreme



Novel Type Electric Switching Locomotive Pushing Car by Means of Side Arm.

council, recently announced the personnel of the permanent railway terminal commission which, according to present plans, will hereafter pass on all terminal matters and make a complete survey of the electrification proposition. Those named on the commission are: John F. Wallace, who acted for the city in recent adjustment of the Pennsylvania R. R. terminal matter; Bion J. Arnold and Walter L. Fisher of the citizens' terminal plan commission, E. H. Bennett of the Chicago plan commission, Alderman Geiger, L. E. McGann, commissioner of public works, and William H. Sexton, corporation counsel. The citizens' committee and the plan commission are to pay the salaries of their respective representatives.

Adverse Decision in Mail Claims Case.

In a test case decided before the United States court of claims on May 18, the contentions of the 720 railroads, whose aggregate claims against the post office department for arrearages for carrying mail now amount to \$31,000,000, were denied. In rendering his opinion, Chief Justice Campbell reversed a former ruling and held that the present method of weighing mail to fix compensation for transportation is legal and proper. Prior to 1907, the post office department, in weighing mail, got the average daily weight by weighing for a period of 105 days and dividing the total by ninety, the number of days exclusive of Sundays. Since 1907 the department has recognized Sunday as a working day and has made the divisor 100. By this means the railroads contended they were carrying about one-seventh of the mail without compensation. This contention was upheld by the court of claims during the last administration, but Assistant Attorney-General Thompson secured a rehearing, which resulted in the above named finding. The original finding would have held the Government liable for \$31,000,000 to 720 different roads.

The New York state hours-of-service law was annulled by the United States Supreme Court May 25th, as in conflict with the federal hours-of-labor law. The case in question arose over the application of the federal hours of service law. The New York law prohibits the employment of tele-

Court, on the ground that the Oklahoma court had held it applied to interstate commerce as well as state commerce.

The New York statute requiring railroad corporations to pay employees semi-monthly in cash, was upheld as constitutional by the United States Supreme Court, May 25th.

Novel Type Electric Switching Locomotive.

For handling cars at its Cleveland, Ohio, ore docks, the Pennsylvania Lines West has recently had built three electric locomotives of unusual design. The most novel feature in these locomotives is that they do not run on the same tracks as the cars they handle but on narrow gage (42-inch) parallel tracks. They are not attached to the cars by couplings but each locomotive is equipped with an arm on each side which can be lowered by means of compressed air controlled from the cab and acts as a pusher, as shown in the accompanying illustration. Single cars or trains can easily be handled and cars can be shifted and cut out from trains with a minimum of time and trouble.

The locomotives are of Baldwin-Westinghouse make and are 25 tons in weight. They have bar steel frames, which give great strength but permit ready access to the interior. The motors are of the Westinghouse commutating-pole type. Power is obtained from two rails located inside the rails on which the locomotives operate. These rails are protected by a wood covering.

Scrap Reclamation, Illinois Central R. R.

The efforts of the Illinois Central R. R. to reclaim material received at scrap dock at the Burnside shops resulted, during March, 1914, in returning to service 1,490,383 pounds of material, the scrap value of same being \$27,591.30. The expense of reclamation being added makes a total of \$39,221.79. Deducting this total from the value of the same amount of new material, which is \$62,246.53, shows a net saving of \$23,024.74. Some of the articles reclaimed were: Brake beams, journal brasses, grab irons, arch bars, truck frames, miscellaneous castings, bolts and nuts, road material,

miscellaneous bar iron, turnbuckles, couplers, coupler pockets, oil boxes, oil box lids, signal material, and telegraph material.

Many of the above articles are ready for reclamation without any additional expense, while others are re-worked in some particular. The chief and most profitable of the items reclaimed are journal bearings, which are re-lined, and bar iron, which is re-rolled from odds and ends of wrought iron.

The "reclamation habit" has become quite general on this road, and taking the figures given above as a basis, material valued at \$331,095.60 as scrap would be returned to stock annually at a total expense of \$470,661.48, representing staple material worth \$746,958.36. In this manner stock at Burnside storehouse receives an approximate benefit of \$276,296.88 per year.—F. T. Edwards in Illinois Central Employees' Magazine.

Revision for Grade Reduction Between Nashville and Birmingham, L. & N. R. R.—II

(Continued from page 699.)

The two largest bridges included in the work in Alabama are at the crossings of the Mulberry Fork and the Locust Fork of Warrior river. Both of these streams are crossed at new locations, although the second is much further distant from the old line than is the first. Views of both structures taken during erection, are shown herewith; and drawings illustrating the design of the structures are reproduced in Figs. 13 and 18, respectively.

The Mulberry fork bridge is double-track, and located on a 3-degree curve. It is 635 ft. in length between abutments. It consists of two 70-ft. deck girder approach spans with an intermediate span of 35 ft., at the north end; and a 70-ft. deck girder approach span at the south end; and three deck truss spans of 120, 150 and 120 ft. respectively. The substructure consists

of four steel columns resting upon concrete pedestals, at the north approach, and four mass concrete piers at the other spans. The two central piers are 60 ft. in height, 51 ft. in width, and 19 ft. thick; and the other two are respectively 54 ft. and 28 ft. in height. All rest upon solid rock with the exception of that at the south approach, which has a sub-foundation of boulders. The piers are made hollow, but in spite of this economy in material, each of the larger piers contains 1200 cu. yds. of concrete.

Mulberry fork, under ordinary circumstances is, an insignificant stream running about 150 ft. wide, and at low water the central piers are just at the water's edge. During the winter of 1912, however, while the concrete work was in progress, the water rose several times to such a high as

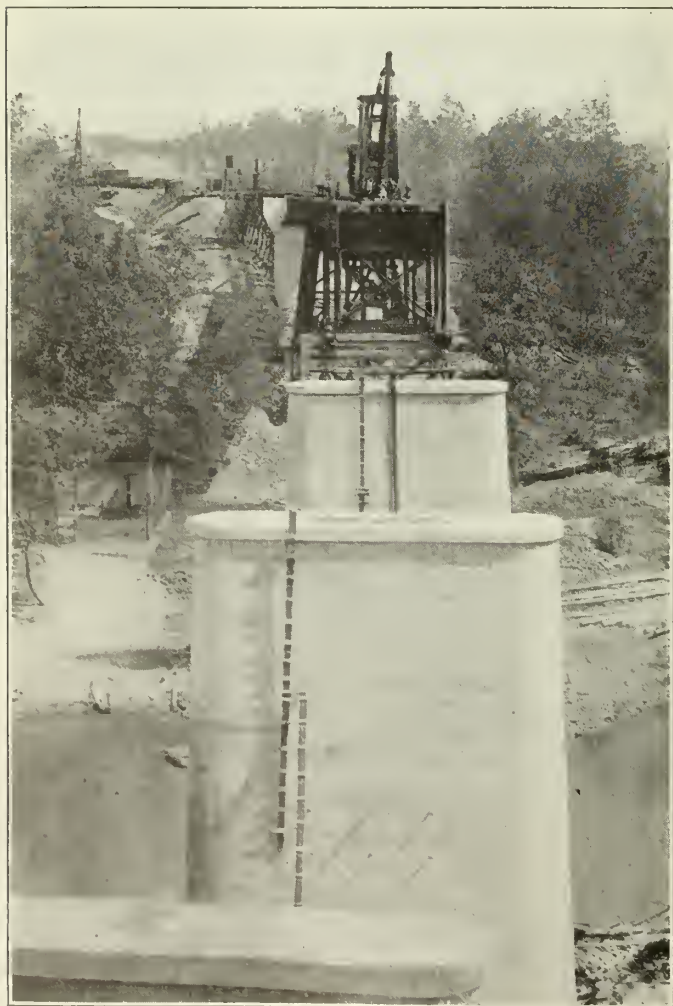


Fig. 13—Bridge Over Mulberry Fork of Warrior River, During Construction, Louisville & Nashville R. R.



Fig. 16—Bridge Over Locust Fork of Warrior River During Construction, Louisville & Nashville R. R.

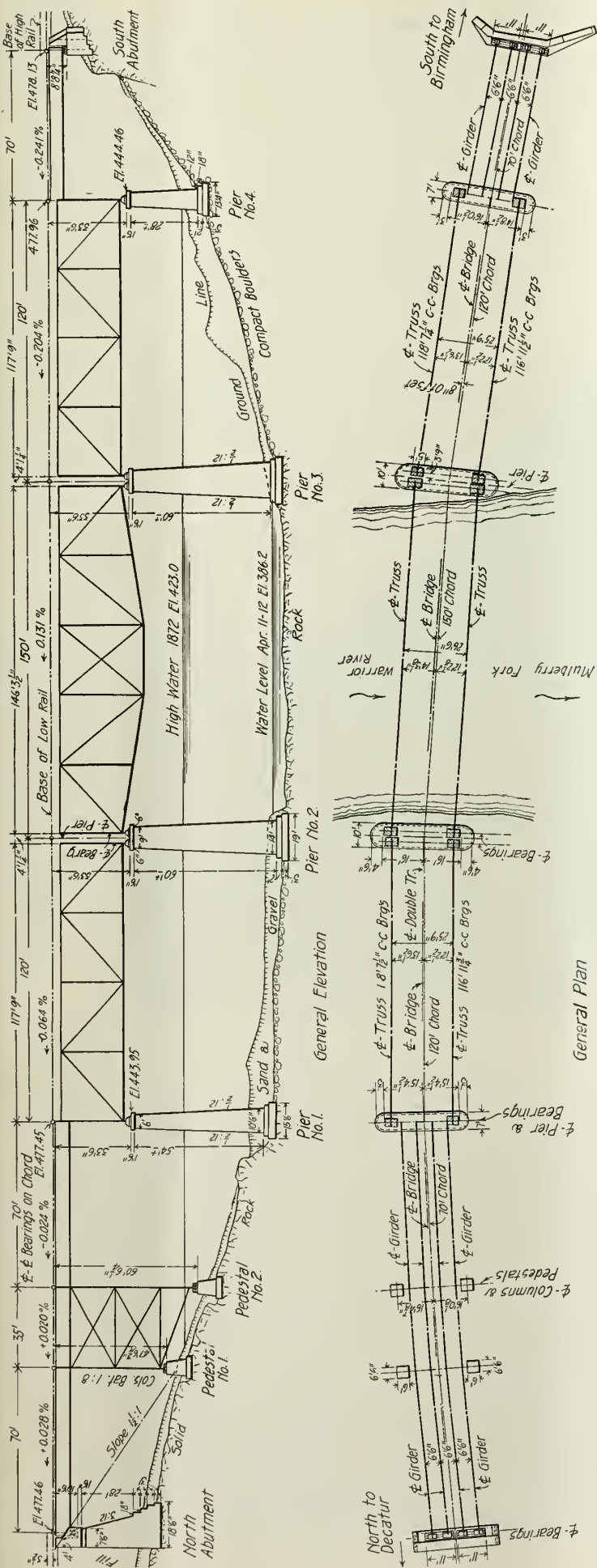


Fig. 15—General Plan and Elevation of Bridge at Mulberry Fork of Warrior River, Louisville & Nashville R. R.

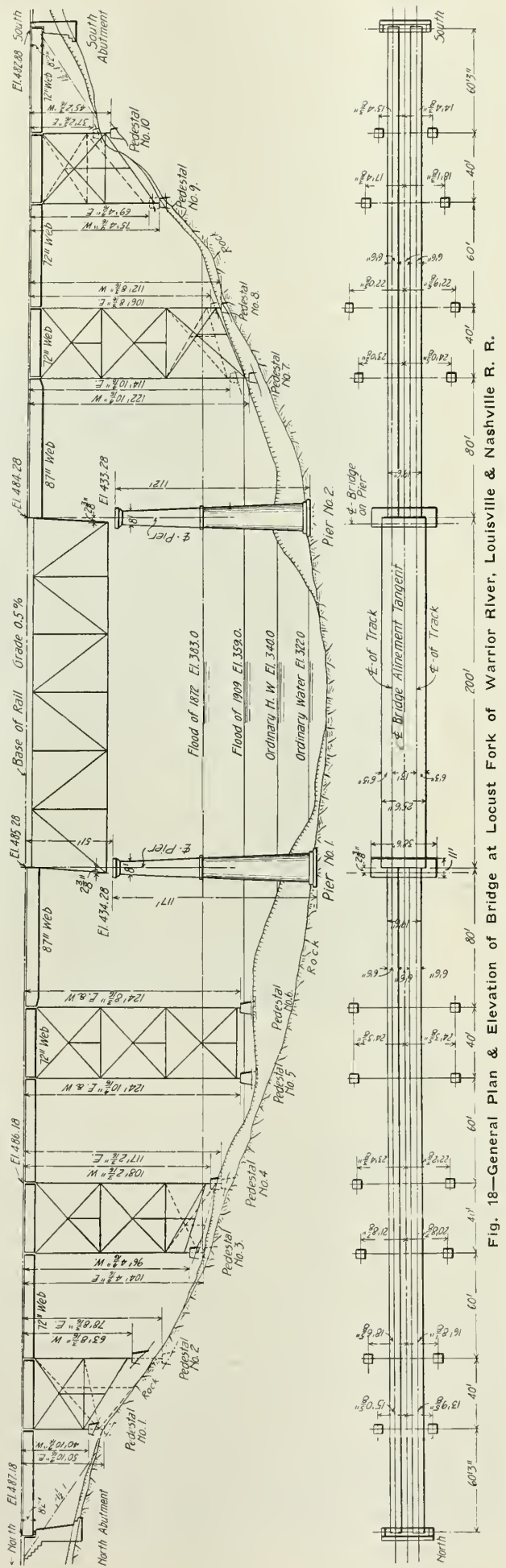


Fig. 18—General Plan & Elevation of Bridge at Locust Fork of Warrior River, Louisville & Nashville R. R.

to carry away and delay the work repeatedly. And a temporary construction bridge over which the material had to be hauled from the nearest point on the railroad, about $\frac{3}{4}$ mile distant, was carried away three times. The National Concrete Construction Co., Louisville, Ky., was the contractor for the concrete work on this bridge, as well as a number of other structures on the line. The steel in both this bridge and that at Locust fork, as well as a number of the smaller structures, was furnished by the Mt. Vernon Bridge Co., the Louisville Bridge & Iron Co., and the American Bridge Co., and erected by the Foster-Creighton-Gould Co., of Nashville, Tenn.

The bridge over the Locust fork of the Warrior river is located on a tangent. It is about 860 ft. between abutments, and consists of a viaduct approach at each end and

from Japan. According to Dr. Haven Metcalf, the government's expert on such diseases, this appears to be of the same type as the chestnut blight which is ravaging the forests of the eastern United States, and it is possible that the new disease would be equally as destructive if it became established in this country.

Status of the Mississippi River Bridge at New Orleans.

Formative arrangements for renewing the project for a bridge over the Mississippi river, at New Orleans, are now in hand. The general public, the municipality of New Orleans, the State of Louisiana, the leading bankers of the city and interested railroad men are now in favor of it. The idea was first brought forward in 1888, and between then



Fig. 14—Bridge Over Mulberry Fork of Warrior River, During Construction, Louisville & Nashville R. R.

a 250-ft. deck truss span over the waterway. The substructure consists of structural towers resting on concrete pedestals, for the approaches; and for the central span, two concrete piers 117 ft. in height, 38 ft. 6 ins. in width and 11 ft. in thickness. These piers are solid from the bottom to a point about 65 ft. above the base, and from that point up, double and surmounted by an arch. The substructure rests upon solid rock throughout.

The concrete work was built by Kreis & Son, Knoxville, Tenn. The location is some three miles from the old main line of the railroad; but it is only one mile from the end of an old coal spur, and this was extended to bring up the material. The mixing plant was located along the track at the bottom of the valley; and the concrete was handled by a 1-yd. bucket traveling on a cableway at about the elevation of the track. This arrangement may be noted in the views given in Figs. 16 and 17, and in the latter the cableway and power plant which operated it are clearly seen.

(To be continued.)

California state inspectors at San Francisco have found a new canker disease on chestnut trees recently imported

and 1897 surveys for a site and general plans for the structure were worked out under the direction of Mr. E. L. Corthell, but were laid aside at the hesitation of the railroads by reason of the financial set-back of those times. The approaching completion of the Panama canal and other influences have now operated to resuscitate the project.

Looking at the situation as it exists today, it is to be noted that general commercial conditions at New Orleans have greatly improved during recent years. Ocean and rail commerce have greatly increased since 1894 and 1901, in which years Mr. Corthell made estimates of traffic that might be expected over the proposed bridge.

A most important improvement has been made in methods of handling commerce of all kinds. The municipality and the state of Louisiana working in harmony have made the port of New Orleans one of the best in the United States and it is "noteworthy for a high degree of public ownership, control, efficiency and equipment," as reported by Hon. Herbert Knox Smith, late commissioner of corporations, Department of Commerce and Labor, in a report on "Transportation by Water in the United States," when he had occasion to make a personal investigation in 1910. The

Daily Consular and Trade Report of March 19, 1914, gives information of importance regarding additional facilities to cost \$3,000,000, which had just been financed in New York for building and equipping six reinforced concrete warehouses each 600 ft. long, 100 ft. wide and 8 stories high, equipped with the mechanical devices for the economical handling of cotton, together with a loading wharf and shed along the entire water front of the property, 3000 ft. long covering 70 acres. This plant can take care of 1,000,000 bales of cotton annually.

To return to the original project, which first came forward in definite shape in 1888, when a local concern, the Southern Bridge and Railway Co. was organized fully empowered by the board to do all that was necessary to obtain a charter from congress, and the approval of the plans by the secretary of war. After this was done, the interest behind the company being the Southern Pacific Co., a railroad board was formed for the active work.

Exhaustive surveys were made during the years 1889-1893, investigations were conducted to ascertain the changes, growth and extent of commerce—ocean, river and rail—and particularly the extent of traffic crossing the river, freight and passenger, and loaded and empty cars, east and west; also investigations into methods and rates at six of the principal river bridges of the Mississippi river and its tributaries.

During this period a historical chart from records was made which showed that the only point on the river where the bed and banks had not undergone important changes was about $4\frac{1}{2}$ miles above the city, and there no change had occurred in the memory of man. The bridge was located at this straight reach of the river and its approaches connected with the two railroads on the west, the two on the east. The line of the bridge furnished the shortest distance to the center of the city, due to the peculiar course of the river at the "Crescent" city. The bridge line was definitely located by base lines and triangulation and the field notes and triangulation chart with all references are still preserved and from these the bridge could be relocated in a few hours.

Very careful and satisfactory wash borings were made to ascertain the material in the bed of the river to a depth of 209 ft. below low water. The river is 100 ft. deep at the west main cantilever pier, and 85 ft. deep at the east main

pier, these piers being 1070 ft. apart, center to center. Below these depths the material is a clean gray sand, growing coarser as the depth increases, being quite coarse and somewhat sharp at 209 ft. The two main piers were to be sunk to a depth of 170 ft. below low water, where they would rest on coarse gray sand and the river bed, protected from erosion by willow mattresses, as was done and is now being done at the old and new Memphis bridges.

The conditions of the act of congress were that the length of the main channel span shall be at least 1000 ft., measured in the clear at low water. The lower chord of the superstructure shall be horizontal and the lowest point of the same not less than 85 ft. above extreme high water. The range between high and low water is about 20 ft.

The plans, made according to these requirements, were submitted to and approved by the secretary of war. The detail plans of the substructure, superstructure and approaches were worked out with great care, even to the working details of the caissons, masonry, brick piers and creosoted trestle for the approaches, and many months were spent on the main superstructure. The total length of the steel structure planned is over two miles, total length of main bridge 2280 ft., and its maximum height from foundation to top of towers over the main piers, 450 ft. The width between centres of trusses is 40 ft. throughout the main bridge.

The specifications for obtaining propositions to build the bridge were in full detail and covered 40 pages, and quantities and complete conditions were stated for the benefit of the companies bidding on the work. The lowest bidder was the Phoenix Bridge Company of Philadelphia, associated with Messrs. SooySmith & Co. for the substructure. A provision contract was entered into with the Phoenix Bridge Co., or rather a promise of a contract when the project should be ready for construction. The entire cost of the work, covering the $6\frac{1}{2}$ miles between the railroads and on the west and east, amounted to about \$6,000,000, including not only all the level superstructures and masonry of all kinds, but embankments, connections, etc.

The investigations of traffic and rates showed that a reasonable estimate in 1896, covering over 200,000 loaded cars and 255,000 passengers, would give gross earnings of \$1,135,300, and with operating expenses at 40 per cent, \$681,180 of net earnings of 5 per cent on \$13,623,600.

The normal rate of increase would make the total and



Fig. 17—Bridge Over Locust Fork of Warrior River, During Construction, Louisville & Nashville R. R.

empty cars in 1906 (when a statement was made to the late Chas. M. Hays, then president of the Southern Pacific), 500,000, and at the present time at least 600,000 that would use the bridge if now built.

As before stated, the early opening of the Panama canal is one of the principal influences in again bringing forward the project at this time by the municipal and state interests. New Orleans expects reasonably a large increase in its commerce and great and increasing demand upon its commercial facilities of all kinds. Its present project of cotton warehouse construction is a reflex of this expectation. The bridge will not be used entirely for railway traffic, as originally contemplated, but for electric, vehicular and pedestrian traffic, which will require two levels for traffic in place of the one railroad level of the plans made in 1893-4. This will require some modification in the superstructure and approaches, but it is yet too early to go into the details of these modifications.

Mr. Corthell states that several alternative designs have been worked out for the main bridge: a "modified cantilever" plan, with some improvements over the previously approved design; a bascule plan designed by Mr. Waddell, and a drawbridge by the Phoenix Bridge Co. The two latter designs were made to avoid the necessity for a high bridge, the track of which would be nearly 100 ft. above the lowlands on each side of the river. The drawbridge would have two 1000-ft. draws, practically opening up the whole river, and a center opening, required by the act of Congress, of 1000 ft. The details of this novel structure were worked out completely, including the machinery for operating the draws, which could be opened or shut in four minutes.

The charter from Congress has expired by limitation. It was once extended, in December, 1894, as follows: "Amended so as to extend the time for the commencement of the construction of said bridge to three years and its completion to six years from the approval of this act."

A central clearing-house to handle all revenue way bills and all other railway and steamship documents covering freight shipments is under consideration in New York city by accountants and officials of trunk-line railroads and steamship lines. The proposed clearing-house would be established in New York or in Buffalo, and would be maintained at the joint expense of the roads and the steamship lines.

American Railway Association Spring Meeting.

A brief account of the meeting in New York was given last week. The following is a fuller report. The action looking to standardizing freight equipment is of especial interest; as well as the names of the committee of presidents which is to study the subject. The proposed elimination from interchange of cars unsafe from general worn out conditions or damage in wrecks is a step in the right direction. Progress was reported in safe transportation of explosives.

The following is an official summary of the proceedings of the American Railway Association at the meeting at Hotel Baltimore, New York, May 20th.

Certain changes in the specification for carbon steel rails, proposed by the committee on maintenance, were approved. The committee also reported that it had arranged to provide for an additional card of test letters, making a total of three to be used in testing eye sight. Further report was made that there is no general demand for a change in the present standard dimensions of box cars and therefore no recommendation was made.

Resolutions reaffirming present standard inside dimensions, except for special equipment like automobile cars, and requesting the Master Car Builders' Association to design and adopt a standard frame for closed cars, were ordered to a vote by let-

ter ballot. E. D. Bronner, general manager of the Michigan Central, was elected a member of the committee.

The joint committee on automatic trainstops presented suggestions for new rules of installation. Adjustments for automatic train control were presented and approved by the association.

Upon recommendation of the executive committee a special committee of seven executives will, assisted by the committee on maintenance, take up the subject of standard freight equipment, with a view to greater economy in the maintenance of equipment. The committee consists of President E. P. Ripley, of the Santa Fe; Fairfax Harrison, of the Southern; Samuel Read of the Pennsylvania; A. H. Smith, of the New York Central; Julius Kruttschnitt, of the Southern Pacific; Darius Miller of the Burlington; and Howard Elliott, chairman of the New Haven board.

The executive committee invited the attention of members to conditions affecting uniform standard time, recently developed in Ohio, and to some of the results that will follow if the movement began at Cleveland should spread. Pressure is being brought to bear upon railways in Ohio to change from central to eastern time, both for time tables and for their operating departments. The association has a peculiar interest in the proposition, as it was through its forebears that the reform in time-keeping was brought about in 1883.

Upon the recommendation of the executive committee the following special committee of general managers was appointed to consider time changes that may be suggested and present a complete report upon the subject to the association at its November meeting. C. W. Galloway, Baltimore & Ohio; H. A. Worcester, Big Four; D. C. Moon, Lake Shore; A. W. Johnston, Nickel Plate; A. J. Stone, Erie; M. C. Connors, Hocking Valley; and H. W. McMaster, Wheeling & Lake Erie.

The committee on relations between railroads reported rules agreed upon with the National Industrial League, for the weighing and reweighing of carload freight. These were approved.

On the recommendation of the committee on weighing, a note was added to car service rule eleven providing that the marked weight shall be the multiple of 100 pounds, nearest the scale weight, except that when such weight indicated an even 50 pounds the lower multiple shall be used.

On the recommendation of the committee on freight handling a resolution was adopted requesting the Master Car Builders' Association to so reframe its rules of interchange as to provide that cars unsafe to load, on account of general worn-out condition or due to wreck or accident, shall not be offered in interchange.

The committee on the safe transportation of explosives and other dangerous articles reported that it had attended a hearing at Washington before the Interstate Commerce Commission, to consider proposed amendments to the regulations for shipments by freight and express and to shipping container specifications. Much of the advice given by the railroad committee the commission took under consideration. It is anticipated that within a few weeks an order will be issued promulgating revised regulations and specifications.

The committee also called attention to the report of the chief inspector of the bureau of explosives and especially to that portion of the report showing that in the transportation and storage of explosives on railway property during the year 1913, no life was lost and only four slight personal injuries occurred. The total property loss amounted only to \$22,048.

The committee on electrical working reported that it has under consideration the question of third rail working conductor clearances, clearances for overhead working conductors and overhead crossings for power and other wires.

The committee on nominations reported that the vacancy caused by the death of J. C. Stuart has been filled by the election of C. L. Bardo, general manager of the New Haven, and that Benjamin McKen has been elected chairman.

H. U. Mudge was elected president of the association for the ensuing two years; R. H. Aishtom, first vice-president; and H. E. Bryan and George L. Peck members of the executive committee.

The following roads were elected members of the committee on transportation. Chesapeake & Ohio, Burlington and Illinois Central.

The following were elected members of the committee on maintenance. Baltimore & Ohio, Erie and Michigan Central.

The following roads were made members of the committee on relations between railroads. Chicago & Eastern Illinois, Grand Trunk and Pennsylvania.

It was decided to hold the next regular session in Chicago, on November 18.

Milwaukee Avenue and Desplaines Street Viaducts, in Chicago.—I

By J. H. PRIOR.*

Rebuilding of viaduct carrying two important thoroughfares over the tracks of three different railroads, in Chicago. Reinforced concrete construction of interesting design, with girders of the same material 55 to 57 ft. long.

Milwaukee avenue is one of the fourteen farm roads, shown in Fig. 1, which radiated from the early village of Chicago. Half a century ago it was known as the "Milwaukee and Chicago Plank Road," and was one of the principal highways entering the city. It has retained its importance as a highway, and, at present, probably 30,000 people pass daily in and out of the business district of Chicago on this highway.

The viaducts described in this article carry Milwaukee avenue and Desplaines street over the tracks and team yards of the Chicago, Milwaukee & St. Paul, the Chicago & Northwestern and the Pennsylvania railroads, between Kinzie and Wayman streets. At this point the tracks of these companies are just approaching the central business district of Chicago and occupy a belt 460 ft. wide, as shown in Fig. 2. Milwaukee avenue crosses these tracks in a diagonal direction, intersecting Desplaines street on the north in such a manner as to form a Y-shaped figure, one arm being formed by Milwaukee avenue and the other arm by Desplaines street, making the north end of the viaduct common to both streets. Desplaines street viaduct crosses the tracks at an angle of approximately 90 degrees, and is 524 ft. long. The diagonal direction in which Milwaukee avenue crosses the tracks makes the total length of this viaduct 665 ft.

The old viaducts on both Milwaukee avenue and Desplaines street (the former shown in Fig. 3), were built in 1873. There is no record of the specifications and loading for which they were designed, but during the last few years of their life various parts of the structures were over-stressed more than 100 per cent under traffic. This situation was remedied by the decision to replace these bridges with new structures designed under the city specifications, the loading in which is substantially equivalent to Cooper's "Class A-2" loading for highway bridges. The new structures are both heavier than the original ones, and have widths of roadway and sidewalks shown in cross section in Figs. 4 and 12.

Preliminary estimates showed a reinforced concrete structure to be cheaper than a steel structure with a concrete floor, besides requiring less for maintenance. It was, therefore, decided to build eight reinforced concrete spans on the north end of each structure, with a truss and a plate girder span on the south end of Milwaukee avenue and three plate girder spans on the south end of Desplaines street viaduct, where the spans required were longer than could be made of concrete. The truss span and plate girder spans on the south end, shown in Fig. 5, present no unusual features.

In designing the reinforced concrete spans, it was necessary to meet three rather unusual requirements. The first of these requirements was that the new bridges should carry the heaviest city traffic with a floor depth not much greater than in the old steel structure designed for the light traffic of 40 years ago. It

was not difficult to meet this requirement in the design of the Desplaines street viaduct, as the city consented to a maximum rise of $8\frac{1}{2}$ inches in the street grade. In the Milwaukee avenue viaduct, however, it was necessary to design through girder spans, as the street grade established by the city, together with the headroom which had to be provided over the railway tracks below, limited the floor depth to 4 ft. 1 in. from the top of street car rail to the bottom of the concrete. The outlines of a typical span are shown in Fig. 4. The main through girders, G of Fig. 4, have an average length of 55 ft., with a maximum of 57 ft. 1 in. These are the longest bridge girders

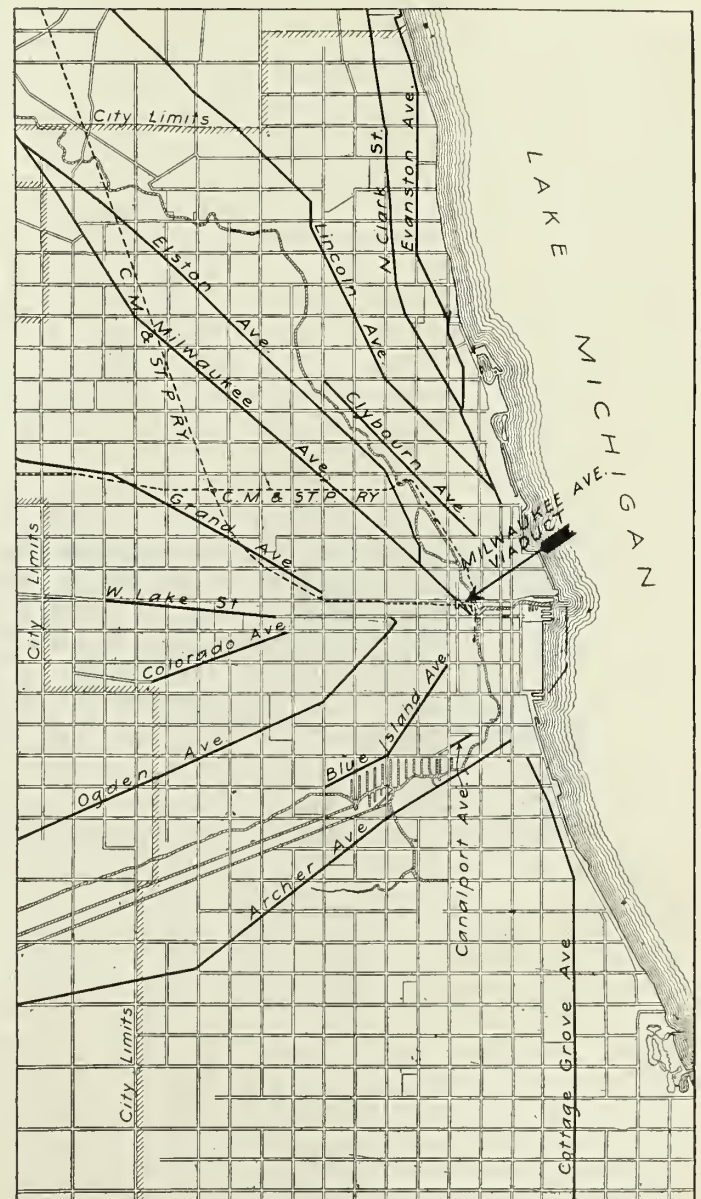


Fig. 1—Principal Highway Connecting Chicago with the Country.

*Assistant chief engineer, Illinois Public Utilities Commission, formerly engineer of design, Chicago, Milwaukee & St. Paul Ry.

of reinforced concrete known to the writer to have been constructed up to this time.

As the main girders are a little more than 42 ft. apart, and the average perpendicular distance between the bents is slightly less than this, the beams b-3 were placed at right angles to the

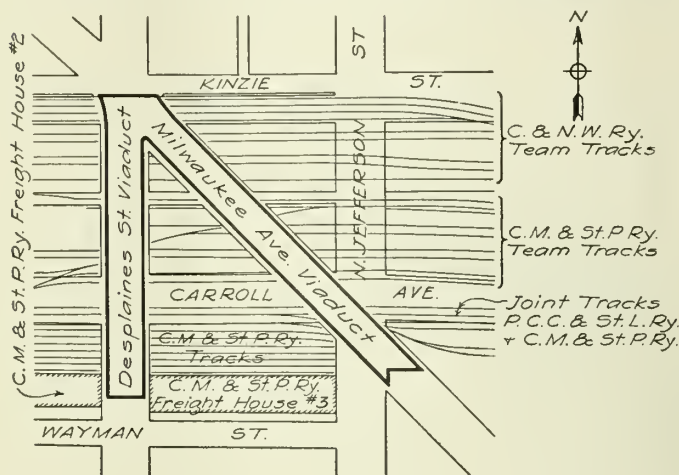


Fig. 2—Map Showing Location of Milwaukee Ave. Vincent and Des Plaines St. Viaduct, Chicago.

bents c instead of at right angles to the girders G, as is more usual in through girder construction.

The beams b-3 afford nearly all the support for the heavily loaded central portion of the roadway under the street railway tracks. The beams b-1 and b-2 are also at right angles to the bent c and carry most of the lighter loaded portion of the roadway. One end of the beams b-1 and b-2 is supported by the bents c and the other end is supported by the main girders G.

This arrangement of the floor system has the additional advantage of reducing the total load to be carried by the girder

inforced with twenty-eight 1 in. bars spaced 3 inches horizontally and 2 inches vertically. They also contain a very considerable amount of vertical reinforcement necessary to provide for web stresses.

The floor on Desplaines street is similar to construction to that of Milwaukee avenue, except that as the bridge crosses the street at approximately 90 deg., there is no occasion for heavy girders, as on Milwaukee avenue.

The concrete spans in both viaducts were arranged in groups of three, as shown in Fig. 7. The ends of the span which rest on the two center bents of each group were made fixed ends,

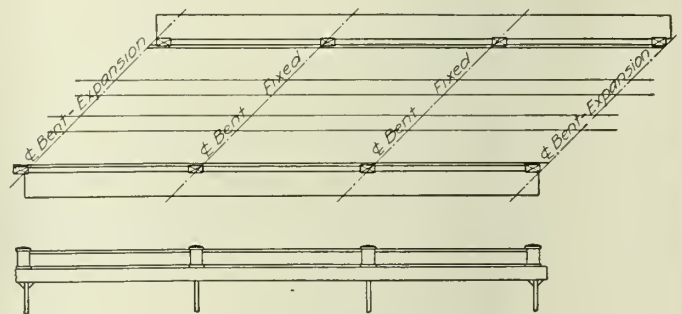


Fig. 7—Viaduct Construction.

and the ends of the spans which rest on the outside bents were made expansion ends. The fixed ends of the beams b-1, 2, 3, Fig. 4, were built as a monolithic with the cross beam c-0, but at the expansion end they rest upon the bent c-2 and are tied together by a diaphragm, expansion being provided by means of a specially designed sliding bearing.

In the Milwaukee avenue viaduct the main girders G at their expansion end are carried on expansion bearings, shown in Fig. 8. The lower half of this bearing consists of two beam grillages, g-1 and g-2, concreted into the bent. The lower beams g-2 of this grillage were made parallel to the bents to assist in distributing the load over the bent and the upper beams g-1



Fig. 3—Old Viaduct on Milwaukee Ave.

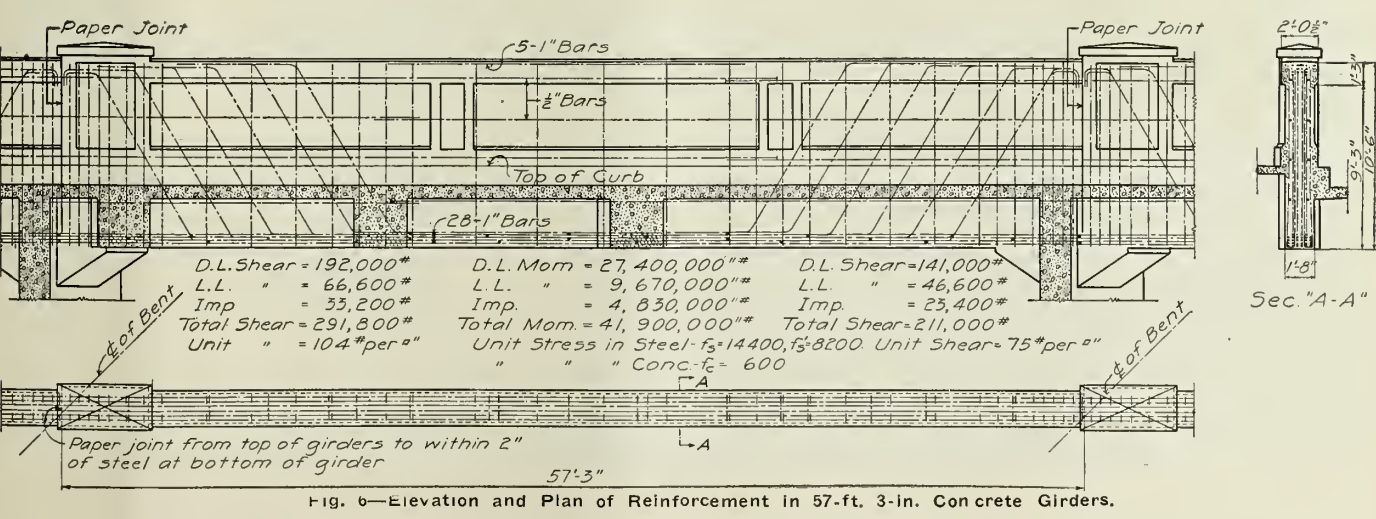
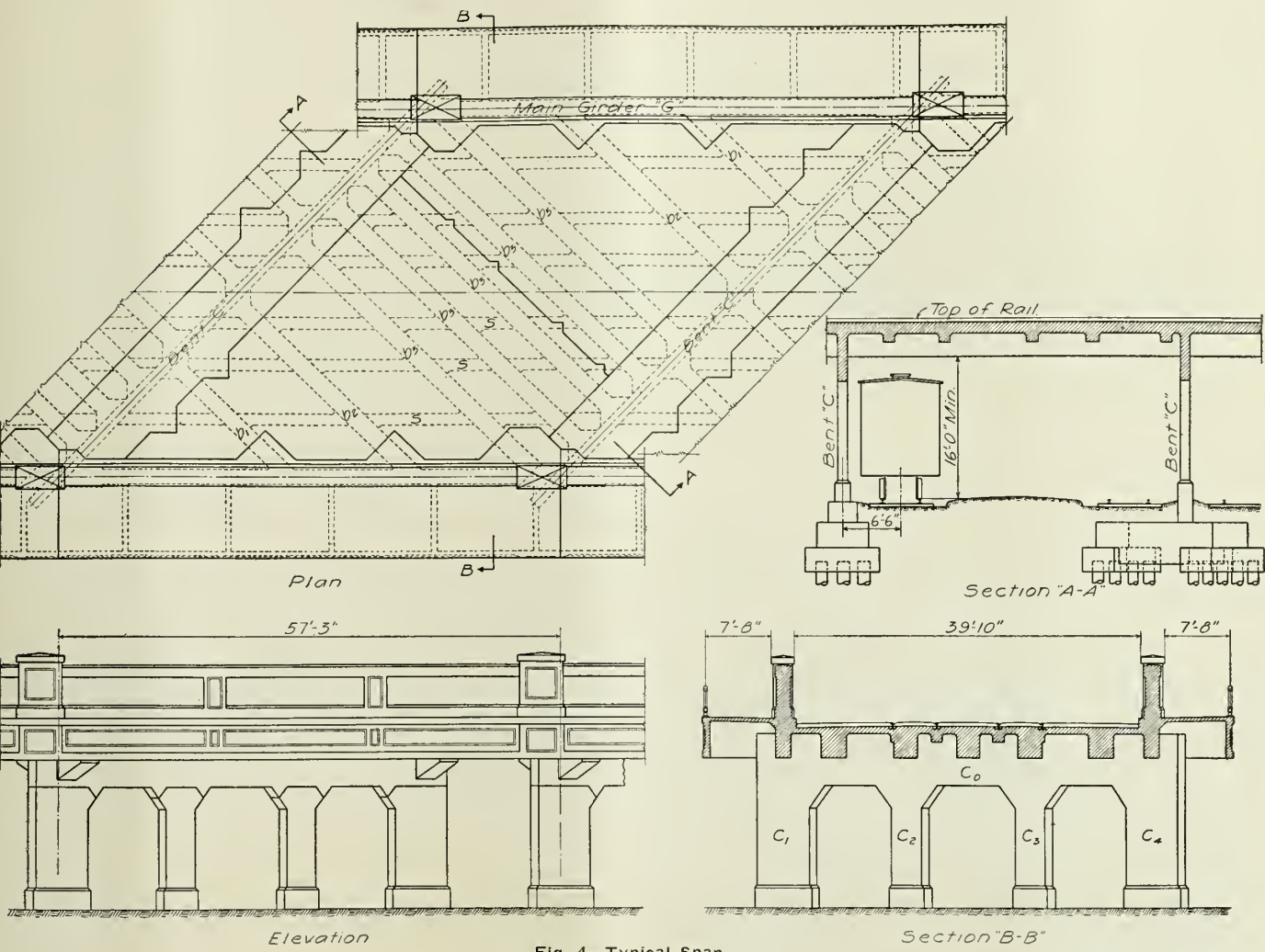
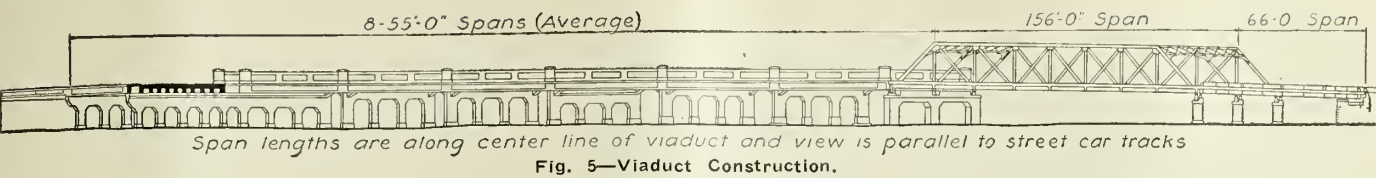
G, thus avoiding the inconveniently large dimensions which would otherwise occur. By arranging the beams in this manner and by the use of a special rail fastening, described in another part of this article, it was possible to make the floor with the required depth of 4 ft. 1 in.

In the opinion of the writer, the design would have been complete and sufficient without the short stringers s (Fig. 4) which extend between the beams b-2, b-3, etc., in a direction parallel to the center line of the viaduct. These stringers were, however, inserted at the direction of the municipal authorities.

The general details of the main girders are shown in Fig. 6. These girders are 10 ft. 6 in. deep and 20 in. wide, and are re-

inforced with twenty-eight 1 in. bars spaced 3 inches horizontally and 2 inches vertically. They also contain a very considerable amount of vertical reinforcement necessary to provide for web stresses.

Bronze plates A and B, the upper surfaces of which were finished as a sliding surface, are fitted into the upper cover plates E of the grillage beams g-1 by means of a lug. Cast steel plates C and D, planed smooth and designed to slide upon the bronze plates A and B, were concreted into the under surface of the main girder G. It is believed that this detail will be a protection against excessive stresses due to expansion and contraction of the concrete structure, and that it will also prevent the formation of cracks around the bearings which are sometimes to be found in concrete structures not provided with adequate ex-



pansion joints. A similar provision was made for expansion under each of the beams b-1, b-2, etc., where they rest on the bents.

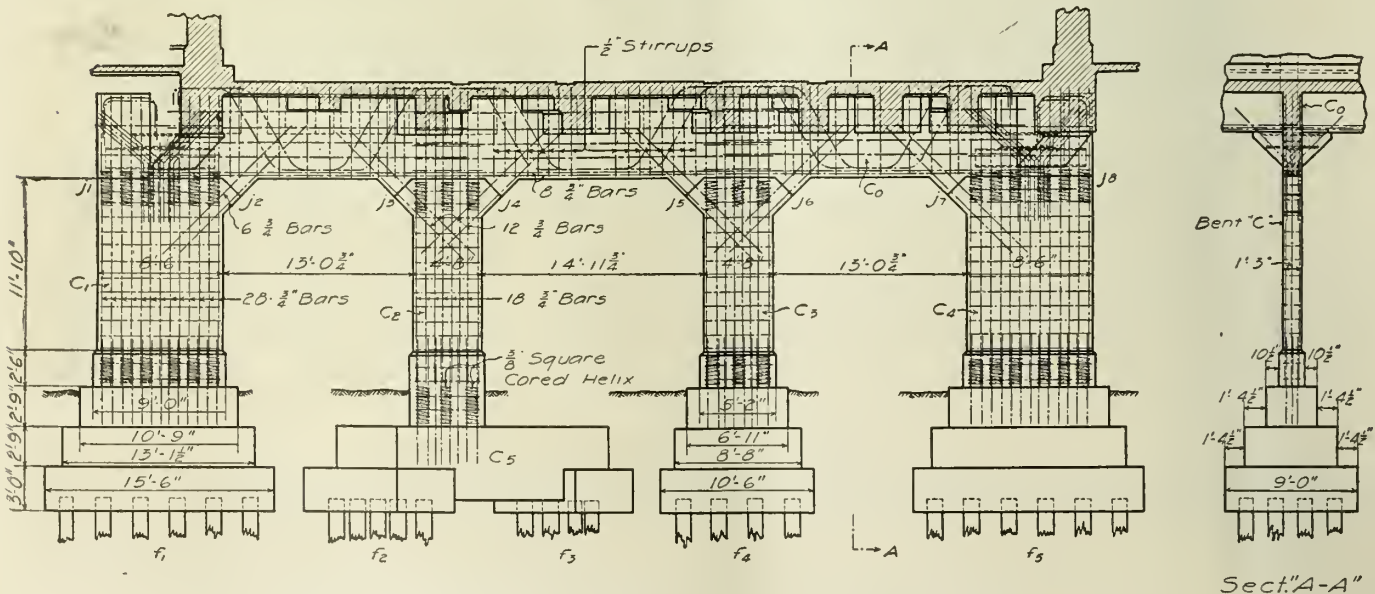
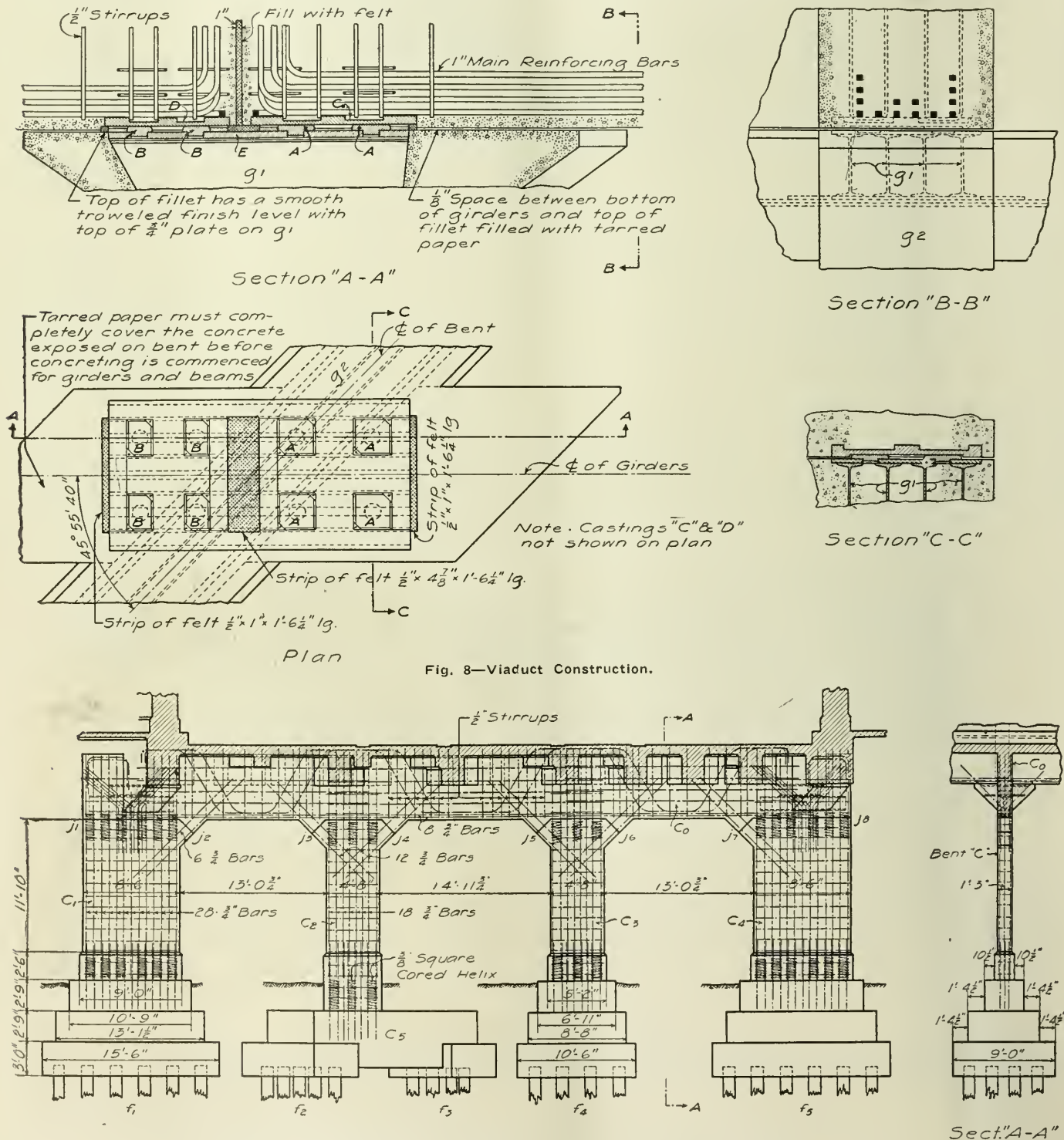
The details of a typical bent are shown in Fig. 4 and Fig. 9. In order to maintain the former clearance for teaming purposes it was necessary to place the bents midway between adjacent tracks, which were arranged in pairs, as shown in Fig. 10. This limited the thickness of the bents to 15 inches, necessitating the use in the columns of 1 per cent of vertical reinforcement with hoops and spirals. A view of the reinforcement of one of the columns is shown in Fig. 11. The columns c-1 (Fig. 9) are supported directly upon pile foundations, but the column c-2 is supported upon the beam c-5 spanning the tunnel of the Illinois Tunnel Co. which runs directly beneath both viaducts about 50

ft. under ground. The ends of the beam c-5 are carried upon the pile foundation f-2, and f-3. The columns c-1, c-2, etc., support the cross beams c-0.

(To be continued.)

Mr. Morgan and Mr. Mellen.

In a statement given out this week by J. P. Morgan, is the following regarding the relation between the late J. Pierpont Morgan, Charles S. Mellen and the New Haven road, which is contradictory to Mr. Mellen's testimony: "Mr. Mellen in substance charges my father with having concealed from him, the president of the company, facts which



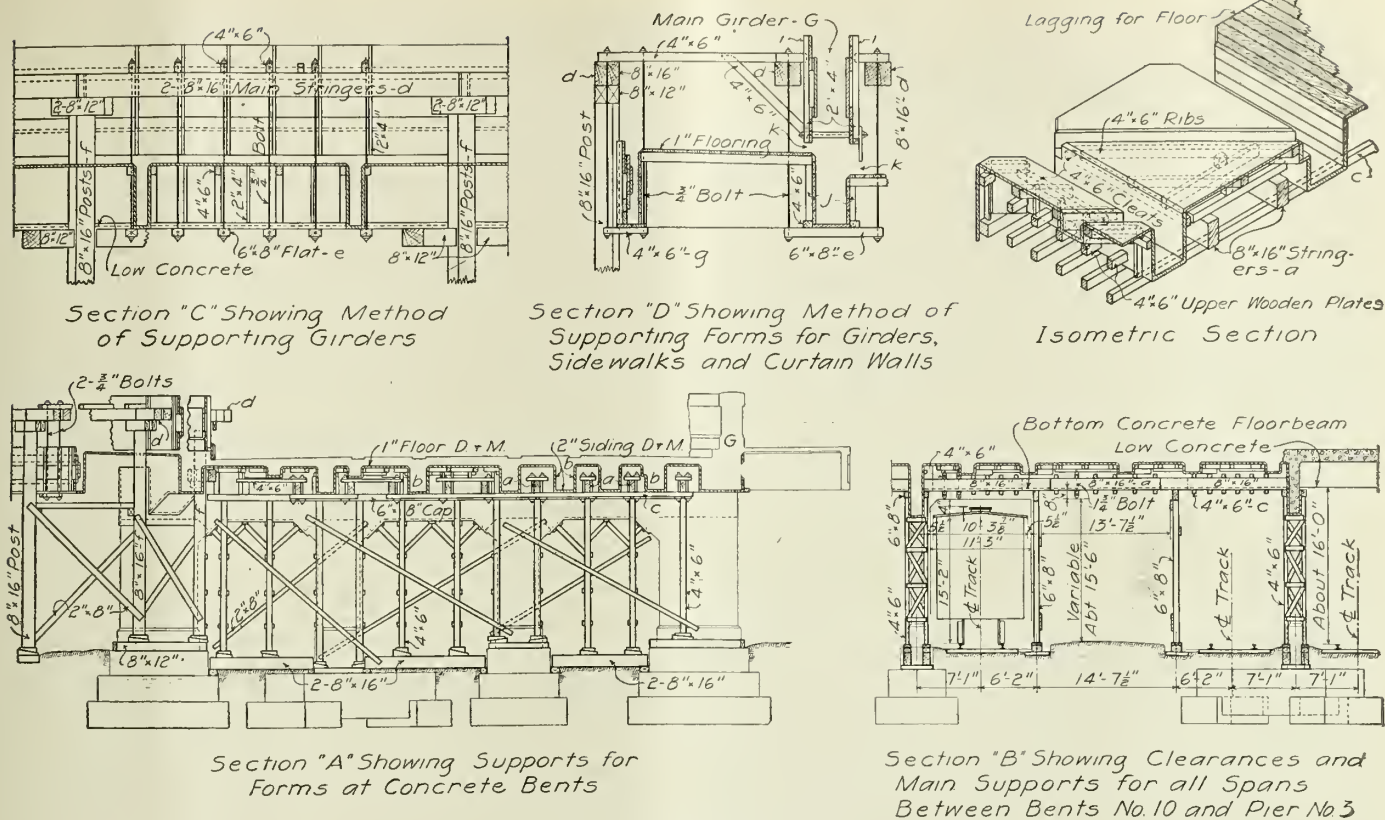


Fig. 10—Viaduct Construction.

the president of the company should have known. Every one who knew my father knows this to be untrue.

"During the last ten years of my father's life he was abroad more than one-third of the time. During the last three years of his life he was abroad one-half of the time. As the world knows, he was actively connected during this whole period with many different affairs. That he would have had the time, even if he had had the desire, to interfere actively in the management of the New Haven railroad is impossible.

"Mr. Mellen is right in describing my father as a forceful man. He is right also in picturing my father's deep interest in New Haven affairs. My father was born in New England, and he believed in the New Haven railroad. He recognized as others have recognized, that with the shifting of the centre of population in this country and the changing economic conditions, the commercial position of New England was threatened, and that a change in this commercial position would, unless an effort were made to counteract it, result in an unfavorable effect upon New England's leading railroad.

He undoubtedly believed that a railroad peculiarly situated as is the New Haven, with a growing passenger traffic at very low rates and with expensive improvements required all along its line, must make every effort to increase its traffic and maintain its position. He believes, more over, that the New Haven and the Boston & Maine, which were not, in his opinion, in any sense competing lines, could be operated to the benefit of New England more advantageously together than apart, and that no harm could come to the public from this amalgamation by reason of the full measure of state and national regulation which the laws afforded.

"I am quite ready to believe, also, that he agreed with Mr. Mellen that the entrance of the Grand Trunk railway into Providence would have involved the unnecessary duplication of facilities for which the New England public sooner or later would have to pay. But the imputation that my father

in any sense took the management of the railroad, or any part of its affairs, out of the hands of the president is untrue."

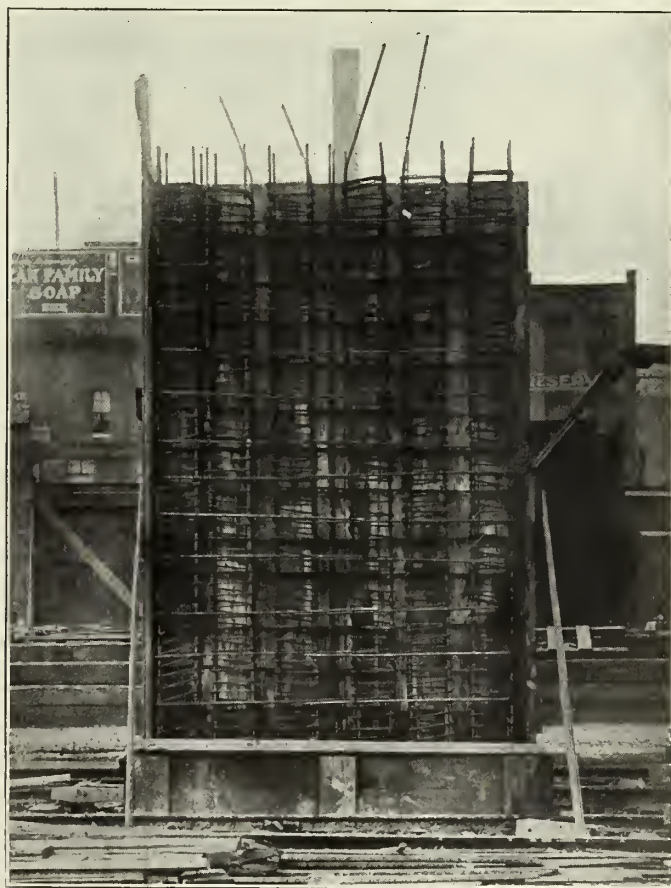


Fig. 11—Spiral Reinforcement, Milwaukee Ave. Viaduct.

RAILWAY REVIEW

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Eastern Office, 30 Church St. (Hudson Terminal), New York
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SATURDAY, MAY 30, 1914.

Senator La Follette and his followers object to the people praying to the government. The New Haven "prayer from the hills," which figured in Mellen's examination, was an impersonal affair. But the honorable Senator from Wisconsin has expended \$12,000 of the government's money to print some 365 pages of prayers from the hills and the valleys, the city and the country, the high lands and the bottom lands; from the rich and from the poor—but especially from the business men of the entire country—that the railways be granted an increase of rates. For this effrontery the sensation seeking politician, denounces everybody concerned. It is not "public opinion," which he and his ilk at Washington want. Prayers from the mills and the farms are impertinences. The only thing which goes is the rant and raving of self-seeking politicians who are trying to cover their ass ears under a lion's skin. Curses against railways are at a premium with this outfit; shut up the prayer shops!

The question of endeavoring to rehabilitate a road while it is in receivership is now undergoing considerable discussion in the case of the Pere Marquette in

the U. S. District Court at Detroit. The credit of the receiver is exhausted and large expenditures are urgently needed for safe operation and for economic reasons. Application is before the court for the issuance of \$12,000,000 of receiver's certificates. Some bondholders and equipment trust holders seek delay and object to having more receivers' certificates issued; and those who brought the foreclosure suit want the road sold and to stop the issuance of receiver's certificates. The receiver cannot go on without some action and the court while desiring to keep the system together in the interest of the public, is disposed in view of the conflicting interests to order the property sold as soon as possible. Receiver Felton said that "the road is on the very verge of discontinuance for lack of funds." Unless the conflicting interests reach an early agreement upon some plan, the court will order sale.

The commendable attitude displayed by some of our leading roads in giving their men occasional opportunities to broaden their knowledge and experience through attendance at the conventions dealing with subjects in which they are interested, is illustrated by the representation of the Baltimore & Ohio and the Chicago & Northwestern railroads at the convention of the International Railway Fuel Association held last week in Chicago. The total railway attendance numbered approximately 200 and of this number, the two roads in question furnished 20 and 30 members respectively, or one-fourth of the total attendance. The Chicago & Northwestern Ry. is especially noteworthy in its inclination to support the work of this and similar conventions, but can scarcely take precedence over the Baltimore & Ohio in this instance, when consideration is taken of the greater average distance that the representatives of the latter road had to travel, and the further fact that their attendance, in the main, was continuous throughout all sessions of the convention.

It is highly complimentary to the association to have its work participated in so generously by the representatives of roads of the standing enjoyed by those named, and there is also no doubt that the situation reflects credit on the judgment of the railway officials authorizing and supporting so large an attendance from among their subordinates. One has to review but briefly the proceedings of the International Railway Fuel Association to understand that such judgment is well founded, since the opportunity afforded for the increased efficiency of the individual through attention to the deliberations of the association is certainly vast.

The Tap Lines Decision.

The tap lines cases decided by the U. S. Supreme Court, on Monday, were four in number; the United States and Interstate Commerce Commission being

appellants from a decision of the Commerce Court, and the Louisiana & Pacific Ry., Woodworth & Louisiana Central Ry., Mansfield Railway & Transportation Co., and Victoria Fisher & Western Rd. Co., being appellees. In each case the railway, called a tap line, and a lumber company are practically under the same management, the railway company having been organized in order to secure rate division from the railways with which it connects. As a result of an extensive inquiry into practices connected with lumber roads (over a hundred in number) the Commission declared one class to be merely plant facilities and as such not entitled to share in thorough rates; others to be plant facilities, but rendering a switching service in connection with the line haul for which specified charges per car could properly be made; and a third class common carriers in fact and entitled to division of thorough rates ranging from one to three cents a hundred pounds.

The Commission held that the rate division, milling in transit privilege, allowances for switching service, etc., theretofore granted to these tap lines by the railway systems, were in fact rebates and ordered them discontinued. The tap lines named above brought suit in the Commerce Court with the result that the Commission was not sustained. That court held that these allowances or charges may be integral parts of thorough routes covered by the line rate on lumber. The tap lines were decided to be common carriers and entitled to be treated as such, both for their proprietary business and that which they transact for others. Appeal was taken on this question of law.

Counsel for the Commission maintained that the giving of these divisions to the tap lines constituted a rebate and that where a tap line, although a common carrier is wholly owned by a proprietary lumber company, a division with the tap line upon the business of the lumber company, constitutes unjust and undue discrimination against competitors in the same field. They held that such tap line may be a common carrier as to part of its business and a mere plant facility as to the proprietary lumber company. The Commerce Court had held that if the tap lines were common carriers as to any part of their traffic, they were for all—including that lumber traffic which is really their own business.

The Supreme Court sustains the Commerce Court and holds that tap lines as common carriers are entitled to share in through and joint rates, **but only** so far as actual service is rendered. The Commission had shown that the divisions and allowances were too large, and that through the milling-in-transit privilege the log haul from the stump to the mills was absorbed by the railway which took the lumber from the tap line. The Supreme Court holds that the Commission may and must regulate these matters so that there shall be no effect of a rebate.

"Congress has not," said Justice Day, "made it illegal for roads thus owned (owned by the persons who also

own the timber and mills which they principally serve) to operate in interstate commerce." He added that even the commodities clause, which attempted to divorce eastern railroads from the coal business, expressly excepted from its operation the lumber industry; and that the common ownership was not shown to be inconsistent with the laws of the states in which the tap lines operate.

That the power of the Commission to prevent discrimination and everything in the nature of rebate is not impaired, is conclusively shown by the following paragraph of the decision: "Because we reach the conclusion that the tap lines involved are common carriers, as well of proprietary as non-proprietary traffic, and as such entitled to participate in joint rates with other common carriers that determination falls far short of deciding, indeed does not at all decide that the division of such joint rates may be made at the will of the carriers involved and without any power of the commission to control. That body has the authority and it is its duty to reach all unlawful discriminatory practices resulting in favoritism and unfair advantages to particular shippers or carriers. It is not only within its power, but the law makes it the duty of the Commission to make orders which shall nullify such practices resulting in rebating or preferences in whatever form they take and in whatever guise they may appear. If the divisions of the joint rates are such as to amount to rebates or discriminations in favor of the owners of the tap lines because of their disproportionate amount in view of the service rendered, it is within the province of the Commission to reduce the amount so that a tap line shall receive just compensation only for what it actually does."

In the argument before the court, counsel for the Commission omitted discussion of switching and spotting service. These cases are somewhat similar to the industrial railway case recently decided by the Commission. But that decision is not affected as far as tracks which are only plant facilities and are not acting as common carriers are concerned; and as to others the Commission has power to say what free service may or may not be granted and what allowances made. Milling in transit privileges ought to be entirely abolished not only on tap lines, but on all railways. They have no justification except in their long use; and the evils connected with them are numerous in addition to the depletion of railway revenue for which they are responsible.

Nullification of the Texas Conductor Law.

We published in our issue of May 16 the particulars of a decision of the United States Supreme Court, rendered May 11, which found to be unconstitutional the Texas law in regard to the employment of conductors on railway trains. This act of the state legislature made it unlawful for any person to serve "as a conductor on a railroad train in this state without

having for two years prior thereto served or worked in the capacity of a brakeman or conductor on a freight train on a line of railroad." Disobedience of the law rendered the transgressor guilty of a misdemeanor and punishable by a fine of \$25 to \$500, each day of such unlawful employment constituting a separate offense. One W. W. Smith, who had served six years as a fireman and fifteen years as an engineer on freight trains, mixed freight and passenger and on passenger trains did, for one day, during July, 1910, serve as conductor on a freight train, whereupon he was arrested, convicted and fined in accordance with this law. On the contention that the statute violated the provisions of the 14th amendment of the national constitution the case was carried up to the United States Supreme Court, where judgment was reversed and the case remanded to the court of criminal appeals of the state of Texas for further proceedings not inconsistent with the opinion of the federal court. Justice Lamar delivered the opinion of the court, and Justice Holmes dissented.

As far as any evidence that appeared in the case showed there was no claim that the plaintiff in error was incompetent to discharge the duties of conductor, but he had transgressed the law of his state, and, of course, laws must be upheld unless or until, by properly established authority, they are shown to be inconsistent with constitutional rights. So far as argument is concerned it would seem like trifling with common sense to propose a discussion of the merits of this law with any person at all acquainted with train operation, but "fool" questions are some times passed up by learned lawyers to high councils, and so the courts are not blamable for having to dispose of matters of this kind. The astonishing thing in the present case, however, is that it had to go to the court of last resort.

When the supreme court of the United States came to look into this case it found a law setting up an exclusive and privileged class of employees in line of promotion for the position of conductor of a train, namely, brakemen on freight trains; and excluding from employment as conductor, the firemen and enginemen of all trains, and even brakemen and conductors of passenger trains. The court found in the statute no requirement that the brakeman of a freight train must prove his fitness to serve as conductor, except for two years' service as freight brakeman, whereas all other employees of railways were prevented from showing that they were competent for such a position. The state, in the exercises of its police power, ostensibly to provide for public safety, had proscribed no tests or examination to show competency for the said position of conductor, but arbitrarily, admitted any applicant who had been a brakeman on a freight train for two years, and just as arbitrarily excluded all others, thereby establishing a class monopoly of the worst type. This it did in the face of the prevailing practice of railroads

which, under the rules, permit an engineman of a freight train to serve as conductor in event the regular conductor is disabled en route; in face of the fact that enginemen are necessarily familiar with all orders sent to conductors of trains, which are made in duplicate, one copy for the conductor and the other for the engineman; in face of the fact that enginemen must be familiar with all of the rules, signals and other things associated with the movement of trains and the safety thereof. In fact, the enginemen participates in about every essential duty of moving a freight train except that of handling the way bills, to ascertain the destination of the cars on the train, a clerical matter readily understood by any one "who can read and write and who has ordinary sense."

After reviewing these and other matters concerned with the handling of trains that are common knowledge to every railroad man the court concluded that "promotion is a matter of private business management, and should be left to the carrier company, which, bound to serve the public, is held to the exercise of diligence in selecting competent men, and responsible in law for the acts of those who fill any of these positions."

The underlying motive for the type of legislation of which this particular law is a good illustration is, of course, quite clear to the reader and need not be dwelt upon. By such a law a certain class of persons would have a "dead cinch" on railroads in time of strikes. The intention here is so evident and clear that the process by which such a scheme became enacted into law hardly deserves to be designated as underhanded. It would be every bit as sensible, and more decent, to enact a law that in event of a strike of train conductors no train should be run until the railway management would meet the demands of the striking employees.

It is nothing new to note the general tendency for widely prevailing classes of people to look upon all service as intended primarily to be a means of livelihood for employees. In politics this idea is almost predominant, quite so in municipal government and very largely so in state and national governments. The employment of politicians and their friends is the main thing and the transaction of public business incidental. In the minds of a certain class the operation of the railroads should be conducted primarily for the benefit of employees and secondarily to serve the public; hence, as in politics the constant effort to multiply jobs and to pull strings on the management. This clique works well with the politician, and so the national government and state legislatures are continually besieged by persons who, under the guise of concern for public safety, are trying to better the hands of railway managements. The law here under discussion is a sample of the character of hundreds that have been passed by state legislatures and

received the signature of governors. Verily there is a people wise in their generation. Where would such tomfoolery end if it were not for our courts?

The Status of Railway Valuation.

The statement here given was prepared by Thomas W. Hulme, general secretary of the Presidents' Conference Committee, concerning the developments in connection with federal valuation during the four months ending April 30, 1914.

Since the issuance on January 29, 1914, of the "Statement of Developments in connection with Federal Valuation in the year 1913," the organization of the government and the railroads has been developed as follows:

The Interstate Commerce Commission has created a division of valuation under the supervision of C. A. Prouty, director, with P. J. Farrell as solicitor. In addition to the engineering board, which was appointed in May, 1913, there has been created an accounting board of five members, one from each district, and a law and land department, consisting of a supervisor of land appraisals and five land attorneys; the land appraisers to be selected from a civil service list, senior and junior class.

In April, the Presidents' Committee appointed a land committee and a committee "on preparation of financial histories and accounts." There have also been selected group engineers in preparation for the study of cost data.

The engineering committee held conferences with the engineering board on Feb. 25th and 26th, and has given further consideration to the subjects enumerated in the review for 1913, and the following matters: Cost data investigations, depreciation, abandoned property and classifications of grading quantities.

The equipment officers have prepared a "tentative draft of instructions in connection with equipment assembly forms."

The accounting committee held a conference with the government accounting board on April 20, which was of a preliminary and informal nature and at which the following matters received general discussion: (1) "Fourth" and "Fifth" sections of valuation act; (2) Inventory of records of the accounting and of other departments to which the accounting forces of the division of valuation will want access; (3) Future additions and betterments; (4) Investment in existing property not capitalized; (5) Investment capitalized and subsequently abandoned but not written off the accounts; (6) Concessions in the way of free and reduced rates to federal, state, county and municipal governments. The committee has since given further consideration to the subjects discussed at the conference with the accounting board and has discussed: (a) The preparation of corporate history charts, and (b) A form for a general inquiry of the carriers as to the extent, description and location of their existing records.

The land committee held its first conference with the government's law and land department on April 21. At this conference, which was also of a preliminary and informal nature, general consideration was given to the requirements of those portions of the act relating to lands. This committee met subsequent to the conference with the government and is giving consideration to the several features in connection with the requirements of the Valuation Act, some of the more important of which are: (1) Inventory of lands owned or used by the carriers that is to be furnished to the commission; (2) The methods that are to be used in assembling and reporting the evidentiary facts embraced in the inventory of lands; (3) leases of portions of railroad lands, right of ways and terminals; (4) in-

terpretations of various requirements of the valuation act relating to land as contained in the "Second," "Third" and "Fifth" sections of the act; (5) considerations paid for land other than money; (6) methods of valuing trackage, tunnel and riparian rights; surface or support rights in connection with mining and oil fields, rights through canyons, water power and water supply rights, etc.; (7) government land grants.

These subjects are receiving further consideration preparatory to a conference with the government's law and land department, which will take place in the early part of June.

Government Map Order: It was originally the intention of the government engineers to require complete maps and profiles showing the lands and improvements owned by the railroad companies, which would then be the basis of the government inventory work. The objections offered on behalf of the railroad companies to the tentative map order of Aug. 1, and the hearings and subsequent discussions, resulted in such a better understanding that the order issued by the Interstate Commerce Commission under date of Feb. 1, was a material modification of the original intention. Subsequent consideration, however, of the terms of that order and the other developments as to methods of co-operation between the government and the railroads has made it clear that the field work upon the part of the railroad companies necessary to complete their maps can be avoided by the government furnishing copies of the field notes which it takes, the railroad companies furnishing in the first instance blue prints of their existing maps, marking approximately thereon the location of structures of more recent construction.

It is probable that the government will issue a circular advising that where existing maps and profiles and other plans are believed by the carriers to be sufficient for the use of the government field parties in assisting them in their examination of the property, the carriers should bring their maps together at one or several points as is convenient, and notify the commission of the place or places where these copies are located and request the commission to examine them as to their sufficiency; and when this notice of readiness has been given to the government the carrier need not feel called upon to take further steps until the examination shall have been made, but that carriers having no maps and profiles, or whose maps or profiles are clearly of such a character as to be insufficient for the above purposes, should at once proceed in the preparation of those called for by the map order, and that in such cases it will be necessary to adhere strictly to the requirements contained in the map order.

The plan of co-operation that has been developed involves:

(1) Field work by the government with a representative of the railroad, known as the pilot, to be present to point out all of the carrier's property that may not be readily visible, and to agree, if possible, on the proper classification to be used.

(2) Copies of the field notes taken by the government parties to be furnished to the carriers, which are to be accepted as correct by both the government and the carrier unless exceptions are taken to any part of them within a period of time (about 30 days), not yet determined upon.

(3) Free transportation to be furnished by the railroads for the government parties, and supplies, while engaged in the inventory work on their property.

(4) Labor to ascertain the depth of the ballast, or classification, to be furnished by and be under the supervision of the railroad representative.

Since Jan. 1, 1914, there have been sent to the carriers:

(1) Tentative instructions for field parties which were prepared by the engineering committee and submitted to

the engineering board to serve as a basis for any final instructions that may be issued.

(2) A booklet containing a list of valuation committees appointed by the railroad companies supporting the Presidents' Conference Committee.

(3) Suggested instructions to field engineers relative to study of "quantities and special features of construction not visible on a field inspection," with a request for suggestions prior to the printing in May.

(4) A set of "cost data" forms, one each for the accounts of engineering; grading; tunnels; steel bridges; frame and pile bridges and trestles; pipe and timber box culverts; stone box and arch culverts; ballast; track-laying and surfacing; right of way fences; cross, switch and bridge ties; rails; track fastenings; frogs and switches; blanket form for buildings and other structures, and a sheet of general instructions covering the use of all of the forms.

The report on "Valuation for Rate Making Purposes" of the special committee of the American Society of Civil Engineers has received much consideration, and statements have been presented to the Society by several of the members of the engineering committee in refutation of some of the fallacious theories contained in that report.

The government has furnished the following list of railroads which they now have under survey and of those which are to be undertaken during this year with advice that all roads not included in this list will be given at least three and, if possible, six months' notice before survey work is started upon their properties.

Now being surveyed: The Norfolk Southern, the Atlanta, Birmingham and Atlantic, the Kansas City Southern, the New Orleans, Texas and Mexico, the Texas Midland and the San Pedro, Los Angeles and Salt Lake.

To be surveyed this year: The Boston and Maine, the Cleveland, Cincinnati, Chicago & St. Louis—Portion of; the Chicago & Eastern Illinois, the Elgin, Joliet & Eastern, the Central of Georgia, the Chicago & Northwestern (South from Peoria), the Great Northern—Branches in North Dakota, and the Western Pacific.

It is possible that the following may also be taken up this year, in which case due notice will be given: The New York, New Haven & Hartford, the Philadelphia, Baltimore & Washington, the Pittsburgh & Lake Erie, the Minneapolis, St. Paul & Sault Ste. Marie—Fordville Branch of; and the Chicago, Milwaukee & St. Paul—Puget Sound portion.

The government will probably reach a decision early in June upon many of the questions as to methods that have been under discussion during the past year, as their work will be more thoroughly organized by the beginning of the next fiscal year (July 1). Territorial meetings will then be held for a general explanation and discussion thereof.

Opening Up Railroad Tracks in Mexico.

By L. F. HAGAN, IN THE WISCONSIN ENGINEER.

At the outbreak of hostilities in Mexico, three years ago, the railroads of the country found themselves in the center of the storm. The first stroke of the rebels was the capture of a passenger train at a way station in the desert south of Juarez, and from that time to the present the fight has raged up and down the various lines, almost without cessation. It was imperative, from the governmental standpoint, that the lines should be kept open, so that troops and supplies might be transported as needed; it was just as imperative from the rebel standpoint, that the lines should be destroyed, in order to hamper the movements of the federal troops. Being well mounted themselves, the rebels could dispense with the railroads quite conveniently. Both sides were determined in their views and the roads suffered severely,

at first in the matter of bridges and trains. Later as the struggle grew more bitter and the depredations of the rebel forces more wanton, water-tanks, coal-sheds and station buildings were wiped out, in most cases, it would seem, merely for the childish pleasure of causing destruction.

A large portion of the bridges in the northern part of the country were wooden trestles and these were the first to go. A small band of mounted men would ride along for miles, setting fire to one trestle after another. The timber was dry and once afire, burned rapidly. Later dynamite was used lavishly for the purpose of destroying the steel and masonry structures. An American "soldier of fortune" was active in this dynamiting. The rapidity and thoroughness with which he did his work commanded admiration; but he earned the most cordial dislike of those of his countrymen upon whom fell the task of repairing the damage he did, and no regrets were expressed when finally he fell in battle.

Occasionally the rebels were able to capture a work train or a train of material. It was customary, upon such occasions, to run the train into a pile bridge and set fire to both. In one instance the train was taken to the top of a steep grade and dropped, car by car, down the grade into a burning trestle at the bottom. These wanton antics reached their climax only recently when a freight train was captured, set afire and run into a long tunnel. The timber lining of the tunnel caught fire causing cave-ins. Into this horrible trap a passenger train was allowed to plunge. About fifty lives were lost, among the dead being several American railroad men.

In the beginning, the railroads made every effort to repair such damage and to keep the road open. Later it became necessary to abandon operation over portions of the system. The brunt of the repair work fell upon the Mexican trackmen, and those much malingered individuals distinguished themselves under the test. Their loyalty was surprising, considering the scanty wages they received and the fact that their political inclinations were usually toward the rebels. The telegraph linemen had what was perhaps the most unpleasant task of all, since they traveled alone, as a rule, and frequently were held up, robbed and threatened by the rebels. One lineman who ignored orders to stop repairs was shot from the pole upon which he was working. Under the circumstances their persistence and success in keeping the lines in working order was remarkable.

For some time the city of Chihuahua was the center of operations. It is the capital of the state of the same name, and the only city of importance between Torreon and Juarez. The rebels were anxious to take the city and establish there the headquarters of their government. Accordingly the railroad bridges and the telegraph lines in all directions were destroyed. Torreon, 294 miles to the south and Juarez 227 miles to the north, were the nearest places of importance. Chihuahua is not in a position to endure long isolation. It is really a big mining town, lacking the usual belt of truck gardens and farms that surround the most cities and supply them with a considerable portion of their food stuffs. The interruption of communication caused much uneasiness in the city and the authorities went so far as to prepare a schedule of prices for foodstuffs and fix the quantity that could be sold to any one person. The situation did not develop into anything serious, however, as communication was restored within about two weeks.

Shut up in the town were the engineer of maintenance of way for the National lines of Mexico and the division superintendent. They had men and rolling stock, but the supply of material was limited. They decided to work toward the south until stopped either by rebels or by lack of material. The general superintendent of the system, accompanied by an escort of several hundred soldiers, started south from Juarez. This outfit was not heard from again for about three weeks.

A third outfit, of which I had charge, began to work toward Chihuahua from the south. This latter outfit included about 140 trackmen and was accompanied by an escort of 200 soldiers of the 29th regiment, which afterward became rather famous as a result of the part it played in the uprising against Madero. It was commanded by Col. Blanquet, the man who later arrested Madero and who is now Minister of War under Huerta.

My impressions of the Colonel are rather sketchy as I was too busy to become very chummy with him. I did entertain him at supper, in the caboose, one evening after obtaining permission from the cook to do so. The cook was the rear brakeman in disguise and naturally he was pretty independent in view of the fact that he didn't think much of the cooking job anyway. He said that, as a rebel sympathizer, he would throw up the job before he would cook for a federal soldier; but he was not proof against the wiles of diplomacy and finally consented to allow us to entertain. The Colonel, a tall, lean man, resembling the pictures of Don Quixote, came bringing a pint bottle of milk as his contribution to the feast. He impressed me as being pretty much of a soldier in spite of his appearance; but he did not seem to be at all blood thirsty. Politics were touched upon in the course of the conversation, and, with Mexican politeness, he avoided any clash of opinion by admitting that conditions throughout the country were in need of reform. He soon got away from that topic and told us of his campaigns in Quintana Roo, boasting that he was the only commander who had not been ambushed in those campaigns. I knocked on wood for him, for I didn't think he knew the charm.

In addition to the soldiers, we were protected by an armoured car mounted with gatling guns. It was an ordinary, wooden box car, lined with sheet steel between which lining and the sides of the car was a layer of sand about 4 ins. thick. The gatling guns were to be fired through the side doors and through portholes cut in the ends. In addition numerous loop holes were provided so that rifles could be used also. The exterior of the car was painted black and white in a checker-board pattern. The tout ensemble was striking. The checker-board design was intended to obscure the portholes, which it did to some extent but it also rendered the car very conspicuous, especially in the country in which we were operating, where, because of a lack of vegetation, it is possible to see great distances. Whether the car would prove valuable in action seems questionable. The only opportunity to try it was when a couple of horsemen appeared suddenly out of a dry run. They saw the car and took a shot or two at it for luck. When the gatling cut loose in reply they fell over backward into the gully in their hurry to escape the rain of bullets. No damage was done on either side, but a few days later we received some of the Mexico City newspapers containing an account of the affair that caused much glee among the ribald train crew. According to the papers the car had received a "baptism of blood and fire" and had repulsed a fierce rebel attack with heavy loss. Perhaps the Colonel colored his official report and then again, perhaps, the reporters who wrote the story used their imaginations. In either event, the story was much improved in the telling.

In most cases our task of repairing the line was a simple one, viewed from the constructional standpoint, our troubles being minor ones that were annoying chiefly because of the delay they caused when haste was so important. There was practically no difficulty from water, since most of the burned structures had spanned what were dry runs most of the year. In most cases the destruction was complete, nothing remaining but the iron bolts, drift pins, etc., scattered about in the ashes. The rails sagging across the openings, were so stretched and twisted that they were of no further use. We made no attempt to rebuild the structures in the usual

way; but contented ourselves with cribbing the openings. This required a great quantity of material, but was more rapid than rebuilding. We were hampered at the outset by the creosoted ties that we had to use and by the lack of bridge stringers. The ties were so slippery that it was difficult to pile them into solid cribs. By sprinkling earth over them this trouble was overcome to some extent. The lack of stringers made it necessary to fill the openings with a solid mass of ties. This took material and, what was worse, it required extra time. Fortunately, we soon began to receive a plentiful supply of untreated ties and stringers. A supply train came to us from the south every day. We never did receive any iron work. Our structures were built like the Temple of Solomon, without the sound of a hammer, until we began to lay the rail.

After reaching a burned bridge, the first task was to clear away the ashes and make sure that there were no hot ambers remaining that might set fire to the crib. For the first few days we were so close behind the destroying parties that we came upon the bridges still smoking. When the ground was cleared and leveled, cribs of ties were built up to the necessary height; on top of these stringers were laid and on the stringers ties and new rails were placed. We found it convenient not to remove the old rails until the cribs were up so that men could work on top of them in handling the rail. It was convenient also to slide the heavy stringers along the old rails.

Laying the new rail usually consumed a considerable portion of the entire time spent at any one place. The expansion and creeping of the rails that remained in the track made it impossible to fill the gap with full-length rails, and at the same time secure a butt joint. We avoided the necessity of using butt joints by laying switch points where we could; when that was not possible we were forced to cut the rail to the proper lengths. As we had no rail saw and no means of repairing track chisels properly, rail cutting was a serious matter and caused much delay. There was also difficulty where our extra rails were not of the same section as the rails in the track.

Our most interesting task was at the bridge over the Conchos river at Ortiz. This bridge has been a pile trestle about 20 ft. high and 2100 ft. long, with a high earth fill at each end. Nothing remained of the structure but a row of blackened piles standing in smoldering ashes with two lines of warped and twisted rails woven in and out among them. At first sight it seemed that we were pretty well tied up. To re-drive the trestle would be a long job; besides we had neither piles nor pile driver. To crib the opening was out of the question. The labor and time necessary would be excessive, even were the material at hand. As a matter of fact there was not enough material available on the whole system to make any impression on such a hole. The rebels, as we were informed later, were satisfied that the burning of the bridge would isolate Chihuahua for two months at least. The solution of the problem proved very simple, however. Although the river at times was "bravo," as the Mexicans would express it, and had swept away a steel bridge of several spans in one of its outbursts, there was, fortunately, not a drop of water running at that time. The bed of the stream was a desert, traversed by two or three gullies where the last few trickles of water had cut depressions below the general level. As rebuilding the structure was out of the question we simply laid track across the bed of the stream. A roadbed was excavated down the side of each fill at a 2½ per cent grade. No surveying instruments were available, so the heights were estimated and the distances were paced in laying out the work. Some care was necessary in laying out the grades, since it would have been embarrassing to get the heavy work train down into the river and not be able to get it out again.

As there was a possibility that the track as we laid it would have to be operated for some time, three small bridges were built in the bed of the stream to take care of small amounts of water that might come down. The location of these were determined after a study of the stream bed to determine the habits of the river at low water.

On the fourth day after reaching the bridge, our track was complete to the far side of the river and we were ready to move ahead. With the engine in the center of the train, we dropped down the grade into the river. Then the rear of the train was uncoupled and the engine pushed the front part of the train up the grade on the other side. It was a breathless moment; but we finally reached the top

to try to drive the men unless their stomachs were full. Accordingly we made use of the stay at Ortiz to organize a commissary department. In a town several miles away, a merchant was discovered who was willing to sell to us on credit, and from him we purchased several hundred dollars' worth of provisions, cooking utensils etc. Our purchases made an imposing array as they came to us by team over the desert. It was necessary to have cooks as well as provisions, so I sent out scouting parties to try and round up some women, but no women would come near the outfit, except the dirty "soldier women", and no one wanted them. For a time it looked as though we would have to go back to the lunches. Then some one proposed that we try to



Electric Locomotive for Heavy Freight Service, Piedmont & Northern Lines.

of the fill and the engine cut off and went back for the rest of the train.

Two days after crossing the big river we met the outfit from Chihuahua, and, together, we cribbed the last opening. It was midnight when we finished, so we pulled back to the nearest station and laid up for the night. A passenger train, the first in two weeks was waiting at the station for the completion of the last bridge. It pulled out immediately and went on to Chihuahua, where it received a hearty welcome.

During the last few days our operations were greatly facilitated by the fact that we were able to maintain telephone connection with the outfit from Chihuahua and also with a station to the south. We had a portable telephone set, and wherever a stop was made, the first act was to hook the pole over the wire and find out what conditions were on either side of us.

At Chihuahua a new outfit was organized and started north in search of the general superintendent who had not been heard from for some time. Two or three days later we found him working steadily southward, but almost out of provisions and material. He had reached a condition in which he was considering the advisability of tearing up track behind him in order to secure material for repairs. After finding him we turned south, abandoning for a time, the attempt to open the line to Juarez.

Providing food for 140 men under the conditions outlined, was not a simple matter. At first we subsisted on lunches put up for us by a Chinaman who managed a restaurant at one of the stations to the south. These lunches consisted chiefly of egg sandwiches, and were conveyed to us on a handcar under the hot sun. That diet soon caused much complaint and little work was accomplished. It was useless

to organize a squad of chefs. It was a doubtful proposition, because cooking is not considered man's work by the peons. We managed, however, to find half a dozen men who knew something about the business, and we put an energetic foreman over the squad. A few privileges were granted them to compensate for the chaffing of the other men. A good deal of fun was made of them, but they stuck to the job and provided three good meals a day. In addition to food, a plentiful supply of cigarets was purchased and doled out from time to time. These were nearly as necessary as the food.

The repairs we made did not last long. The bridges have been destroyed and repaired many times since then, and, even now, the same grim game is still going on.

Nearly 17,000 acres have just been added by act of congress to the Caribou national forest, Idaho. This is one of the first of such additions through congressional action, and is the largest so far made by direct legislation. Those who have followed the national forest movement in this country will recall that most of the forests have been created through presidential proclamation, which set aside, for timber growing or for water protection, certain areas of the public domain. In March, 1907, however, congress passed a law that no further additions should be made to the national forest areas in the states of Colorado, Idaho, Montana, Oregon, Washington, and Wyoming, except through congressional action. Since July, 1909, residents of the city of Montpelier, Idaho, have been petitioning to have this 17,000 acres added to the Caribou national forest, because the area includes the watershed of the stream which furnishes the city's water supply. Not being within a national forest, the tract was given over to unregulated grazing and other usages

which resulted in stream pollution and became a serious menace to health. The citizens of Montpelier, at several times subsequent to their first efforts in 1909, renewed their petition; and the act just passed represents the successful outcome of their efforts.

Six New Electric Locomotives for the Piedmont & Northern Lines.

Description of new electric motive power to be used in heavy freight service on this extensive interurban railway in the Carolinas. Operating on 1500 volts direct current, capable of a continuously sustained tractive effort of 11,200 lbs. and handling trains of 800 to 1000 tons gross weight. The latest development in locomotive design and some distinctive features in the arrangement of auxiliary apparatus within the cab.

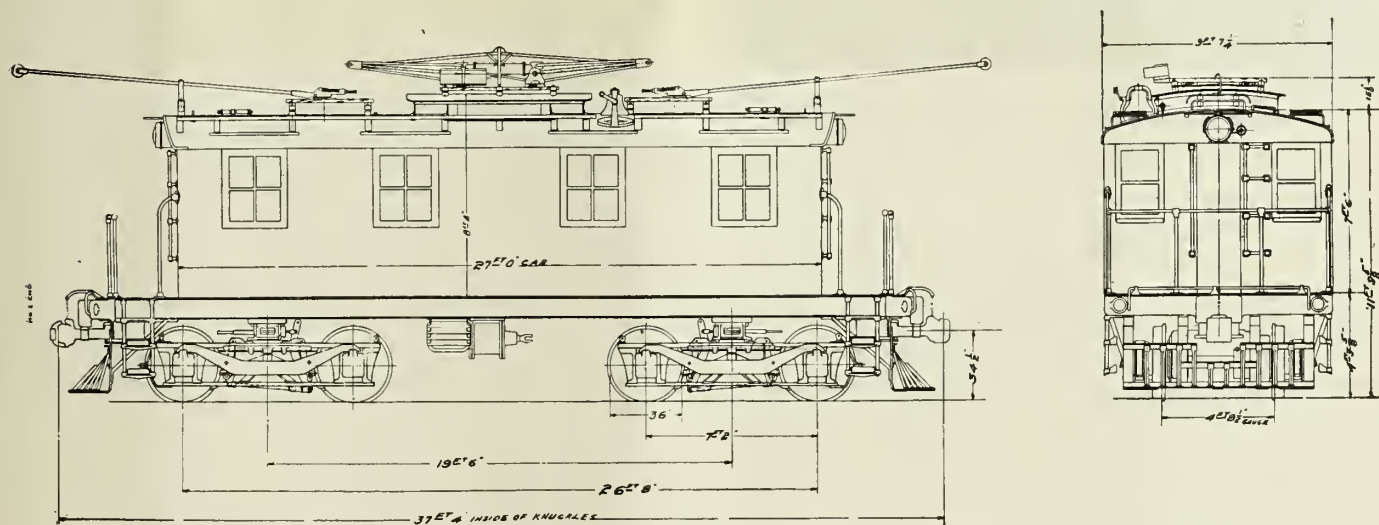
The Piedmont & Northern Lines, Charlotte, N. C., are placing in service on the Greenville, Spartanburg & Anderson division of their system, six new 1500-volt, direct current electric locomotives. These locomotives, which are illustrated herewith, are designed for heavy freight service. They weigh 63½ tons, with all the weight on drivers. At the normal rating of the four GE-212 motors, with which each locomotive is equipped, operated on 1500 volts, two in series, they will develop a tractive effort of 17,500 lbs. and a speed of 21 miles per hour. The locomotives will handle trains of 800 to 1000 tons gross weight.

The Piedmont & Northern Lines comprise two main divisions, which when entirely completed will embrace 280 miles of track for limited and local passenger, express and heavy freight service. One division, operated by the Piedmont Traction Co., extends from Charlotte to King's Moun-

Gastonia. On the southern division of the road there are four substations, one three miles south of Spartanburg, one at Greenville, one at Belton and one at Downs, which is three miles out of Greenwood. The roads have a very heavy freight traffic and transport great quantities of cotton from shipping points to the various mills along the route, and in turn fabric from the mills to connecting stations for distribution to distant markets.

The new locomotives were designed and built by the General Electric Co. and are designated class 404-E-120-4GE212F machines. The cab is of the all-steel box type and extends nearly the whole length of the underframing. Outside platforms of suitable width are left at each end for the switchman to handle the trolley poles and are protected by side and end hand or guard rails. In the interior the cab is open throughout as far as is consistent with the apparatus located therein. While the operating mechanism is grouped in the central section, it is not located in a compartment separate from the engineer's operating cabs. Convenient passageways run along each side and connect with the operating positions in each end. The cab is built up of steel channels and angles and sheet steel plates properly braced and riveted together, and is entered through center doors at each end.

The underframe of the locomotive consists of four 10-in. steel channels extending the entire length of the platform. These channels are tied together by heavy end frame box girder castings and bolster plates, each channel being riveted to the webs of the end frame castings and to the top and bottom bolster plates. The bolsters are built up of 18-in. by 1-in. plates, the top bolsters being carried clear across the platform and riveted to all four longitudinal sills.



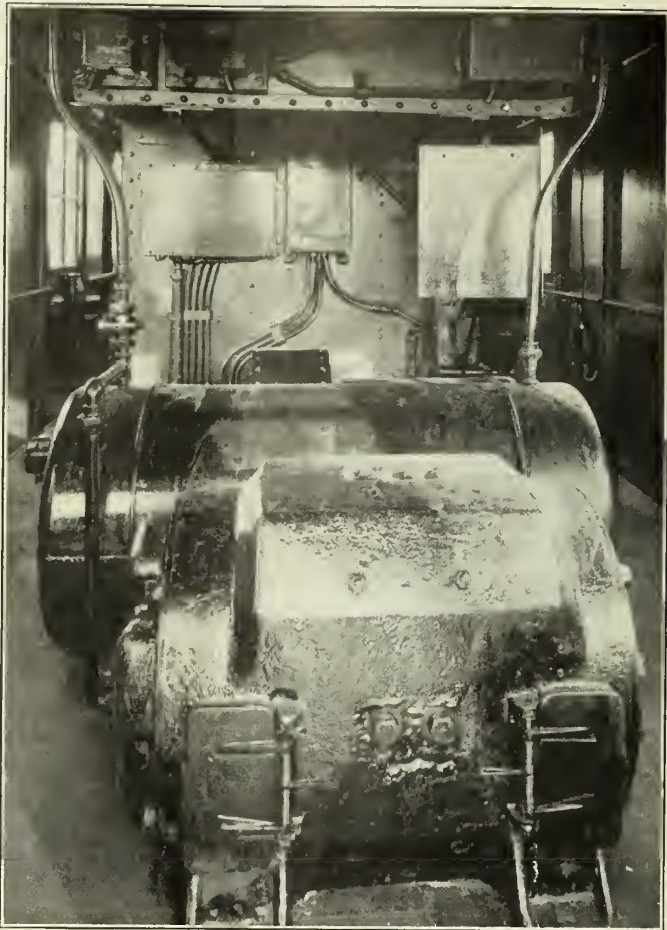
Side and End Elevations, Electric Locomotive for Heavy Freight Service, Piedmont & Northern Lines.

tain, N. C. Twenty-three miles of this road are in operation at the present time between Charlotte and Gastonia, but the remaining 12 miles from Gastonia to King's Mountain are yet to be constructed. The other division, operated by the Greenville, Spartanburg & Anderson Traction Co., extends from Greenwood through Greenville to Spartanburg, S. C., and joins the northern division at King's Mountain. Ninety-five miles of this road are now in operation from Greenwood to Spartanburg, including a 10-mile spur running from Belton to Anderson. The section between Spartanburg and King's Mountain is also yet to be closed, and with the northern gap through to Gastonia leaves about 50 miles of the system yet to be built.

All these lines operate on 1500 volts direct current. Energy is purchased from the Southern Power Co. and is delivered from the transmission lines to two substations for the Piedmont Traction Co., one in Charlotte and the other in

The two center channels are enclosed throughout with steel plates riveted to the under sills and carry the center-pin castings, which are bolted to them. The space between the center sills serves as a reservoir for distributing air from the blowers to the motors. Openings in the floor of this reservoir admit air from it through suitable intake pipes into the back end of each motor.

The drawhead castings are bolted to the center sills, which in turn are riveted to the end frames. The draft gearing consists of M.C.B. No. 3 couplers with 5-in. by 7-in. shank and standard yoke, twin springs and follower plates. The whole platform is floored and braced by heavy steel plates running the width of the locomotive and riveted to the longitudinal sills. In the cab this is covered with the usual wood flooring. Necessary ballast required to bring the locomotive up to its rated weight consists of steel bars running the whole length of the platform, notched over the bolster



Location of Apparatus in No. 1 End, Electric Locomotive for Piedmont & Northern Lines.

plates and bolted to the longitudinal sills. Pilots with switchman's steps are bolted to the end frames and braced to the side sills.

The two four-wheel trucks are a swivel type, designed for heavy freight work, and conform to M.C.B. standards. The side frames are built of heavy rolled bars for top and bottom members with cast steel pedestals. The bolster, or center transom, is bolted rigidly to the side frames, and the entire weight of the truck framing is supported on heavy semi-elliptic springs hung by links to the double side equalizer bars, which in turn rest on the journal boxes. The journal boxes are a standard design with M.C.B. bronze bearings and wedges. The wheels are solid rolled steel, 36-in. diameter, with M.C.B. treads and flanges. The axles are forged open hearth steel, 6-in. diameter between the wheels and with 5½-in. by 10-in. journals. The air brakes are the combined straight and automatic type. The brake shoes are inside hung, and the brake rigging is proportioned for a brake shoe pressure of 85 per cent of the weight on the drivers with 50 lbs. pressure in the brake cylinders.

The motor equipment consists of four GE-212F, 600-1200-volt box frame commutating pole motors, insulated for operation on 1500 volts. Each motor is geared to an axle. All the axles are therefore driving axles. A forged pinion is mounted on each armature shaft and meshes into a corresponding solid steel gear mounted on the axle. The gear ratio is 65 to 18 teeth, making 3.61 gear reduction. The continuous capacity of each motor is 200 amperes under forced ventilation, and 269 amperes at the one-hour rating. For the complete equipment of four motors on a locomotive this is equivalent to a continuously sustained tractive effort of 11,200 lbs. at the rail head.

The GE-212 motor is designed especially for locomotive

service. Through the method of forced ventilation employed, air is circulated over the armature and field coils, over and through the commutator, through longitudinal holes in the armature core, and thence exhausted through openings in the bearing head. A large volume of cool air is thus distributed effectively throughout the motor, which keeps all parts at a uniform temperature and eliminates the possibility of "hot spots."

The control equipment is the well-known Sprague-General Electric type M multiple unit control, arranged to operate the four motors in series and series-parallel connections. The pairs of motors with their respective resistances are all connected in series on the first point of the controller. The resistance is varied through six points and finally short-circuited on the seventh or running point. The pairs of motors are then operated similarly in series-parallel and all resistance is cut out on the twelfth point, which is the full speed running point. This provides control connections with seven steps in series and five steps in series-parallel. The transition between series and series-parallel is effected without opening the motor circuit, and there is no appreciable reduction in tractive effort during the change. This smooth transition between control points permits operating the motors close to the slipping point of the wheels throughout the entire range of acceleration without sudden fluctuations of tractive effort. Two switches are provided for cutting out either pair of motors, so that the locomotive can then be operated with one pair of motors in the usual manner.

One of the new and distinctive features for a locomotive of this type is the convenient manner in which the apparatus is arranged in the central section of the cab so as to afford ready and complete access to all parts for inspection, cleaning, adjustment or repair. The main motor rheostat boxes are mounted in banks in an enclosed sheet steel compartment in the cab center. This compartment extends from the floor to the roof and is accessible through doors opening into the passageways on each side. The floor in the compartment is open and it is surmounted by an open monitor deck. Thus there is a continuous draught of air rushing up through the compartment while the locomotive is running, which affords exceptionally good ventilation. The rheostats are formed of the usual cast iron grids assembled in frames and insulated with mica. This arrangement allows ample rheostat capacity for the locomotive, as there are eighteen resistance units included in the group.

At each end of the rheostat compartment and suspended from the roof of the cab in laterally enclosed steel frames, accessible through lift doors at the sides, are grouped the contactors and reverser. Beneath these are installed on the floor the dynamotor, blower and one of the air reservoirs in one end, and the two air compressors and the other air reservoir in the other end. All mechanism and circuits carrying 1500 volts are thoroughly insulated and protected from accidental contact.

The blower set for ventilating the motors has a capacity of 2000 cu. ft. per minute and is driven by a series-wound motor of the railway type. Air is taken from the exterior through a suction box with side louvres underneath the platform at the center. Current at 600 volts for the operation of the blower, and also the air compressors, the contactors and the lights, is furnished from a two-fifth's tap taken from the dynamotor. The contactors are of the same general design as that employed in the standard 600-volt type M control. The principal modifications are embodied in the greater insulation distances and more effective methods of insulating where the contacts and magnetic blowouts make and break on the 1500-volt circuit.

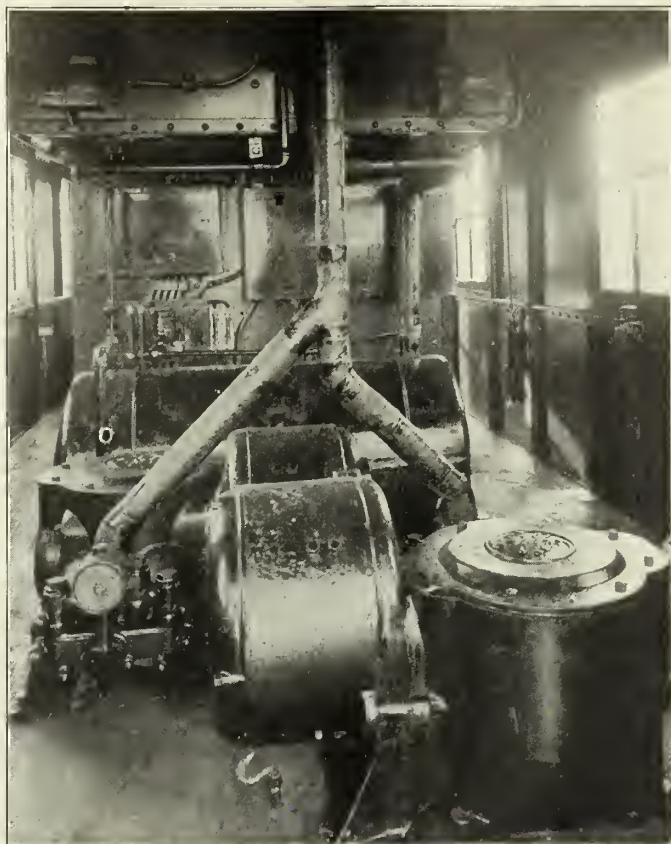
Current is collected by an overhead US-13 pantograph into service from either engineer's station by a manually-operated valve. The trolley is arranged for a minimum op-

erating height of 14 ft. 6 in. and a maximum height of 22 ft. On some of the local lines which form the system, the overhead construction is not adapted for the pantograph trolley, and in order to operate over such lines, the locomotives are equipped with pole type trolleys and trolley wheels. Some of these local lines are operated on 600 and in some cases as low as 500 volts direct current. A change-over switch is installed for cutting out the dynamotor while the locomotive is operating on low voltage circuits, so that in such cases the current for the auxiliary control and supply circuits is obtained direct from the trolley circuit. This change-over switch is protected by an automatic relay, which makes it impossible to connect 1500-volt trolley current to the auxiliary circuits of the locomotive.

The principal data and dimensions applying to the locomotives are the following:

Length inside of knuckles.....	37 ft. 4 in.
Length over cab.....	27 ft.
Height to trolley base.....	13 ft.
Width over all.....	9 ft. 7 in.
Total wheel base.....	26 ft. 8 in.
Rigid wheel base.....	7 ft. 2 in.
Track gauge	4 ft. 8½ in.
Tractive effort at 25 per cent coefficient.....	30,000 lbs.
Tractive effort at one hour rating.....	17,500 lbs.
Tractive effort at continuous rating.....	11,200 lbs.
Weight per driving axle.....	31,750 lbs.
Weight electrical equipment.....	37,500 lbs.
Weight mechanical equipment.....	89,500 lbs.
Total weight on drivers.....	127,000 lbs.

The growth of the parcel post service is compelling the railroads to assume an additional expense to the extent of widening the side doors of cars in which such shipments are handled. Such an expedient has become necessary in order to avoid delays to trains in loading large packages. Until the extension of the parcel post system the railroads loaded the mail matter through small doors, which provided ample



Location of Apparatus in No. 2 End, Electric Locomotive for Piedmont & Northern Lines.

space for the mail clerks to assort letters. The railroads contend that the expense incident to this change in the design of equipment will total a large sum, for the expenditure of which they will receive no additional revenue.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

Alternate Reserve and Volubility of Mr. Mellen.

"It should never be forgotten that secrecy and concealment were handmaids in the carrying out of Mr. Mellen's policy. It is absolutely foreign to his nature to disclose anything except under force and compulsion. It has always been his custom to keep every one in the dark, barring those occasions when mighty protests have been raised against some of his acts and legislative investigations resulted. Then he would suddenly become voluble, and, in apparently childish simplicity, would profess an inordinate desire to let every one into his confidence. This has happened many times in the past, just as it is happening now. Investigation over, Mr. Mellen would lapse into his bad methods again. There is something grotesque about a man of this character pleading the baby act, and saying that he observed wrongdoing, but was powerless to correct it."—Financial Chronicle.

Indebtedness Piling Up Under Receivership.

At the request of attorneys representing eastern bondholders, United States Judge Tuttle, at Detroit, Mich., adjourned until June 2, the hearing of the petition of the receivers of the Pere Marquette railroad for authorization to issue \$7,000,000 in receivers' certificates. The receivers want

the money to pay a part of the road's most pressing debts. Before granting the continuance Judge Tuttle declared he thought he should order the road sold at once. "I think I ought to sell this road, and sell it now," he said. "The only issue in this case, as I see it, is whether I shall sell the road now or grant the petition to issue the certificates. The conditions in this case are disgraceful. I will not permit this disgrace to go on in this court. I cannot and will not allow the indebtedness of this road to pile up."

Imposing on Railroads.

Two years ago, in an address at Yale University, Charles A. Prouty, then chairman of the Interstate Commerce Commission, said: "While we can provide by legislation the kind of cars which a railroad shall use and the rates it shall impose, we cannot by legislation force one single dollar of private capital into railway investment against its will."

This is true. But we can, by hostile legislation, repel investments of capital in railways and are doing so. Men in State Legislatures and Congress who know absolutely nothing about railroad management have been assuming the detail of financial charges by arbitrary enactments. And now comes the Federal government with its parcel post

service, which enormously increases the expenditures of railroads without a dollar of additional compensation. The parcels post service is so wide reaching that a man may send two tons of oats, in 50-pound sacks, for \$50 less than the shipment would cost by freight. This has been done, and the railroads lose by this kind of employment of the parcels post, which enormously increases their operating expenses. But they are required to submit to the imposition and accept this kind of business under the established rates for performing the general mail service of the government.

No doubt these anti-railroad legislators regard this as a "good joke" on the railroads. But it is a costly and destructive one.—Wilmington, Del., Every Evening.

That "Prayer from the Hills."

The New Haven road paid \$358 for a "prayer from the hills," which was sent to the Massachusetts Legislature, to aid in securing legislation for some new lines. Although it was paid for and therefore not a genuine appeal from the people, it is a pretty good piece of writing. Mr. Mellen's high opinion of its literary excellence is warranted. The thought of it is not fiction; and there is little doubt that it expresses what the "people of the hills" would like to have said.

"I will lift up mine eyes to the hills from whence cometh my help." Good reason have you of the cities to remember these words. To you of the valleys, of the plains, of the

coast, our help has gone steadily forth; our best young manhood has kept you whole; our blood, our character, has made New England.

"We take pride in you, ye teeming cities all. Often have you sought our assent to costly promotions for your advancement; time after time have you had our support. But we have sacrificed much; our population has dwindled, our herds have diminished, the woods have grown at our cost; we have bowed to our fate. Our youth have forsaken the homesteads; our elders are gray and disheartened.

"We now in turn make our appeal for help. The boon we crave, though great for us, is slight enough for you to grant. Opportunity, long a stranger here, now knocks at our doors, leading prosperity back to these hills. We only ask your leave to bid her enter. Wherever modern transit lays its course there dawns the age of a golden New England; cultivation thrives; new orchards are planted; industries develop; summer guests arrive; gladness rejoices the land.

"To make these benefits our own we ask not that the public purse be opened and millions poured for our advantage. We only pray that others be allowed to help us; that you don't bar our gates against their coming; that helping hands reached out to serve us be not stayed! that they, with faith in us and in the potent promise of our Massachusetts hills be not rebuffed, they who would back their faith with works. And well we know what a refusal means—that you would thrust us back again, unhoping, down to the slough of despond, there to decline and vanish from the land where once we counted with the foremost there."

The Railway Supply Man's Point of View

The views of our correspondent on the question "Are there too many conventions and exhibitions?" are bringing out many expressions of approval. The June conventions will afford opportunities for talking over the subject.

There are a good many supply people who would like to know whether this will be a good summer to take vacations or whether a sudden turn in business will make it best to keep on the job. They can get numerous opinions both ways. Some are looking for no marked improvement in business until next fall, if then; and others think the dam will break and the flood come on right in hot weather. Perhaps the conservative plan would be not to get so far away that one can't get back quickly.

A certain railway company which has had the car-builders figuring on a pretty good order for freight cars for some weeks, is gathering considerable information. After getting figures on its own specifications, with numerous alternate appliances and designs, it has asked the car builders to bid, each on his own design of complete cars. It will doubtless be able from these bids, to ascertain just what its own preferences will cost, in first outlay, at least. It is important to know this in the aggregate and in detail; but more important to estimate judiciously what the cost of maintenance and the real ultimate service purchased will be.

The movement begun by the American Railway Association for the standardization of freight cars, will be watched with lively interest by manufacturers. A strong committee of presidents has been formed to study and report upon the subject. It will possibly put the best experts it can obtain upon the work. The problem as to the degree of uniformity or standardization obtainable, without blocking the progress of improvement is as difficult as it is important.

The modern freight car is covered by patents—and, as a rule, the more patents involved, the better the car. Railway men themselves have taken out a large proportion of these patents. Of course, patents cannot be included in standards—but both car-builders and the makers of parts and appliances will be greatly helped by standard dimensions strictly maintained. Any standardization which looks to the abandonment of patented devices, will not get anywhere. To perpetuate bad and inadequate designs and appliances for the sake of standardization will prove bad policy. There is far too much weak, worn out, and crippled equipment now in use. The demands of service are constantly becoming more severe and they cannot be met by any stand-pat policy.

Nevertheless there is room for a greater degree of standardization and there is no good reason for a thousand slight variations which increase expense while accomplishing no good.

The old saying "Any fool can ask questions, but it takes a wise man to answer them," is another proverb that is "not so." The art of asking questions is an important one in the legal profession, but it is an art that gets nowhere, unless there is a knowledge back of it. Mr. Mellen hugs himself nights when he thinks of the questions Folk might have asked and didn't. Folk did well according to his lights; but the interesting investigation might, as Mellen hints, have been even more interesting. It may be suggested that in his capacity as "assistant to the Interstate Commerce Commission," Mellen should tip the Governor off on the questions which would tap the rich leads. He has now had his "immunity bath" as far as the transactions inquired into by Gov. Folk are concerned. Perhaps it would be just as well to clean up thoroughly by going into matters of management which were under his own control and

not dominated by the late Mr. Morgan or the other directors. The railway supply men of the country think there is a deal more of dirty linen which ought to be washed and as the immunity so far acquired is limited, Mr. Mellen has not made a thorough job of it. Can this be because there was no one higher up to lay it to?

And speaking of questions there are Mr. Brandeis' 78 varieties which we are not hearing much about. Can it be that they are canned? The questions were some of them in the nature of innuendo and accusation. If the answers proved anything, it ought to be made known what they proved. It cost a lot of money and a lot of diversion from important work to answer them. One road of very moderate mileage paid out \$3400 in clerk hire on these questions. The total cost, everything fairly included, to the fifty roads was certainly more than a hundred thousand dollars—probably several times that amount. The answers are in the archives of the Commission and the investigation is not closed, although it has been thrown out of the consideration in the present rate case.

Two questions are now pertinent. What information did Brandeis elicit by his great **questionnaire**; and what are the questions that might have been asked of Mellen, but weren't?

The railway supply business somehow feels that it isn't getting the sort of information and guidance for the future that it hoped to get out of this flood of questions. There are some who think they could get up a catechism which would be more searching.

The Iron and Steel Industry.

The optimistic expressions as to the future of the steel industry, so widely entertained, is based on the solid grounds that prolonged economizing and postponing of needed expansions must soon be compensated for, and also on the belief that fair freight rates will be conceded. Another less apparent factor is the holding back of the inauguration of very many steel consuming enterprises which can be readily financed. The past week developed improving business. Mills await logical developments rather than seek business by vain concessions. In one sense the steel industry is crouching for a spring.

Paying for Brains.

A bag of cement, having weight and size, appealing to the sense of touch and sight, seems to be an equivalent for a certain amount of money paid. Advice, however, due to the fact that it is given freely and without charge by so many people, both those who are qualified and those who are not qualified, is different. One has to think twice before realizing fully that advice, as well as cement, may be worth just so much in dollars and cents. Of course, it is a question always as to whether the advice is good, bad or indifferent, and it is much harder to judge as to the value of advice than it is as to the value of cement. Paying for cement at the market value is never questioned. Paying for brains is quite a different matter, possibly one reason being that there is no market value for brains.

We, who are in the business of manufacturing equipment and appliances that are used on railroads, necessarily have to make a pretty exhaustive study of that which we are manufacturing and selling, not only of the article itself, but of the conditions under which it is to be used. We become familiar with conditions as they exist on many railroads, and in relation particularly to one appliance. It is natural that we come to feel, after a number of years, that we are especially fitted to speak with authority derived from

knowledge of facts as they exist. If we have been in business for twenty years, if we have helped with some appliance to solve some knotty problem in railroading, and having seemingly solved the problem, have improved the appliance so that it is even better solved, and have done that several times over, we begin to feel as though our knowledge was of some value in railroading. Then we get an idea that this knowledge which we possess ought to be worth something. We feel particularly that way when someone comes along, figures out that we are in a business that is making pretty good profits and giving us pretty good returns, and therefore that it is a pretty good business to go into.

Such things happen every month in the railway supply business. Railroads use such and such a thing and somebody who has gotten somewhere a misguided notion that there is a big profit in the railway supply business, goes into it in order to sell something that looks like what we have spent years in developing—never mind whether it has equal merit or not. Not that they stay in business, because the majority of them do not, but they go to a railroad, lacking experience, lacking knowledge, lacking so much that is essential if railways are to be sold appliances that are really worth while. When we buy a keg of nails we hardly feel that it is necessary to pay for any amount of brain work in connection with them. It is hardly fair, however, to assume that this same rule should be applied when a railroad buys from a manufacturer of railroad appliances something that, while the principle may remain the same, has to be adapted to the standards of a special road. Not only should a railroad pay a profit over the market price of the material used in the manufacture, not only should they pay a profit on the brains of the man who invented that particular appliance, but profit should also be paid on the brains of the manufacturer who takes the appliance or equipment, improves upon the design, and who uses ordinary human intelligence in adapting that design for use on cars, or track, or signalling, as the case may be, meeting in each case the particular standard of the road which is to buy.

In many cases the manufacture of railway equipment means the services of an expert, or experts. Experts in most fields, men whose knowledge is far beyond the knowledge of the average man in some particular line, receive payment for that expert knowledge, and in some fields the amounts paid to experts run very high. Where a fee of \$25,000 is paid to an expert, and paid very largely for his brains, for what he knows and not for what he does, the expenditure may be very small because of resultant economy. It is certainly good practice to pay a man \$10,000 to save \$100,000. It might even be worth while to pay him \$50,000, as even at that there would be a profit of \$10,000.

We are so hampered, however, by what are known as the senses that it is a hard matter for any man to make a decision without being influenced by the sense of sight or touch. It is a well known fact that salesmen who have "blue sky" to sell receive much larger salaries than salesmen who sell clothing, or cattle, or something which can be handled, felt, measured or weighed. The term "blue sky" has been given to things intangible and a meaning attached to it, giving the idea that things intangible are lacking in value. It is a well known fact that physicians have a larger loss in their collections for services rendered and find it harder to make collections than does any business man who has something to sell over the counter. This would probably be true in the legal profession also, were it not that the client felt that the attorney-at-law had a very distinct advantage over him in the knowledge of how to enforce payment for his services. Human beings are still very averse to paying for brains, and yet brains should bring a much higher price than anything else.

It must be granted, however, that the bigger business men are coming to recognize the value of the expert, whether the word "expert" is attached to the individual name or not. Keen buyers are more and more buying from a man, or from a group of men who thoroughly know their business, buying from them because they believe that they can in the first place get a better article, that a better article is manufactured by "men who know"; and that what is bought will be properly used. In these days when mechanical ingenuity is giving us so much, it is becoming necessary to get the most out of what we buy, to get with it the benefit, the co-operation of the brains that made it possible.

Conventions and Meetings.

GATHERINGS OF ENGINEERING SOCIETIES, RAILROAD ORGANIZATIONS AND PUBLIC BODIES AND ANNOUNCEMENTS FOR THE NEAR FUTURE.

The regular monthly meeting of the New York Railroad club was held at the building of the United Engineering Societies, 29 West 39th Street, New York, on Friday evening, May 15, 1914. At that meeting Mr. William F. Zimmermann, second vice-president of the Pittsburgh Testing Laboratory, presented a paper on "Bureau Inspection by Railroads."

The regular meeting of the Railway Club of Pittsburgh was held at the Monongahela House, Pittsburgh, at 8 p. m., Friday, May 22, 1914. The paper of the evening was presented by Mr. W. A. Converse, Secretary and Chemical Director, Dearborn Chemical Company, subject, "Some ill effects of boiler feed water and their causes."

The annual meeting of the Western Railway Club was held in the Louis XVI room of the Hotel Sherman, Chicago, Tuesday evening, May 26, 1914. At that meeting there was rendered the annual financial report of the club and officers were elected to serve during the coming year. After the transaction of the business above mentioned, an entertainment program was rendered, features of which were refined vaudeville by talent selected from the club membership, in addition to which choice music was rendered by the Western Railway Club band. The officers elected were: President, E. W. Pratt, assistant superintendent of motive power and machinery, Chicago & Northwestern Ry., Chicago; first vice-president, H. H. Harvey, general car foreman, Chicago, Burlington & Quincy R. R., Chicago; second vice-president, J. H. Tinker, superintendent of motive power, Chicago & Eastern Illinois R. R., Danville, Ill., and secretary-treasurer, Jos. W. Taylor, 1112 Karpen building, Chicago. Newly elected members of the executive committee are: J. M. Barrowdale, W. E. Dunham and A. R. Kipp. The library trustees are: H. T. Bentley, W. E. Sharp and Dr. W. F. M. Goss.

The executive committee and the advisory committee of the American Association of Railroad Superintendents, met at the office of President Chas. Burlingame, St. Louis, Mo., Wednesday, May 20, at which time several important matters were discussed and disposed of. It was decided to hold the 1914 annual meeting in New York city, August 20 and 21; and to hold the 1915 annual meeting at San Francisco, California, May 20 and 21. The membership of this association has increased very rapidly during the past fifteen months and now comprises membership of general superintendents, assistant general superintendents, superintendents, assistant superintendents, trainmasters and assistant trainmasters throughout various parts of the United States, Mexico and Canada. There are a number of very

important subjects to be brought up before the meeting in New York next August, the details of which will be furnished later.

Safety of Travel on American Railways.

Two hundred and ninety-nine railways of the United States, operating a mileage equal to the combined railways of the United Kingdom, Germany, France, Austria and Italy, went through the fiscal year ended June 30, 1913, without a single fatality to a passenger in a train accident. The railways, which operate together 120,901 miles of line, constitute more than two-thirds of the operating companies making their annual reports to the Bureau of Railway News and Statistics, which for the tenth consecutive year presents its annual summary of statistics.

During the year the railways thus reporting complete immunity carried a total of 409,808,488 passengers an aggregate distance of 14,400,992,000 miles and 968,764,956 tons of freight a total of 141,790,227,000 ton miles. Almost one-half the entire railway traffic of the United States for the year thus was carried without one passenger being killed in an accident to a train. This immunity record for the past fiscal year is the highest since the banner year 1909 and comes close to it, although traffic density, one of the largest factors affecting the probabilities of accidents, was more than 11 per cent greater in the passenger business and more than 30 per cent greater in the freight business of the railways.

Four railways reporting to the Bureau with a combined mileage of 1411 miles have been operated through ten consecutive years without a single passenger being killed in a train accident. A year ago nine railways operating 4379 miles reported entire immunity over ten years and one of them, the Lackawanna, had a clear record for twelve consecutive years before the Corning collision.

A comparison of the bureau's immunity records for the last two fiscal years follows:

	1911.	1912.
Number of companies.....	299	290
Combined mileage	120,901	101,164
Passengers carried	409,808,488	332,184,518
Passenger miles	14,400,992,000	11,218,221,000
Tons carried	968,764,956	867,909,428
Ton miles	141,790,227,000	105,580,384,000
Passengers killed in train accidents	None.	None.

Included in the roll of honor in 1913 are railways operated in every state of the Union, showing that as a whole no exceptional conditions could prevail. There are included single roads which operate a greater mileage than that of any of the minor states of Europe and four of the honor roads combined have as great a mileage as the British Isles. Though in the matter of safety the block system has contributed its share the majority of this mileage is on single track road where a high degree of safety was attained through automatic, intelligent, observance of rules.

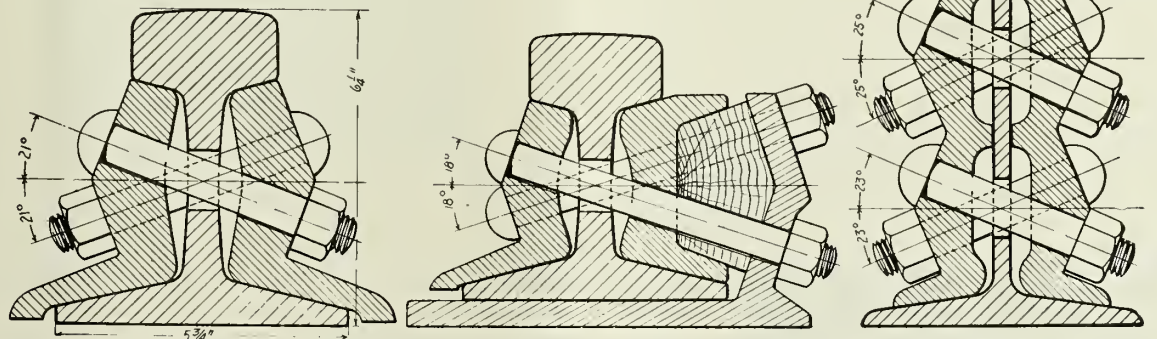
As a result of its ten-year records the bureau is able to present the following table of immunity showing the roads reporting complete freedom from passenger fatalities for periods ranging from one to the entire ten years:

	Number of Companies.	Miles of line with no fatalities to passengers in train accidents.
Ten years to 1913.....	4	1411
Nine years to 1910.....	33	7379
Eight years to 1913.....	57	10,832
Seven years to 1913.....	67	11,552
Six years to 1913.....	87	18,860
Five years to 1913.....	107	28,592
Four years to 1913.....	122	30,897
Three years to 1913.....	153	42,986
Two years to 1913.....	205	63,714
One year, 1913.....	299	120,901

The real significance of these figures is apparent only when it is remembered that the figures relate to consecutive immunity for the same roads for each period. There was an American mileage greater than that of Austrian roads operated without a passenger fatality in a train for six years; a mileage greater than that of the British Isles similarly immune for five years and a greater mileage than that of Germany immune for three years.

The Heinle Oblique Joint Bolts for Rails of Deep Section.

Persons who have had experience in bolting up joint splice bars on rails have noticed that the tightening of ordinary bolts which pass through the rail and bars horizontally does not always bring the bars up against the fishing surfaces of the rail in true alignment. Especially is such the case where the section of the rail or the splice bar varies slight-



Heinle Oblique Joint Bolts for Rails of Deep Section.

ly from standard shape, by reason of wear of the rolls or other imperfections in the rolling process. But even where there is no apparent misfit it is often necessary to exercise some care and intelligence in order to bring the bars to a proper bearing on the fishing surfaces. For illustration, if, in process of tightening up the bolts, the top edge of the bar moves to final place in advance of the bottom bearing surface of the bar, a binding action will occur; and the greater friction of the bottom fishing surface on the rail base will sometimes prevent that part of the splice from being brought fully home by the time the nuts are supposed to be turned sufficiently tight. For this reason it is common practice to set the bars up to place by vigorous hammering after the nuts have once been tightened, when it will usually be found that the bars will be loosened, permitting several additional turns of the nuts to be made in order to give them a firm bearing against the bars.

These troubles are accentuated with increase in depth of splice bar, and in splicing beams, deep T-rails and girder rails considerable hammering and readjustment must be done in order to secure a desirable fit of the bars, with one row of bolts arranged horizontally along the middle line of the splice bars.

With a view to improvement of such conditions Mr. A. W. Heinle, of Crafton, Pittsburgh, Pa., has designed splice bars to be fastened with bolts set obliquely to the horizontal plane of the jointed members. The illustration shows the application of this principle of fastening to the ordinary T-rail, with both the plain angle bar and the Weber joint style of bars, and also to a deep-section street railway girder rail with two rows of bolts, as is ordinarily found in service. In this

manner the bolts have a pull more directly in line with the fishing surfaces of the splice bars, and they are better disposed to hold the splice bar firmly to the rail when it comes under the stresses of rolling loads.

Supply Trade Notes.

—Morgan T. Jones & Co., inspecting and supervising engineers, Chicago, have incorporated under the name of Morgan T. Jones Company.

—The Chicago agency of the Industrial Works of Bay City, Mich., which has been with Mudge & Co., has been discontinued. For the present, the Chicago territory will be handled from the main office in Bay City, but in the near future a sales office will be opened in Chicago under the name of the Industrial Works.

—G. H. Dirhold, for twelve years advertising service manager for the Simmonds Hardware Co., and formerly editor of Hardware, New York, has accepted the position of ad-

vertising and publicity manager for the Walter A. Zelnicker Supply Co., St. Louis, Mo.

—The Westinghouse Electric & Mfg. Co. announces further changes in its sales department. F. N. Kollock, Jr., has resigned his position as district manager of the Seattle office to accept the position of treasurer and assistant secretary of the Westinghouse Lamp Co., Bloomfield, N. J. W. D. McDonald, formerly branch manager of the Minneapolis office, has been appointed to succeed Mr. Kollock as district manager at Seattle. C. C. Curry has been appointed acting branch manager at Minneapolis to succeed Mr. McDonald.

—Some important changes in the executive officers of Cambria Steel Co. and the Pennsylvania Steel Co. have been announced. E. T. Stuart, treasurer and assistant secretary of Cambria Steel Co. has resigned to accept the position of treasurer with Pennsylvania Steel Co. Alexander P. Robinson, vice-president, has been elected treasurer to succeed Mr. Stuart and Philip B. Burtis, who has been connected with the company for some time was promoted to the position of assistant secretary. Mr. Stuart succeeds E. M. Smith as treasurer of Pennsylvania Steel, the latter having resigned.

RAILWAY NEWS.

Apalachicola Northern.—On the application of the Illinois State Trust Co., of East St. Louis, Ill., the United States court at Pensacola, Fla., has appointed L. H. Dimmett receiver of the Apalachicola Northern R. R. The petition for a receiver recited that the company had defaulted in interest on its \$2,000,000 first mortgage bonds.

Clear Lake Railroad.—The California railroad commission has granted authority to the Clear Lake R. R. to issue \$75,-

000 of common stock and \$500,000 first mortgage 6 per cent bonds. The funds derived are to be applied to the construction of the new railroad between Hopland and Lakeport, Cal., which will be approximately 23½ miles long.

Cleveland, Cincinnati, Chicago & St. Louis.—The Cleveland, Cincinnati, Chicago & St. Louis Ry. was given authority by the Ohio public utilities commission May 25 to issue \$5,600,000 equipment trust certificates and \$2,000,000 notes, the proceeds to be used in buying coal cars and box cars. Reports state that it is the purpose of the company to purchase 2500 coal and 4500 box cars.

Detroit, Toledo & Ironton.—According to authoritative information the Detroit, Toledo & Ironton R. R. has prepared plans for what means practically rehabilitation of the entire line in Michigan and Ohio. The work will include the building or rebuilding of roundhouses and shops, repair of locomotives, bridges will be repaired or rebuilt and extensive improvements made to roadbed and track. Shop and track forces will be greatly augmented. Two Edison type storage battery cars are to be tried out in June on the main line south of Lima, Ohio, to determine the practicability of making such cars a part of the permanent equipment of the road.

Grand Trunk.—The Grand Trunk Ry., according to report, is conferring with the Canadian government in regard to a further bond guarantee of \$15,000,000. Under the terms of the agreement with the late government the cost of construction of western lines was to be guaranteed by the government up to 75 per cent. The necessary bonds were issued, but owing to the increased cost of construction, the company claims that another fifteen millions is required to fulfill the terms of the agreement. This claim, it is said, is being resisted by the government, which claims that a first mortgage having been placed upon the road the company is not now in the same position it was in when the original guarantees were issued.

Gulf, Colorado & Santa Fe.—The budget of the Gulf, Colorado & Santa Fe Ry. provides for an expenditure of \$380,784, including the following: Bridges, trestles and culverts, \$54,764; sidings and spurs, \$7190; terminal yards, \$10,410; heavier rails, \$124,340; track fastenings, etc., \$48,680; frogs and switches, \$16,510.

Lake Shore & Michigan Southern.—William A. Read, Henry Evans and Willis D. Wood are acting as a committee to represent stockholders of the Lake Shore & Michigan Southern Ry. (including Michigan Southern & Northern Indiana 10 per cent guaranteed stock), who are opposed to accepting the terms offered by the New York Central railroad for consolidation with the Lake Shore company. In a circular the committee states that it has had a very comprehensive and thorough examination made by expert accountants and engineers of the books, accounts and properties of the Lake Shore & Michigan Southern and, from information so obtained, is convinced that the terms offered to the minority stockholders are "grossly inadequate" and that it is important that the holders of stock not owned or controlled by the New York Central should organize for the purpose of taking steps to protect their interests. The committee advises stockholders not to give proxies to vote for the approval of the proposed agreement of consolidation, but to deposit their stock with the Central Trust Company of New York.

New York Central.—See Railway News under Lake Shore & Michigan Southern Ry.

Philippine Railway.—William B. Poland, vice-president and chief engineer of the Philippine Railway, who has been in charge of the construction and operation of the company's lines for a number of years, will leave the Philippines June 1, 1914, and will return to the United States probably by way of Australia, Valparaiso, and the Trans-Andean line to Buenos Aires. After May 1 his address will be care J. G. White & Company, Inc., 43-49 Exchange Place, New York city. Construction has been finished, the operation systematized and industrial and agricultural development work in Cebu and Panay organized. It is not expected that Mr. Poland will return to the Islands, in which case the property will be left under the management in the Philippines of R. R. Hancock, at present general superintendent in Iloilo, P. I.

Register & Glenville.—The recent sale of the Register & Glenville R. R. of Georgia under receivership proceedings for \$225,000 to the Henry Talmadge Co. of New York and the Savannah Trust Co. of Savannah, Ga., has been confirmed by the court. The road was owned by the Perkins Lumber Co. It is about 41 miles long from Register to Glenville,

with a three-mile branch from Hagan to Claxton, Ga.

Rio Grande & El Paso.—The Rio Grande & El Paso R. R. has amended its charter by changing its name to Rio Grande, El Paso & Santa Fe R. R. The capital stock and bonds are all owned by the Atchison, Topeka & Santa Fe Ry.

St. Joseph & Grand Island.—Control of the St. Joseph & Grand Island Ry. must be given to the minority stockholders of that company by the Union Pacific R. R. within the next sixty days, or a receiver will be appointed by the federal court. This was the substance of a memorandum opinion given May 27 by Judge Thomas C. Munger of the United States district court of Nebraska, in which he grants the injunction sought by the Grand Island minority stockholders.

St. Louis & San Francisco.—Following the default of the St. Louis & San Francisco R. R. of the May 1 interest payment on \$69,524,000 of outstanding general lien bonds, an additional receivership suit was filed last week against the company in the United States District Court of St. Louis by the Bankers' Trust Company of New York and N. A. McMillan, trustees. The object of the suit is to have the trustees in court, so they may take whatever future steps are necessary for the protection of general lien bondholders. The present receivership is based upon a general creditors' bill only, and now the general lien bondholders have taken advantage of their right to file a bill of their own. Although the petition asks that new receivers be appointed, it is understood that J. W. Lusk, W. C. Nixon and W. B. Biddle, the present receivers, will be acceptable to the general lien trustees. The petition also asks for authority to sell the property under a foreclosure decree, but no immediate change in the existing status of the Frisco is expected.

San Francisco-Oakland Terminal.—The San Francisco-Oakland Terminal Rys. has applied to the California railroad commission for authority to issue \$10,000,000 of its first and refunding 30-year 5 per cent bonds, \$4,600,000 to pay off outstanding obligations and \$5,400,000 for improvements. The proposed immediate expenditures are as follows: Track reconstruction, \$400,000; construction proportion of necessary improvements to present track and paving, \$160,000; additional curves, turnouts, etc., for increased service, \$30,000; improvements and additions to overhead trolley system, \$5000; additional feeder lines, \$10,000; purchase of fifty new traction cars, \$325,000; purchase of two new ferry-boats, \$600,000; remodeling present rolling stock, \$105,000; purchase and installation of additional electrical equipment for present rolling stock, \$115,000; paving plant and equipment, tools, etc., \$40,000; additional shop machinery and tools, \$10,000; construction of office building, \$50,000; pier fill and construction of new pier and pier terminal and ferry slip; total cost, \$2,400,000; available cash, \$1,000,000; additional cash required, \$240,000.

Trona Railway.—The Trona Railway Co., a subsidiary corporation of the American Trona Corporation, promoted to construct a standard gage railroad between the properties of the corporation at Searles lake, in San Bernardino county, Cal., and the Owenyo branch of the Southern Pacific Co., a distance of 31 miles, has applied to the California railroad commission for authority to issue \$550,000 of 5 per cent bonds.

Union Pacific.—See Railway News under St. Joseph & Grand Island.

PERSONALS.

H. H. Broughton has been appointed assistant superintendent of the Cleveland division of the Baltimore & Ohio R. R., with headquarters at Canal Dover, Ohio, reporting to W. T. Lechlides, superintendent at Cleveland. J. W. Root has been appointed assistant superintendent of the Wheeling division, with headquarters at Benwood, W. Va., reporting to H. B. Green, superintendent at Wheeling. Both appointments are effective May 25.

E. C. Bagwell, assistant engineer of the Seaboard Air Line Ry. at Norfolk, Va., has been appointed president's assistant, with headquarters at Norfolk.

Albert T. Clifton has been appointed secretary and treasurer of the Texas Central R. R., with office at Waco, Tex., succeeding K. Bowerfind.

William S. Kies, general counsel of the Chicago & Western Indiana R. R. and the Belt Ry. of Chicago, with office at Chicago, has resigned to become connected with the National City bank of New York.

Xerxes H. Cornell, superintendent of transportation of the Pere Marquette R. R., has resigned to accept appointment as master of transportation of the Chicago & Alton R. R., with headquarters at Bloomington, Ill. The appointment is effective June 1.

John F. Auch, vice-president and freight traffic manager of the Philadelphia & Reading Ry., with office at Philadel-



Photo by Moffett, Chicago.

G. B. Vilas, who was recently appointed General Superintendent of Chicago & North Western Railway.

phia, effective May 20, was appointed vice-president and traffic manager of the company, in charge of freight and passenger traffic.

W. H. Foster, superintendent of the Shore Line division of the New York, New Haven & Hartford R. R. at New Haven, Conn., has been appointed superintendent of the New York division, with headquarters at Harlem River, N. Y., succeeding C. H. Motsett, resigned to accept service with another company. **J. D. Gallary** has been appointed superintendent of the Shore Line division, succeeding Mr. Foster at New Haven; **R. D. Fitzmaurice** has been appointed superintendent of the Providence division, with headquarters at Providence, R. I., in place of Mr. Gallary, and **M. D. Miller**, trainmaster at Providence, has been appointed superintendent of the Western division, with headquarters at Waterbury, Conn., succeeding Mr. Fitzmaurice.

J. H. Nelson, hitherto superintendent of transportation of the Florida East Coast Ry. at St. Augustine, Fla., has been appointed terminal trainmaster of the Pere Marquette R. R. at Detroit, Mich., effective May 23.

G. B. Vilas, whose appointment as general superintendent of the Chicago & North Western Ry. has been noted in a previous issue of the Railway Review, was born April, 1868, at Ogdensburg, N. Y. He was graduated from Phillips Exeter academy, Exeter, N. H., in 1887 and in September of that year entered the service of the Chicago & North Western as a clerk. He was agent at Kenosha, Wis., and from May, 1890, to September, 1896, freight agent at Milwaukee, Wis. He was then made trainmaster at Milwaukee, which position he held until February, 1903, when he was appointed assistant superintendent of the Madison division at Baraboo. Seven years later Mr. Vilas was promoted to superintendent at Baraboo and on April 1, 1912, he was made assistant general superintendent at Chicago. His appointment as general superintendent of the lines in Illinois, Iowa, Wisconsin and Michigan was effective May 18.

TRAFFIC.

John J. Kirby, general passenger agent of the Ann Arbor R. R., with headquarters at Toledo, Ohio, in point of service the oldest head of any department of that company, has resigned, effective June 1. The office of general passenger agent will be abolished and the office of traffic manager cre-

ated. **H. S. Bradley**, who has been general freight agent, will be traffic manager, and will have direct charge of all freight and passenger matters.

W. A. Shropshire has been appointed general agent of the Western Maryland Ry. at Baltimore, Md., succeeding **H. E. Williams**, who resigned to engage in other business.

H. F. Sanborn has been appointed general agent of the freight department of the Great Northern Ry. at St. Paul, Minn., succeeding **R. M. Smith**, resigned, to engage in other business.

ENGINEERING.

O. S. Bowen, resident engineer of the Great Northern Ry. at Seattle, Wash., has been appointed assistant chief engineer with headquarters at Spokane, Wash., in place of **Alexander Stewart**, who has been granted leave of absence.

MECHANICAL.

L. A. Richardson has been appointed mechanical superintendent of the First district of the Rock Island Lines, with headquarters at Des Moines, Iowa, vice **H. C. Van Buskirk**, resigned, effective June 1. **R. L. Stewart** is appointed mechanical superintendent of the Third district, with headquarters at El Reno, Okla., vice **Mr. Richardson**. **Mr. Stewart** is succeeded as master mechanic of Illinois and Chicago Terminal divisions by **P. J. Colligan**, with headquarters at Chicago. **W. M. Wilson** has been appointed master mechanic of the El Paso and Mexico divisions, with headquarters at Dalhart, Tex., in place of **Mr. Colligan**.

Louis E. Endsley, whose appointment as professor of mechanical railway engineering at the University of Pittsburgh was announced in a previous issue, was graduated from Purdue University in 1901, with the degree of B. S. M. E. In 1903 he was granted the degree of M. E. For two years he was associated with **Dr. W. F. M. Goss**, in research work and in 1903 he was appointed instructor in the locomotive laboratories of Purdue University. He was advanced two years later to associate professor of railway mechanical engineering, and in 1908 was appointed professor of railway mechanical engineering, and given direct charge of the master car builders laboratory at Purdue. He has had charge of all the tests conducted on the brake-shoe testing



Photo by Moffett, Chicago.

Professor Louis E. Endsley, who goes to the University of Pittsburgh, Department of Railway Mechanical Engineering.

machine of the Master Car Builders association for the last twelve years. He has also conducted a great many tests on locomotives pertaining to super-heated steam, presenting papers with regard to this work before the Master Mechanics Railway association. He was in direct charge of the locomotive laboratory during the tests on the front end of the locomotive conducted by the Master Mechanics' association several years ago. Later he conducted for the Amer-

ican Steel Foundries some very interesting tests on the friction of a freight car truck as affected by the different degrees of curvature. Professor Endsley is a member of the American Society of Mechanical Engineers; associate member of the Master Mechanics' association, and associate member of the Master Car Builders' association, member of the Western Railway club, Indiana Engineering society, and the Society for the Promotion of Engineering Education. In September he goes to the University of Pittsburgh as professor of mechanical railway engineering. This is a new department just being organized in the university and is under the direction of D. F. Crawford, general superintendent of motive power of the Pennsylvania Lines West of Pittsburgh. Mr. Crawford is taking an active interest in the organization of the department, and through him the students of the university will have access to the testing facilities of the Pennsylvania railroad, and will be able to visit the railroad shops and obtain valuable information with regard to actual operation.

OBITUARY.

Jacob O. Brinkerhoff, superintendent of the Kansas division of the Union Pacific R. R., at Kansas City, Mo., died at his home in that city May 23. Mr. Brinkerhoff was born March 3, 1839, in Tioga County, N. Y. He began his railway career and entered the service of the Union Pacific in 1865 as a brakeman. In July, 1877, he became superintendent of the Smoky Hill division. From 1878 to 1884 Mr. Brinkerhoff was superintendent of the Kaw Valley division; 1884 to 1891, superintendent of the Kansas division; 1891 to 1898, general superintendent of that division, and since November 1, 1898, superintendent of the Kansas division. He is survived by a wife, a son, J. H. Brinkerhoff, general superintendent of the Belt Ry. of Chicago, and a daughter.

Pennel Cherrington, general attorney of the San Pedro, Los Angeles & Salt Lake R. R., died at the Good Samaritan hospital, Los Angeles, Cal., May 22. Mr. Cherrington was getting a glass of water for his little son the previous Monday morning, fell and sustained fatal injuries.

J. R. Dillon, president of the Texas City Terminal Co., Texas City, Tex., died at Mineral Wells, Tex., May 18, aged 44 years.

NEW ROADS AND PROJECTS.

Arizona—The Parker & Colorado R. R. is reported as in process of organization to construct a railroad from Parker, Ariz., through the Colorado River Indian reservation.

California—A report says that San Pedro, Los Angeles & Salt Lake R. R. contemplates building a line of railroad from Daggett to Riverside, Cal., where the company now uses the tracks of the Atchison, Topeka & Santa Fe Ry.

The Mojave Northern R. R. has applied for a charter of incorporation, to construct a railroad from Victorville, Cal., to a point near Oro Grande, a distance of 4.7 miles. C. Leonardt, J. S. Schirm, C. C. Merrill, F. H. Powell, F. R. Powell and R. McNamee are the incorporators.

The Red River Lumber Co. has awarded contract to Moffit & Meade for construction of a railroad from Westwood to Big Meadows, Cal., 13 miles.

Georgia—A charter has been issued to the Washington & Lincolnton R. R. which is projected between Washington and Lincolnton, Ga., 25 miles. Capital stock is fixed at \$100,000, with the privilege of increasing to \$250,000. Among the incorporators are W. B. Crawford, W. T. Florence, W. C. Powell, Lincolnton; J. R. Dyson, W. T. Johnson, K. A. Willhoit, Washington.

Idaho—The Boise-Payette Lumber Co., Boise, Idaho, has awarded contract to the Wasatch Grading Co., Salt Lake City, Utah, for grading of 14 miles of railroad for the lumber company's Intermountain Railroad. Work is to be begun at once and completed by October 1, 1914. The contract for laying the steel and building the bridges will be let later. One of the bridges over the Boise river near the mouth of More's creek will cost \$30,000.

Kentucky—The Louisville & Nashville R. R., according to report, has awarded contract to Mason, Hanger & Carmichael to build a cut-off about three miles long from its line at Woods, near Lexington, Ky., to the Lexington & Eastern line at Montrose.

See New Roads and Projects under Ohio and reference to the Chesapeake & Ohio Northern Ry.

Michigan—The board of trade of Saginaw, Mich., is negotiating with the Grand Trunk Ry. system for the extension of

the Toledo, Saginaw & Muskegon line from Ashley, Mich., to Saginaw, Mich., about 18 miles.

Missouri—The Kansas City Connecting R. R. has applied for a charter in Missouri. The application sets forth that the company proposes to construct and operate general terminal facilities for the connection of various trunk-line railroads with the Union Stock Yards, Kansas City, Mo. The capital stock of the company is \$1,000,000, and all of the 10,000 shares into which it is divided except eight are held by George R. Collet. The remaining eight shares are held one each by the other members of the board of directors, which is as follows, Collett, W. H. Weeks, H. L. Jarboe, Jr. A Newman, O. L. Waite, C. W. Trickett, W. J. Pray, L. W. Keplinger and F. H. Servatus, all of Kansas City.

Nebraska—The Chicago, Burlington & Quincy R. R. has received bids for construction of the proposed Chalco-Yutan cut-off to be built from Chalco to Yutan, Neb.

North Dakota—The Minneapolis, St. Paul & Sault Ste. Marie Ry. expects to have completed this season the line being built from a point near Makoti, N. D., westward a distance of 33 miles. Contract for grading and bridging was recently let to Foley Bros., Welch & Stewart. A sub-contract has been awarded to Peter Nelson, Minneapolis, Minn.

The Northern Pacific Ry., according to report, will build a branch line from Elliott to Harlem, N. D., 17 miles.

Ohio—The Chesapeake & Ohio Northern Ry., of Maysville, Ky., capitalized at \$50,000, filed articles of incorporation May 22 with secretary of state of Kentucky, and with the state railroad commission. The railroad will connect with the Chesapeake & Ohio at Tygart's Creek in Greenup county, Ky., and extend through to Columbus, Ohio, a distance of 95 miles. The incorporators are George Stevens, Decatur Axteell, M. J. Caples, F. M. Whittaker, W. D. Cochran, Henry Bacon and Le Wright Browning. This project was previously reported in the Railway Review of April 25 and May 23.

Ontario—The Toronto, Hamilton & Buffalo Ry. proposes construction of an extension to Dannville, Ont. The railway company, in return for a free right of way, will erect a station, estimated to cost \$30,000, and a freight house, to cost \$10,000. A by-law will probably be submitted to the rate payers of the town in the near future, asking them for sufficient funds to purchase right of way, about \$35,000.

Pennsylvania—The Pittsburgh & Shawmut R. R., it is said, has awarded contract to J. J. Corbett Co., Montreal, Que., for construction of an extension from Kittanning to Ford City, Pa. The work is to be completed by November.

Quebec—Plans are being made by the Quebec Central Ry. for the extension of its line from St. Sabine, Que., to English Lake, Que., about 25 miles.

Tennessee—The Tennessee, Kentucky & Northern R. R. expects to start work in a few weeks on the construction of an extension from Algood, Tenn., to Sparta, Tenn., a distance of about 20 miles.

Texas—A report says that engineers are surveying up the Rio Grande valley northwest of Laredo, Tex. It is assumed that this work is being done in the interest of the Rio Grande & Eagle Pass Ry. which has contemplated an extension from Minerva, Tex., to Eagle Pass, Tex., 135 miles.

The proposed San Angelo & Gulf Ry. which will connect San Angelo and Aransas Harbor, Tex., has abandoned the plan of using the old grade extending from Yoakum to Victoria, Tex., on account of claims pending against it. Advances state, however, that if these claims, amounting to about \$185,000, are withdrawn this section may be built as originally planned and an extension built to connect with the Missouri, Kansas & Texas Ry. at Smithville or Austin.

Virginia—The Indian Creek & Pound River R. R., says a report, will build a 10-mile extension from Pound to Freeling, Va. W. G. Coutts, Sergeant, Ky., is engineer.

Washington—The Doty Lumber & Shingle Co. has awarded a contract to the North Coast Construction Co., Portland, Ore., for the construction of a logging road to extend north from Doty, Wash.

West Virginia—The Greenbrier, Cheat & Elk River R. R. is reported completed by the West Virginia Spruce Lumber Co. from Cass, W. Va., along the Elk river to a point within 12 miles of Webster Springs. The work is being continued.

Wisconsin—The Door County Peninsula R. R. proposes to build a 40-mile railroad north from Sturgeon Bay, Wis. The road would be operated by steam for freight and gas-electric cars would be used for passenger service. Plans call for 65-lb rails, 14-ft. roadbed, two per cent maximum

grade, six deg. maximum curves; 200,000 cu. yds. of grading, of which 11,000 is rock; stone box culverts, 16 bents pile trestle. Construction is to be started by June 15, and the line is to be in operation by October 10. Promotion and financial arrangements are in the hands of E. E. Galle & Co., Plymouth building, Minneapolis, Minn. F. G. L. Hunt, 1940 Garfield street, N. E., Minneapolis, Minn., is directing engineer.

Electric Railways.

The Alton, Jacksonville & Peoria Ry., which has been in receivership for two years, was sold at Alton, Ill., May 25, at public auction for \$500,000 to J. C. Van Riper of St. Louis, Mo., president of the Title Guaranty Trust Co. The company is to be reorganized and refinanced as the Alton & Northern R. R. It is planned to raise the bonded indebtedness from \$700,000 to \$2,000,000 and complete the line to Jacksonville.

The London, Grand Bend & Stratford Ry. has been incorporated to build a railway operated by electricity or other motive power from London, Ont., to a point on Lake Huron near the boundary between Lambton and Huron counties, and to Stratford. Capital, \$2,000,000. The directors include W. R. Wullard, G. H. Gray and J. J. Gray.

The North Louisiana Interurban Ry. expects to begin construction of its projected line from Shreveport to Monroe, La., 90 miles, about June 1. Major A. B. Blevins is president.

The San Antonio, San Jose & Medina Interurban Ry. is reported to have completed $3\frac{1}{2}$ miles of its proposed 15-mile line from San Antonio to Kirk, Tex. A. D. Powers is president and L. S. Powers, general manager, both at San Antonio.

Promoters of the Chicago, Peoria & Quincy Ry. expect to commence grading next month. The road will connect the McKinley line with the Mississippi river at Quincy, Ill. Most of the surveys have been completed and the right of way contracted for.

Actual work on construction of the proposed interurban railway to connect Waco and Austin, Tex., via Temple and which is being promoted by the Southwestern Traction Co., of Temple, is now a question of only a short time, according to Colonel C. M. Simpson, fiscal agent for the company. A. M. Coffin, also of Temple, is chief engineer.

A company has been organized at Casnovia, Mich., by stockholders of the Muskegon-Casnovia Land & Development Co. to build an interurban line from Muskegon to Saginaw, Mich. Actual construction of the line from Muskegon to Stanton will be started this year, promoters assert.

The San Francisco-San Mateo Right of Way Co. has been incorporated to secure the right-of-way for the proposed electric railway from San Francisco to Palo Alto, Cal. The incorporators are: M. B. Johnson, Montara, president of the San Mateo County Development Association; H. C. Tuchen, Redwood City; Torrence Masterson, San Mateo; D. G. Doubleday, Millbrae; F. A. Cunningham, South San Francisco; E. M. Moores, Burlingame, and W. A. Brewer, Hillsborough.

The London, Grand Bend & Stratford Ry. has been incorporated to construct and operate an electric railway from London, Ont., to Lake Huron. The incorporators are: W. R. Wullard, G. H. Gray and J. J. Gray.

The Carbon & Stillwater Electric Ry., it is said, will award contracts about August 1 for the construction of an electric railway from Red Lodge to Columbus, Mont., about 40 miles. E. W. Harper, Red Lodge, is secretary.

After negotiations continuing nearly five months the final draft of the tentative agreement between the Philadelphia Rapid Transit Co., and the city providing for a metropolitan elevated and subway transit system has been completed. Although a decision was reached upon the main points in the agreement and details were concluded it was decided not to make public the plan until after it had been submitted to Mayor Blankenburg, to the special councilmanic transit committee and to the board of directors of the Philadelphia Rapid Transit Co. It is generally understood that all the subway-elevated construction to be undertaken will be paid for by the city, except the tunnel to Camden. That will be separately financed, and the capital put into it will be virtually underwritten by the Rapid Transit company through a lease arrangement. The city will thus create a municipal system and own it outright. This system would be leased to the Rapid Transit company under an agreement that the company shall equip and operate it as part of one common system. It is roughly estimated that the company will also invest \$11,000,000 to \$15,000,000, and assume rental obligations

as to \$6,000,000, and that the city will put in \$45,000,000 to \$50,000,000. Presumably the net income of the new municipally-owned company-operated system will be pledged: first, to protect the capital investment of the company, and, second, to reimburse it for loss of net earnings resulting from diversion of traffic from the present to the new system.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Chicago & North Western Ry. has ordered 15 Pacific (4-6-2 type) and 25 mikado (2-8-2 type) locomotives from the American Locomotive Co.

—The Public Belt R. R. of New Orleans, reported in the Railway Review of May 23 as ordering 2 locomotives, has ordered 2 six-wheel (0-6-0) switching locomotives from the Baldwin Locomotive Works.

—The McCloud River R. R. has ordered one mikado (2-8-2 type) locomotive from the Baldwin Locomotive Works.

—The Northwestern Iron Co., Mayville, Wis., has ordered one six-wheel (0-6-0) locomotive from the Baldwin Locomotive Works.

—The St. Louis, Brownsville & Mexico Ry. has ordered 20 consolidation (2-8-0) locomotives from the Baldwin Locomotive Works. A previous report in these columns stated that 15 locomotives had been ordered.

—The Solway Process Co. has ordered 2 superheater six-wheel (0-6-0-S) switching locomotives from the American Locomotive Co. The cylinders will be 21x26 ins.; driving wheels, 51 ins. in diameter, and total weight in working order, 157,000 lbs.

—The Cuban Central Rys., Ltd., has ordered 15 locomotives from the American Locomotive Co. The order calls for 1 superheater eight-wheel (4-4-0-S) passenger locomotive, cylinders 17x24 ins., driving wheels, 62 ins., total weight in working order, 106,000 lbs.; 13 superheater ten-wheel (4-6-0-S) passenger locomotives, cylinders 18x24 ins., driving wheels, 50 ins., total weight in working order, 120,000 lbs., and 1 consolidation (2-8-0) freight locomotive, cylinders 16x20 ins., driving wheels 38 ins., total weight, 98,000 lbs.

Freight Cars.

—The St. Louis, Brownsville & Mexico Ry. has ordered 800 box cars from the American Car & Foundry Co. and 20 caboose cars from the Mt. Vernon Car Mfg. Co.

—The Batesville Southwestern R. R. is in the market for 60 flat cars, 60,000 lbs. capacity.

—The Cleveland, Cincinnati, Chicago & St. Louis Ry. has been granted permission by the Ohio public utilities commission to issue equipment trust certificates and notes which, according to report, will provide funds for the purchase of 2500 coal cars and 4500 steel-underframe box cars.

—The Chicago & North Western Ry. has ordered 250 Rodger ballast cars. These will be built by the American Car & Foundry Co.

—The Seaboard Air Line Ry. is in the market for 400 ventilated box cars.

—The Kansas City Southern Ry., according to report, has ordered 100 Hart ballast cars from the American Car & Foundry Co.

—The Havana Central R. R. is reported in the market for 150 25-ton flat cars and 100 cane car trucks.

Passenger Cars.

—As reported in the Railway Review of May 23 the Union Pacific R. R. has ordered 107 passenger cars from the Pullman Company. The order consists of 16 69-ft. baggage, 2 baggage and buffet, 10 postal, 5 60-ft. baggage, 4 69-ft. baggage and mail, 21 diners, 8 observation, 2 parlor, 5 60-ft. coaches, 5 70-ft. coaches, 10 60-ft. chair cars and 20 70-ft. chair cars.

—The Seaboard Air Line Ry. is taking bids on 12 coaches, 9 passenger and baggage, 9 express and 7 postal cars.

Iron and Steel.

—The Great Northern Ry. has ordered 3000 tons of rails.

Signals and Interlocking.

—The Seaboard Air Line Ry. has awarded the Federal Signal Co. contract for signal material for the protection

of the Santee River bridge of the Carolina, Atlantic & Western Ry. at Andrews, S. C.

—The New York, Philadelphia & Norfolk R. R. has contracted with the Union Switch & Signal Co. to install a 44-lever improved Saxby & Farmer interlocking machine and plant at Salisbury, Md., at the crossing and junction with the Baltimore, Chesapeake & Atlantic Ry. The plant will be purely mechanical with detector bars. All signals will operate in the upper right hand quadrant, four of them in three positions, the rest in two. The three position signals will each be controlled by two levers. There will be 20 levers for 17 signals, 11 levers for 7 derails, 9 switches and one crossing bar, and 8 levers for 12 facing point locks and 2 crossing bars; a total of 39 working levers.

Bridges.

—The Chicago, Rock Island & Pacific Ry. will build a steel bridge across the South Canadian river at Bridgeport, Okla., to replace the structure lately damaged by flood.

—The International & Great Northern Ry. is reported as contemplating construction of a steel and concrete viaduct across East Elm street, Tyler, Tex.

—The Boston & Maine R. R. is reported to have completed plans for bridge to be constructed over the Hudson river, at Saratoga Junction, N. Y. The proposed structure would have nine double track spans and would require about 2500 tons of steel.

—See New Roads and Projects under Idaho and reference to Intermountain Railroad.

—The Central of Georgia Ry. recently awarded a contract to the Southern Engineering & Construction Co., Macon, Ga., for construction of a viaduct in Macon, incidental to the construction of new yards. The viaduct, it is said, will cost \$50,000.

Buildings, Terminals, Etc.

—The Kansas City Connecting R. R. plans improvements at Kansas City, Mo. See New Roads and Projects under Missouri.

—The Atlantic Coast Line R. R. has let contract to A. M. Walkup Co., Richmond, Va., to erect a \$15,000 station at Troy, Ala.

—The Kansas City Southern Ry., it is reported, proposes to erect a depot at Beaumont, Tex., to cost \$26,000.

—The Seaboard Air Line Ry. and the Atlantic Coast Line R. R. will erect a union depot at Bartow, Fla.

—The New York Central & Hudson River R. R., according to report, plans an expenditure of about \$3,000,000 for new shops and equipment on the Pennsylvania division.

—The Savannah & Statesboro Ry. has completed new shops at Statesboro, Ga.

—Grading for the new yards of the Central of Georgia Ry. at Macon, Ga., has been completed.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, MAY 19, 1914.

Extension car step, 1,096,837—Lennie A. Hanson, Deering, N. D.
Fluid pressure brake, 1,096,870—Walter V. Turner, Edgewood, Pa., assignor to The Westinghouse Air Brake Co., Pittsburgh, Pa.

Safety switch mechanism, 1,096,895—Merle A. Dow, Toledo, Ohio.

Valve for steam heating systems, 1,096,899—James Logan Fitts, Merchantville, N. J., assignor to Warren Webster & Co.

Water tube arch for fire boxes, 1,096,917—William C. Jacobs and Harry F. Jacobs, Waterloo, Iowa.

Car roof, 1,096,944—Columbus Phillips, Meridian, Miss.

Rail joint chair, 1,096,986—William R. Arnold, Geneva, Nebr.

Brake beam and hanger lever, 1,097,000—Thomas L. Burton, Pittsburgh, Pa., assignor to The Westinghouse Air Brake Co., Wilmerding, Pa.

Railroad closet sanitation, 1,097,003—Harrison Taylor Cronk, New York, N. Y., assignor to Cronk-Salter Co., New York, N. Y.

Metallic railroad tie, 1,097,004—James Curtis, Sacramento, Cal.
Track laying car, 1,097,006—William Abner Darden, Anniston, Ala.

Draft rigging for railway cars, 1,097,007—Charles E. Dath, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.

Truck frame, 1,097,045—Ivar A. Randal, Chicago, Ill.

Triple valve, 1,097,055 to 1,097,161, inc.—Jacob Rush Snyder, Pittsburgh, Pa.

Railway switch, 1,097,065—Fred Tolbert, Fort Smith, Ark.

Railroad tie, 1,097,079—David V. Buck, New Columbia, Pa.

Railway signaling system, 1,097,080—Clyde J. Coleman, New York, N. Y., assignor to The Hall Signal Co., New York, N. Y.

Railway cross tie, 1,097,082—Benjamin F. Cornelius, Lindsay, Okla.

One rail car, 1,097,104—James McGlinsey, Tyrone, and Walter A. Trimble, Birmingham, Pa.

Rail joint, 1,097,109—Johann Schuler, Dusseldorf, Germany.

Diaphragm curtain fixture, 1,097,119—Roy T. Axe, Syracuse, N. Y., assignor to Oliver M. Edwards, Syracuse.

Locomotive furnace, 1,097,125—Frederick F. Gaines, Savannah, Ga., assignor to American Arch Co., New York, N. Y.

Locomotive lubricator, 1,097,134—Elijah McCoy, Detroit, Mich.

Car door lock, 1,097,155—Samuel F. Adams, Buffalo, N. Y.

Electric railway system, 1,097,160—Charles E. Balzer, McKees Rocks, Pa.

Railway angle bar, 1,097,183—William E. Miller, Palisade, New York.

Railway signaling system, 1,097,197—Joseph C. Thullen, Leetonia, Ohio, and Louis H. Thullen, Edgewood Park, Pa., assignors to The Union Switch & Signal Co., Swissvale, Pa.

Combined metallic rail supporting tie and rail brace, 1,097,206—Albert L. Austin, Cleveland, Ohio.

Siding protection for signaling systems, 1,097,241—William H. Lane and Clarence W. Coleman, Westfield, N. J., assignors to Hall Switch & Signal Co., New York, N. Y.

Arch for locomotive fire box, 1,097,246—Thomas W. Lukens, St. Louis, Mo., assignor to Evens and Howard Fire Brick Co., St. Louis, Mo.

Railway tie, 1,097,253—William James Morton, New York, N. Y.

Flange lubricator, 1,097,262—Leland S. Pratt, Sacramento, Cal.

Railway tie and rail fastener, 1,097,270—Albert E. Thompson, Aurora, Ohio.

Railroad tie, 1,097,275—Isaac L. Van Schoiack, Sugar Grove, Ill.

Noiseless fork lock railway rail joint, 1,097,279—George R. Wood, Los Angeles, Cal.

Track wrench, 1,097,288—Charles A. Biding, Woodstock, Md.

Rail joint, 1,097,301—Leo A. Chmara and Anastasius A. Chmara, Bay City, Mich.

Convertible stock and grain car, 1,097,304—John C. Cottrell, Kingsley, Iowa.

Air brake, 1,097,305—Arthur Doan, Oakland, Cal.

Bonding pin, 1,097,340—Frederick C. Lavarack, Orange, N. J.

Railway rail joint, 1,097,347—Paul Mudroch, Pittsburgh, Pa.

Railway tie and clamp, 1,097,373—Sun R. Still, Hot Springs, Ark.

Retaining valve for air brake systems, 1,097,375—William A. Talley, Sayre, Okla.

Automatic railway signal, 1,097,382—Arnold Zukor, New York, N. Y.

Electrical block signaling apparatus for railways, 1,097,388—George Herbert Brown, Belfast, Ireland.

Railway tie, 1,097,394—Rufus A. Crow, Kirksville, Mo.

Method of restoring worn railway switch points, 1,097,404—Henry Elliott, St. Louis, Mo.

Ball bearing car wheel, 1,097,430—John A. Heckman, Friend, Nebr.

Safety wheel clamp for repair jacks, 1,097,431—Theodore H. Hensley, St. Albans, W. Va.

Coaling device, 1,097,434—Daniel Hilleman, Jr., Wellston, Mo.

Automatic train stop, 1,097,457—Paul Neree Mathis, New York, N. Y.

Switch lantern, 1,097,464—Adolph F. Prahm, St. Louis, Mo.

Rail joint, 1,097,467—Marion M. Roberts, Gossett, Ill.

Vestibule car curtain holder, 1,097,469—Maurice J. Roche, Jersey City, N. J.

Coal measuring and delivering machine, 1,097,471—Hermann Adolph Ruetschi, Pueblo, Colo.

Side bearing, 1,097,488—Benjamin R. Van Kirk, Philadelphia, Pa., assignor to The Baldwin Locomotive Works, Philadelphia, Pa.

Track spike, 1,097,495—Samuel C. Wood, Canton, N. C.

Car brake, 1,097,515—James P. E. Bernier, Salem, and Frank A. Andersen, Danvers, Mass.

Pilot coupling for locomotives, 1,097,535—Walter E. Coffin, Cleveland, Ohio, assignor to The National Malleable Castings Co., Cleveland, O.

Coupling shank and yoke connection, 1,097,536—Walter E. Coffin, Cleveland, Ohio, assignor to The National Malleable Castings Co., Cleveland, Ohio.

Rail joint, 1,097,555—Henry H. McFarlane, Extension, British Columbia, Canada.

Railway tie, 1,097,564—Andrew Stark, Chicago, Ill.

Hopper bottom dump car, 1,097,577—Hjalmar Zahl, Duluth, Minn.

Track jack, 1,097,581—John H. Burkholder, Ashland, Ohio, assignor to The Elite Manufacturing Co., Ashland, Ohio.

RAILWAY REVIEW

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The Master Car Builders' Association.

PROGRAM OF THE FORTY-EIGHTH ANNUAL CONVENTION, ATLANTIC CITY, N. J., JUNE 10, 11 AND 12, 1914.

The meetings of the forty-eighth annual convention of the Master Car Builders' Association will be held as heretofore in the Greek Temple on the Million-Dollar pier at Atlantic City, New Jersey, June 10, 11 and 12, 1914. The president, the executive committee and the secretary will have their offices in the Marlborough-Blenheim hotel, which has been selected as headquarters. The enrollment committee will be located in the entrance to the pier and each member of the association, immediately on arrival, is requested to go to the enrollment booth, register and procure his membership button showing his registration.

The meetings will begin promptly at 9:30 a. m., and members should arrange to be on hand promptly. The following is the program as arranged for the several sessions:

FIRST DAY—(Morning Session).

WEDNESDAY, JUNE 10, 1914.

9:30 a. m. to 1:30 p. m.

Address by the president..... 9:30 a. m. to 10:30 a. m.
 Reading of the minutes of the last meeting 10:30 a. m. to 10:35 a. m.
 Report of secretary and treasurer.... 10:35 a. m. to 10:50 a. m.
 Assessment and announcement of annual dues; appointment of committees on correspondence, resolutions, obituaries, etc. 10:50 a. m. to 11:00 a. m.
 Election of auditing committee..... 11:00 a. m. to 11:05 a. m.
 Unfinished business 11:05 a. m. to 11:10 a. m.
 New business 11:10 a. m. to 11:20 a. m.
 Discussion of reports on:
 Nominations 11:20 a. m. to 11:30 a. m.
 Revision of Standards and Recommended Practice 11:30 a. m. to 12:00 m.
 Train Brake and Signal Equipment. 12:00 m. to 12:30 p. m.
 Brake Shoe and Brake Beam Equipment 12:30 p. m. to 1:00 p. m.
 Car Wheels 1:00 p. m. to 1:30 p. m.
 Adjournment.

FIRST DAY—(Afternoon Session).

WEDNESDAY, JUNE 10, 1914.

3:00 o'clock p. m.

This session will be devoted exclusively to a discussion of the revision of the Rules of Interchange, the discussion to form a part of the proceedings. At this session the following reports of committees will be considered:

1. Arbitration committee.
2. Revision of prices for labor and material.

SECOND DAY.

THURSDAY, JUNE 11, 1914.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:

- Coupler and Draft Equipment..... 9:30 a. m. to 10:30 a. m.
 Safety Appliances 10:30 a. m. to 10:45 p. m.

Rules for Loading Materials..... 10:45 a. m. to 11:30 a. m.
 Interline Inspection 11:30 a. m. to 11:40 a. m.
 Car Trucks 11:40 a. m. to 12:30 p. m.
 Train Lighting and Equipment..... 12:30 p. m. to 1:00 p. m.
 Tank Cars 1:00 p. m. to 1:30 p. m.
 Adjournment.

THIRD DAY.

FRIDAY, JUNE 12, 1914.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:

Damage to Freight by Unloading
 Machines 9:30 a. m. to 10:00 a. m.
 Specifications and Tests for Materials 10:00 a. m. to 10:30 a. m.
 Car Construction 10:30 a. m. to 11:00 a. m.
 Retirement of 40,000 and 50,000 lb. Capacity Cars from Interchange Service 11:00 a. m. to 11:30 a. m.
 Unfinished business; reports of committees on correspondence, resolutions, and such other committees as may be named during the convention 11:30 a. m. to 11:45 a. m.
 Election of officers 11:45 a. m. to 1:30 p. m.
 Adjournment.

Report Will Recommend Increase in Railway Mail Pay.

The United States commission on railway mail pay, of which former Senator Bourne is chairman, has completed an extended investigation of the question of compensation for carrying mail, and will present a report embodying the result of its deliberations, to congress, this week. The report will be accompanied by a draft of a bill providing a new basis of compensation for the railways. It is understood that the report, which is a voluminous document, condemns the present system of compensating the railroads for carrying the mail as antiquated, inaccurate, and unfair to both the government and the transportation lines. The defects in the present plan are pointed out in great detail. It is proposed that the postoffice department be authorized to determine the number of cars, half cars, and quarter cars required to carry the mail on each route. The government then would pay for the space in these cars ordered by the department, whether such space be entirely filled with mail matter or not. The rate of compensation proposed is 22½ cents a car mile. This is 10 per cent less than the 25 cents a car mile earned by the railroads for carrying passengers. The railroads now are receiving about \$51,000,000 for carrying the mails, exclusive of the increase allowed for transportation of parcel post matter. On the new basis they will receive about \$61,000,000 for carrying matter for which they now are paid \$51,000,000. The total compensation, however, will be greatly increased by payment for the parcel post. The carriers were losing about \$15,000,000 on the transportation of the mails before the parcel post system was created. Since that time this loss has been increased. The postoffice department has denied the railroads' estimates of losses and claimed that the carriers were being paid about \$9,000,000 too much for the mail service before the institution of the parcel post. While it is proposed that congress shall fix the basis of compensation, the commission's bill provides for a review of the rates by the Interstate Commerce Commission upon the complaint of any railroad.

Cost of "Full" Crew Laws.

The Special Committee on Relations of Railway Operation to Legislation has issued a revised bulletin, which shows the cost, at present, to the railways of the United States of laws affecting the size of train or switching crews

(known as "full crew laws"). Of 163 roads having a mileage of 202,369 miles, 65 operating 31,673 miles are not affected. The cost to the others aggregates \$5,769,174 per annum.

Commission Condemns Private Line Switching Charges.

The Interstate Commerce Commission handed down a decision, June 2, in the case of the Muncie & Western R. R., a line less than three miles long, holding that "there is no justification for the allowance to it by the connecting trunk lines of a switching charge." The commission holds that the line is a private facility of Ball Bros. Glass Mfg. Co., of Muncie, Ind. The report, written by Commissioner Harlan, says: "The record presents a remarkable example of the devices resorted to by industrial companies for exacting allowances from the trunk lines on their own traffic. Here we have a plant railway, representing a total investment of \$28,000, upon which there accrues to the proprietary interests an annual net revenue of nearly 50 per cent, although the plant railway owns neither cars nor locomotives and does not itself turn a wheel."

Reports Required Showing Location of Freight Cars.

The Interstate Commerce Commission has issued an order which requires railroads of the United States to file a monthly statement with the commission showing in detail the exact location of all freight cars which are engaged in interstate commerce. The first report is to be as of June 1, and must be in the possession of the commission not later than Wednesday, June 10. Railroads operating 250 miles or under will not be required to make out their lists in detail, but will be given permission to make their statements in summary only.

Empress of Ireland Sunk With Appalling Loss of Life.

The Empress of Ireland, a large steamship of the Canadian Pacific Ry., plying between Quebec and Liverpool, was sunk in the St. Lawrence river, early Friday morning, in collision with the Storstad, a Norwegian collier. Only a small proportion of the passengers and crew were rescued, the latest estimate being that 1027 lost their lives, and 452 were saved. The Empress of Ireland was outward bound, and the place where the disaster occurred was off Father Point, about 200 miles down the river from Quebec. A fog prevailed at the time, and through some misunderstanding, the Storstad struck the ill-fated vessel in such a manner as to tear away a large section of the side, and it sank in about seventeen minutes.

Stevens Bill Favorably Reported.

The house committee on interstate commerce, ordered, on May 27, a favorable report on the Stevens bill, which gives the Interstate Commerce Commission the same supervisory powers over the physical property of railroads as it exercises in the matter of rates and practices. The bill empowers the commission to make inquiries into conditions of rolling stock and road bed and to prescribe the kind of cars that shall be used, to enforce orders requiring the use of safety devices of all kinds, train control and every other detail of the operation of a railroad train. The bill provides that 10 years from the date of its passage all trains in the United States carrying passengers or mail shall be built entirely of steel or have a steel underframe. Penalties are provided for violation of the law.

Resolution for Investigation of New York Central Lines.

Senator Norris, of Nebraska, introduced into congress, on May 28, a resolution reciting the community of ownership and control of the roads comprising the New York Central system, and directing the United States Department of Justice to inquire whether the railroads constitute a combina-

tion in violation of the Sherman anti-trust act. The resolution also asks the attorney general if his department contemplates any action for the dissolution of such a combination. It alleges that the New York Central, by control of the Lake Shore & Michigan Southern and other railroads and steamship lines, controls "four competing lines of transportation between Chicago and Buffalo and two competing lines between New York and Buffalo." "To my mind it is perfectly apparent that this combination in all its branches is in violation of the Sherman anti-trust law," declared Senator Norris, in a statement on his resolution. "Right now, the New York Central is engaged in bringing about a more complete consolidation of these roads, and it seems to me the time is ripe for action." On objection by Senator Reed action on the resolution was postponed, and on June 1, by a vote of 33 to 20 it was referred to the interstate commerce committee. The effect of sending the resolution to the committee is to delay action, and Senator Norris objected to that course. Other senators, some of them Democratic leaders, objected to calling on the attorney general to disclose his intentions in a matter which might be the subject of litigation.

State Purchase of B. & M. Stock Proposed.

Governor D. I. Walsh, of Massachusetts, submitted to the state legislature, June 1, an agreement between the federal authorities and the New York, New Haven & Hartford R. R., providing for the separation of the Boston & Maine and the New Haven systems. As a part of his message upon the subject the governor recommended that the voters be allowed to decide whether the state should purchase the stock of the Boston & Maine, now held by the Boston Railroad Holding Co. for the New York, New Haven & Hartford. "The agreement," the message says, "provides for the appointment of five representative men, called liquidators, to whom shall be transferred the stock in the Boston Railroad Holding Co. now being held by the New Haven, and whose duty it shall be to liquidate or sell the stock of the Boston & Maine R. R. held by the Boston Railroad Holding Co. These liquidators are obliged under the agreement within 2½ years to sell the stock of the Boston & Maine now owned by the Boston Railroad Holding Co. to such persons as they deem proper, provided that such shares shall not be offered to the stockholders of the New Haven company as a class, nor be sold to the New Haven company, either directly or indirectly to be held in its interest, or so as to re-establish in any manner the combination and control which it is the purpose of this agreement to terminate."

Notification of Mileage Detached.

The Pennsylvania Railroad has instructed all conductors of passenger trains in detaching mileage from mileage books to notify each passenger the number of miles covered by his journey. This was done in order to enable the passenger to check up the amount of mileage detached and also to insure accuracy on the part of conductors in detaching the correct amount. In addition to these instructions, the company is now commencing a plan whereby passengers in sleeping cars will be notified as to mileage lifted by means of a slip inserted in the mileage book.

Opening of Parr Shoals Hydro-Electric Plant.

The Parr Shoals Power Co.'s new 30,000-h.p. hydro-electric development near Columbia, S. C., recently completed by the J. G. White Engineering Corporation, of New York, was officially opened May 30, with much ceremony and a great deal of enthusiasm. E. W. Robertson, president of the power company, was the host. The completion of this development marks an epoch in the industrial development of Columbia, where natural facilities and fine location waited only for the introduction of cheap power for a boom

in the city's enterprises. The Parr Shoals Power Co. is a subsidiary of the Columbia Ry., Gas and Electric Co., of Columbia, S. C., and the new plant supplements the steam and hydro-electric stations of the parent company, which are rated at 14,500 horsepower. The new station comprises a concrete dam 2200 feet long across the Broad river about 30 miles above Columbia. A modern fireproof power house has been provided for the power generating units. Provision has been made for the eventual development of about 30,000 h.p. The present installation comprises five generating units, operating at 35 foot head, which will generate 18,000 h.p. Current at 60,000 volts will be transmitted to Columbia over a double circuit, steel tower transmission line.

Aerial Transportation.

It is announced in Chicago that a regular transportation service between Chicago and Lake Forest, 30 miles, by two hydroaeroplanes, operating over Lake Michigan, will be established June 4. One machine carries six passengers and the other four; and there are to be two trips each way daily; the running time being 30 minutes, and the fare \$10. The machines belong to Mr. Harold McCormick and Mr. Jack Vilas, residents of Lake Forest, which is Chicago's wealthiest suburb.

Railroads as Viewed in the Early Days.

Alexander Wells, an old citizen of Wellsville, Ohio, has a copy of an interesting and novel document issued by the school board of the town of Lancaster, Ohio, in 1828. The question of steam railroads was then in its incipient stage, and a club of young men had been formed for the purpose of discussing their value and feasibility. They desired the

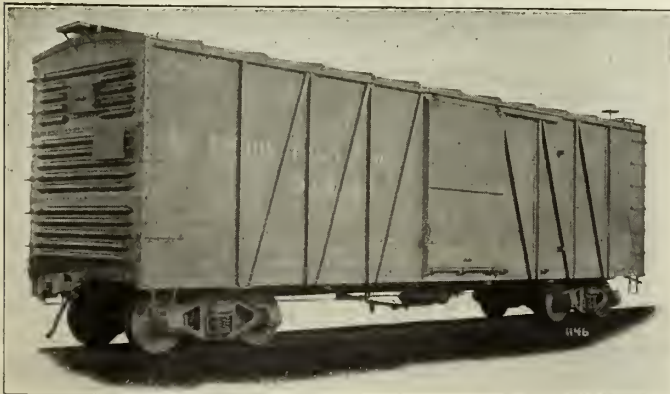
use of the schoolhouse for purposes of debate. This was looked upon by the members of the school board as an innovation bordering upon sacrilege, as indicated by their reply to the request, which is the document in the possession of Mr. Wells. It reads as follows. "You are welcome to the use of the schoolhouse to debate all proper questions in, but such things as railroads and telegraphs are impossibilities and rank infidelity. There is no word of God about them. If God had designed that His intelligent creatures should travel at the frightful speed of fifteen miles an hour, by steam, He would clearly have foretold it through His holy prophets. It is a device of Satan to lead immortal souls down to hell."

B. & O. Lines Encourage Ownership of Homes.

Employees of the Baltimore & Ohio lines with an ambition to own their homes are being assisted in securing desirable properties at satisfactory terms by an arrangement made by the Employees' Relief Department, through which the railroad men are informed concerning real estate activities on the various divisions of the road. Homes that are for sale are brought to the notice of the employees, with complete information as to the price, value and location. Investigations of properties are made for the employees at the expense of the company. Payment on homes are taken care of through the savings and loan features of the relief department in order that the railroad men may carry on their payments in monthly installments. In carrying out this policy, the railroad believes that first of all it improves the economic condition of the men in its employ and raises the grade of service by insuring a class of employees who embody the qualifications of good citizenship. Information about homes is posted on bulletin boards at terminals and in various offices of the service.

Steel Box and Automobile Cars for the Union Pacific R. R.

The Union Pacific R. R., the pioneer in the introduction of the all-steel box car, has for some months been developing specifications for further cars of this variety, which it is expected to order in considerable numbers, when in the opinion of the mechanical officers of the road, the details have been made sufficiently perfect to warrant such action. The cars described herewith, were built for this road from tentative specifications, as samples, by the Bettendorf Company, and represent a very recent development in steel house car construction. The side frames are made to carry approximately three-fourths of the load, permitting the use of relatively light underframes, and by flanging the side plates and riveting them to the webs of the Z-bar side posts, the interior has been left unusually free from projecting rivets.

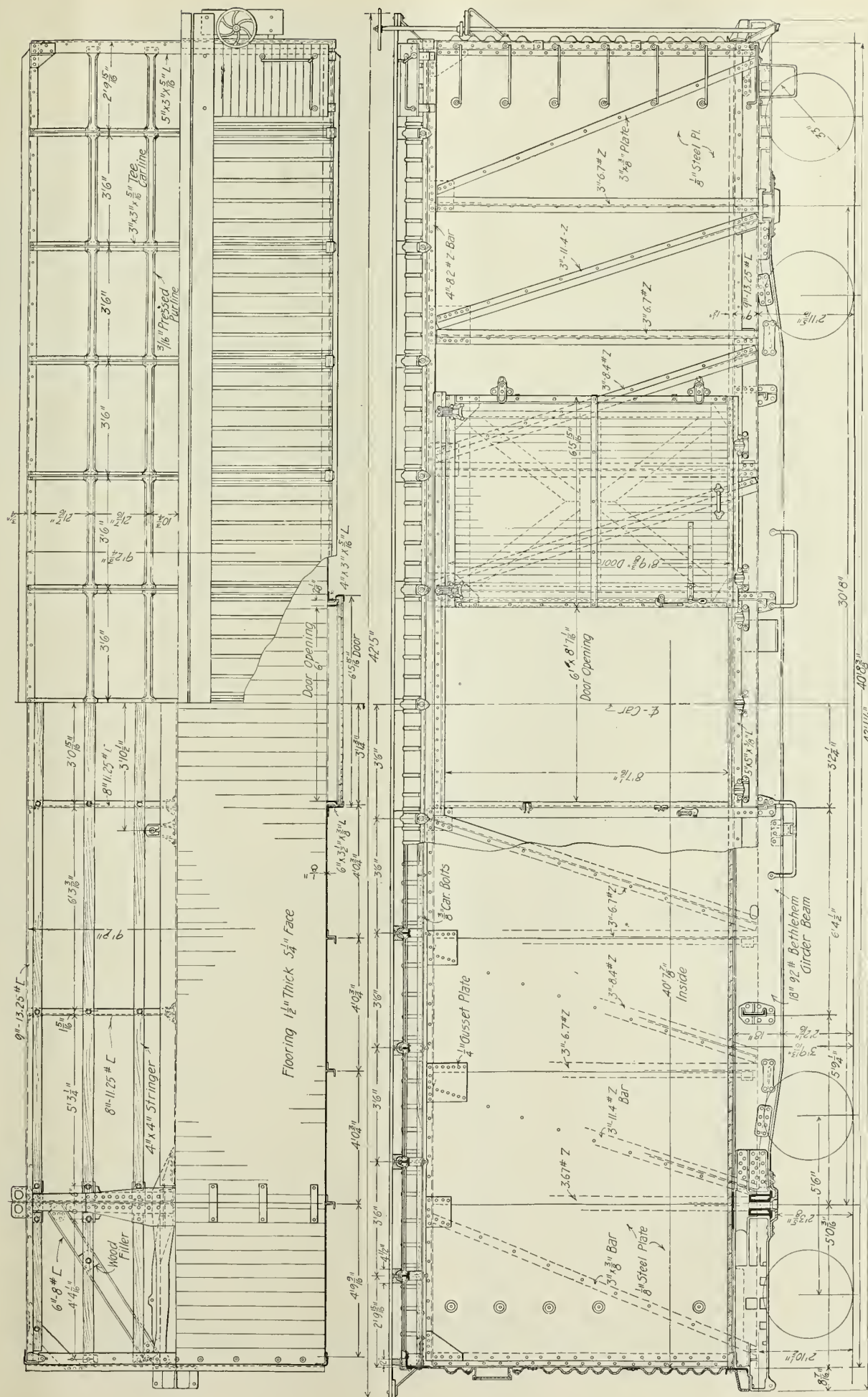


Experimental Steel Box Car for the Union Pacific R. R.

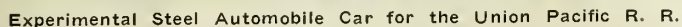
The Union Pacific R. R. has lately received from the Bettendorf Company sample all-steel box and automobile cars as illustrated, that involve some very original and interesting features of construction. Exception may be taken to the term "all-steel" as applied to these cars in that the floors and the longitudinal floor stringers, the side doors, and the running boards are of



Interior, Experimental Steel Box Car for the Union Pacific R. R.

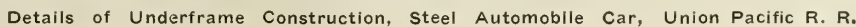


Details of Superstructure Construction, Steel Box Car, Union Pacific R. R.



The underframes of these cars are of the well known Betten-

The automobile car differs from the 40-foot box car in being ten feet longer and in having a correspondingly heavier underframe to bring its capacity also up to 50 tons. The center sill is accordingly made up of a 20-inch by 112-pound girder beam. Further rigidity is secured in the underframe of the automobile car by riveting to the needle-beams, $3\frac{1}{2}$ by $2\frac{1}{2}$ by $\frac{1}{4}$ -inch angles which run continuously from a point just back of the bolster at one end, where connection is made by means of short angles to the web of the center sill, diagonally outward to parallelism with the side sills at the middle of the car, and on to a corresponding point at the opposite end where connection is again made to the web of the center sill. The body of the automobile car also differs in construction from that of the box car, in that double side doors, placed off center on either side are provided, as well as is a double steel door at one end of the car. The posts to which these latter doors are attached are of box shaped steel construction with wooden fillers. The opposite end of the automobile car is provided with a Murphy corrugated steel end, in three sections, same as is applied to both ends of the box car. Another feature introduced in the automobile car consists of a series of nine brace or stanchion pockets 4 feet 8 inches from the floor on either side, provided for the purpose of insert-



and sufficiently large to take care of 1000 passenger cars and 25,000 freight cars, shopping the passenger cars every fifteen months and the freight cars as their condition makes it necessary. The man in charge as master mechanic, superintendent, or general foreman, should be a man capable of handling and directing men in addition to being a good practical mechanic. His staff of foremen under him should be men also capable of directing men as to the best and most economical method of doing work. They should spend at least nine hours each day in the shop among the men and one hour of each day in the office. In addition to having a capable and efficient staff of foremen to direct operations, other important things are to be considered and are mentioned herewith in the order in which their importance is related to the plan of organization.

The first is the stores department. No shop can be expected to produce its maximum output unless the necessary materials are furnished promptly. The robbing of cars of materials in order to get out others is bad practice and should not be followed, although it is done in a great many cases. A smooth-running organization in a railroad repair shop, is directly dependent on an efficient stores department, capable of performing its part, which can best be done by having, in addition to a general store house, a sub-store house in the passenger coach repair shop and one in the heavy repair freight shop. These sub-stores should be centrally located in each of these departments and should be in charge of a capable man with sufficient help to keep up the stock and, when issued on duly signed requisitions, to charge it to the proper accounts.

The men in charge of these respective stores should look over the material situation each day and consult the foreman as to whether or not there is any material wanted that is delaying the work. All castings and other materials that require machine work should be delivered to the machine shop and after the necessary work has been done, they should then be put in stock. This applies to pedestals, oil boxes, couplers, etc. If this is done it saves delay and is a great saving of money. There should also be a capable man located at the scrap bins, as it has been found by practical experience that more or less serviceable material, both new and second hand, finds its way to the scrap bins. All such material should be picked out and returned to the proper department to be used.

The next thing of importance in connection with an efficient organization of forces in a railroad shop is that the forces should be kept steadily employed. Putting on men only to lay them off as soon as business falls off a little is a hardship to the men and is not profitable to the company. Repairs made to cars during these rush periods are not generally satisfactory. This is due to the fact that many of the men picked up are not capable of doing the work in the manner it should be done. Railroads that find steady employment for their men are the roads that are able to keep good men who are capable of turning out good work. This is a great assistance in getting a shop up to the maximum output and in developing an organization to be proud of.

Piece work is another important matter in connection with shop output. The great advantage piece work has over day work is that it is not necessary to follow up the men as closely to keep them employed as if they were on a day work basis. However, the fact that it requires the foreman and piece work checkers to follow up the work constantly to see that it is done in a proper manner should not be overlooked. Establishing piece work in a railroad repair shop is no small task. It is not for a day or month or year but for years to come. Conditions should be studied and no speculation should be indulged in. Each job should be paid for according to what it is worth. The rule should be to pay for each operation what that job is worth and in setting prices they should not be set either by the fastest man or by the slowest man, but by the average man, and the prices should be such that he can, by working faithfully, make 25 per cent more than he formerly made at day rates. One will find the men in a piece-work shop

constantly figuring how they can accomplish a certain amount of work in the least possible time. This is only natural as the more the man does the larger his returns will be, and all men with the proper ambition should and do feel that way.

Another important subject in connection with an efficient organization in a railroad repair shop, is the means for supplying the men with necessary tools. A man can not accomplish much unless he has suitable tools to work with. Most railroads furnish such tools as bars, sledges, wrenches, drifts, and cold chisels. This class of tools should be furnished each man whose work requires such tools and he should be allowed to keep them as long as he remains in the service. However, special tools, such as air drills, hammers, etc., should be kept in the tool room and maintained in repair by the man in charge, who will also issue them to the men and see that they are returned when not in use. Air tools should be turned in at the close of each day and placed in oil over night. The tool room should be in charge of a man who is capable of having made, or of making himself, suitable tools for such different classes of work as may be required.

In building up an organization of forces in a railroad repair shop, civil service methods should be followed and as vacancies occur, men from the ranks should be promoted. If this practice be followed, the ambitious men will try to fit themselves for better positions in anticipation of opportunities for attaining them. Among large bodies of men, such as are employed in railroad shops, there are those who have capacity and they should be given an opportunity to develop it. It is a great incentive for men to know that their employers follow this policy and it is bound to be productive of good results.

In placing the men on the different classes of work, it is generally considered that the best results can be obtained in the coach shop by working four men in a gang on truck work and two men together on platforms, while on general repairs and on cars to be burned off and resheathed, four men usually constitute a gang; on light repairs such as on battens, crown mouldings, and other light work, two men; inside finishers, four men; strippers, four men; trimmers, four men; pipe fitters, two men; gas fitters, two men; for all operations in the cabinet and paint shops, two men; while in the upholstering department, men may work single handed to good advantage. In the freight shop and repair yards on heavy and light repairs, two or four men per gang work to the best advantage; this also applies to truck repairs. It is the best plan to have two general classes of men in the freight shop, distinguishing them as "body" men and as "truck" men.

All heavy repair cars that require rebuilding should be placed on a track set apart for the purpose and stripped of roofing, siding, and lining, etc., in case these parts are to be renewed, before the cars go in the shop. This can be done by cheap labor and it also saves littering up the shop. The old wood reclaimed from this source can be utilized for firing engines or can be sold as may be desired. It is the best practice in the freight department to have all the switching done at night in order to save time and to avoid accidents. It should be the duty of the general foreman of that department to furnish the switching crew at the end of each day, with a list showing all cars to be switched out ready for service. He should also furnish the switchman with a list of the cars to be set in the shop. It is considered the best plan to place all foreign cars on tracks to themselves as they should be given the preference and hurried back into service as soon as possible. Heavy repair steel cars should also be placed to themselves on certain tracks assigned for that purpose.

Two inspectors competent to judge as to just what repairs a car should receive should be assigned to the storage yard and should inspect all cars before they go into the shop, carding the cars to show the repairs that the car should receive. If, however, it is found that the car should receive repairs in addition to those designated by the inspectors, the foreman should be empowered to add to the card such other repairs that, in his

judgment, the car should receive. This method gives the men to understand just what repairs are needed and enables them to proceed intelligently. After the repairs are made the car should again be inspected to see that the work has been done in a satisfactory manner, and the items checked off on the card. The inspector should then "O. K." the card and turn it over to the piece work inspectors to have the prices filled in on each item so that the men may be paid for the work done in accordance with the piece work schedule.

It should be the duty of each foreman in the freight yard, after he has started his men to work each day, to make an inspection of all foreign cars set in for repairs and ascertain the nature of repairs each car should receive. If castings are needed, he should promptly send in his requisition for them. Such forgings as may be needed should be sketched and ordered made in the blacksmith shop. A competent man well versed in M. C. B. rules should follow up all repairs to foreign cars and render the proper forms for the work that is to be billed for according to the rules. He should also keep on the lookout for home cars carrying M. C. B. defect cards and see that they are removed and bills rendered on them also. This is an important matter and should be followed up closely.

The office force should be in charge of a chief clerk, who should be a man with a good general knowledge of matters connected with that department. He should open all mail, (unless personal) and see that the information contained therein is conveyed to the proper individuals, calling attention of the shop master mechanic or superintendent to such matters as require his personal attention.

In addition to a shop superintendent and his chief clerk, a shop of the capacity referred in the beginning of this article should have a force comprising the following individuals: In the coach department, a general foreman, truck foreman, body foreman, mill foreman, lumber yard foreman, tinner and pipe fitter foreman, inside finish foreman, stripper and trimmer foreman, cabinet shop foreman, upholstering foreman, painter foreman, assistant painter foreman, varnish room foreman, piece work inspector (two) and a car inspector on the shipping tracks. This does not include the stores department help as that would come under the stores department. In the freight shop the following force would be required: One general foreman, four heavy repair foremen, four light repair foremen, one machine shop foreman, one labor foreman, six car inspectors, and four piece work checkers. With this amount of supervision, the shop forces would be able to take care of an output of sixty cars per month in the coach shop, approximately thirty general repair freight cars per day, and 200 cars receiving what are usually termed light repairs.

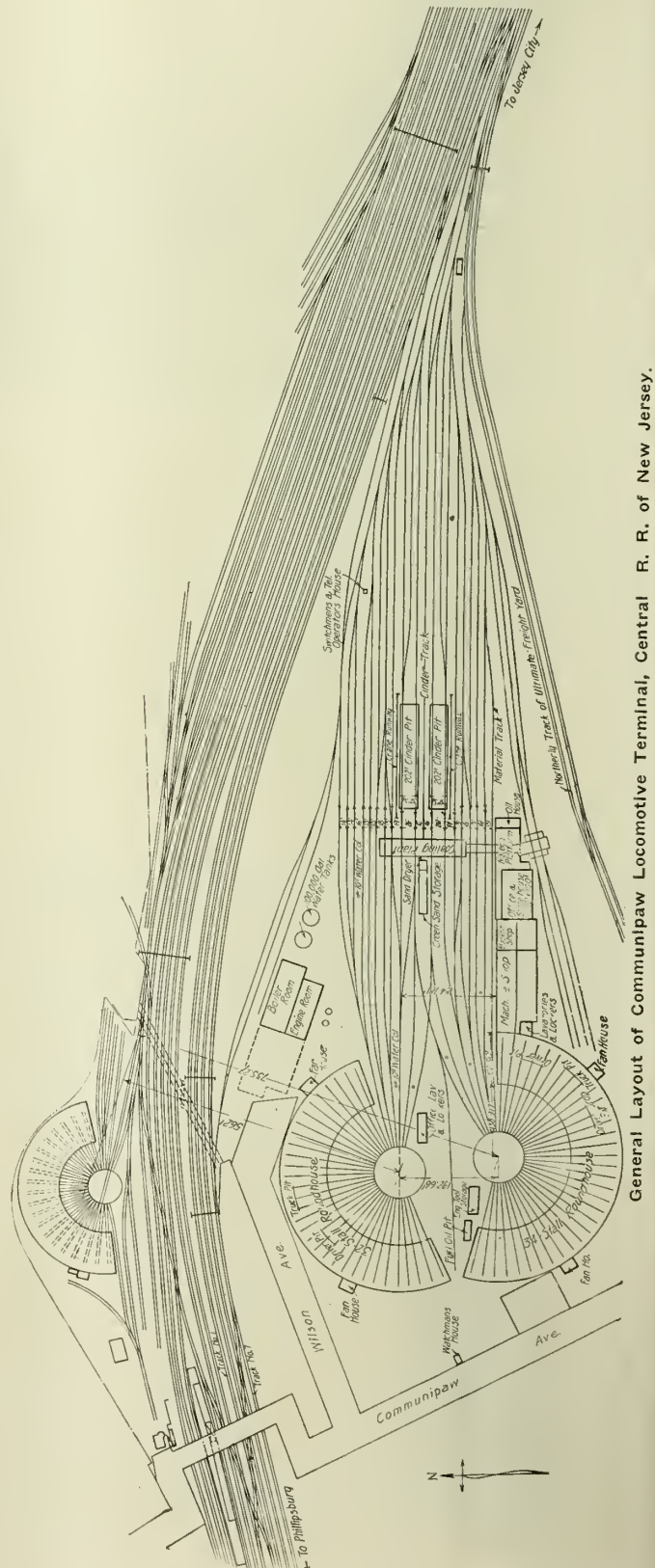
Progress of Steel Passenger Equipment Construction.

The Special Committee on Relations of Railway Operation to Legislation has issued the following bulletin under date of June 1:

Seven bills are pending in congress requiring the replacement of wooden passenger train equipment in steel. The periods suggested during which this is to be done vary from January 1, 1915, to ten years from enactment of the law; in some cases with extensions of time in the discretion of the Interstate Commerce Commission. Three bills are pending which, among other things, leave to the discretion of the Interstate Commerce Commission the operating conditions under which wooden cars must be replaced with steel equipment, and the time for such replacement.

To ascertain the progress of the building of steel and steel underframe passenger equipment, and to develop the cost of reconstruction in steel of the present wooden passenger equipment in the country, Circular No. 53 was issued to the railways on January 2, 1914. Replies to that circular having been received from 227 companies, operating 236,720 miles in the United States, and 58,660 passenger equipment vehicles, with 3144 under construction on January 1, 1914. Replies have also been received from eleven companies, operating 27,030 miles in Canada, and 5118 passenger equipment vehicles, with 240 under construction on the same date.

The estimates and percentages given hereafter apply only to the equipment operated by roads in the United States. It will be noted that there were but fifteen wooden passenger train cars under construction January 1, only two of which were intended for the use of passengers.



General Layout of Communipaw Locomotive Terminal, Central R. R. of New Jersey.

Acquired in	Total Number.	Percentages		
		Steel.	Steel Under- frame.	Wood.
1909.....	1880	26.0%	22.6%	51.4%
1910.....	3638	55.4	14.8	29.8
1911.....	3756	59.0	20.3	20.7
1913.....	3350	63.0	30.4*	6.6
1912.....	2660	68.7	20.9	10.4
January 1, 1914 (under Construction).....	3144	86.9	12.6*	0.5

*This figure includes wooden cars reconstructed with steel underframe.

The rapid increase in steel and steel underframe cars is shown below:

January 1, 1909	629	673
January 1, 1910	1117	1098
January 1, 1911	3133	1636
January 1, 1912	5347	2399
January 1, 1913	7271	3296
January 1, 1914	9492	4608
Increase 1914 over 1909.....		8863
Increase 1914 over 1909.....		1409%
		585%

The number of wooden cars in service January 1, 1912, was 48,126. There are now in service approximately 44,560 indicating the retirement from service of 3566 wooden cars in two years. Of this number 2366 were retired during the calendar year 1913.

The approximate cost of replacement of wooden cars is indicated in the following tabulation:

	Number	Average cost	Amount
Postal	582	\$11,000	\$ 6,402,000
Mail and baggage	2672	10,000	26,720,000
Mail, baggage and passenger.....	584	10,000	5,840,000
Baggage and passenger.....	3600	10,000	36,000,000
Baggage or express.....	7259	8500	61,701,500
Passenger	22,487	12,800	287,833,600
Parlor, sleeping, dining	6405	22,000	140,910,000
Business	740	15,000	11,100,000
Motor	231	20,000	4,620,000
Total	44,560		\$581,127,100
Annual interest charge at 5 per cent.....			\$ 29,056,355

The charge to operating expenses under the classification of accounts of the Interstate Commerce Commission, assuming a value of \$400 per vehicle replaced, will be \$178,240,000.

Locomotive Terminal Facilities for the C. R. R. of N. J., Communipaw, N. J.

This terminal has been designed to handle both freight and passenger locomotives in large numbers, an engine house with a 100-foot turntable having been provided for the locomotives of each variety. The close proximity of these structures permits interchange of service between the two should the necessity therefor arise. A particularly interesting feature is the large concrete coaling station from which ten locomotives can be coaled simultaneously. The cinder pits, of the submerged type are laid out on a correspondingly elaborate scale.

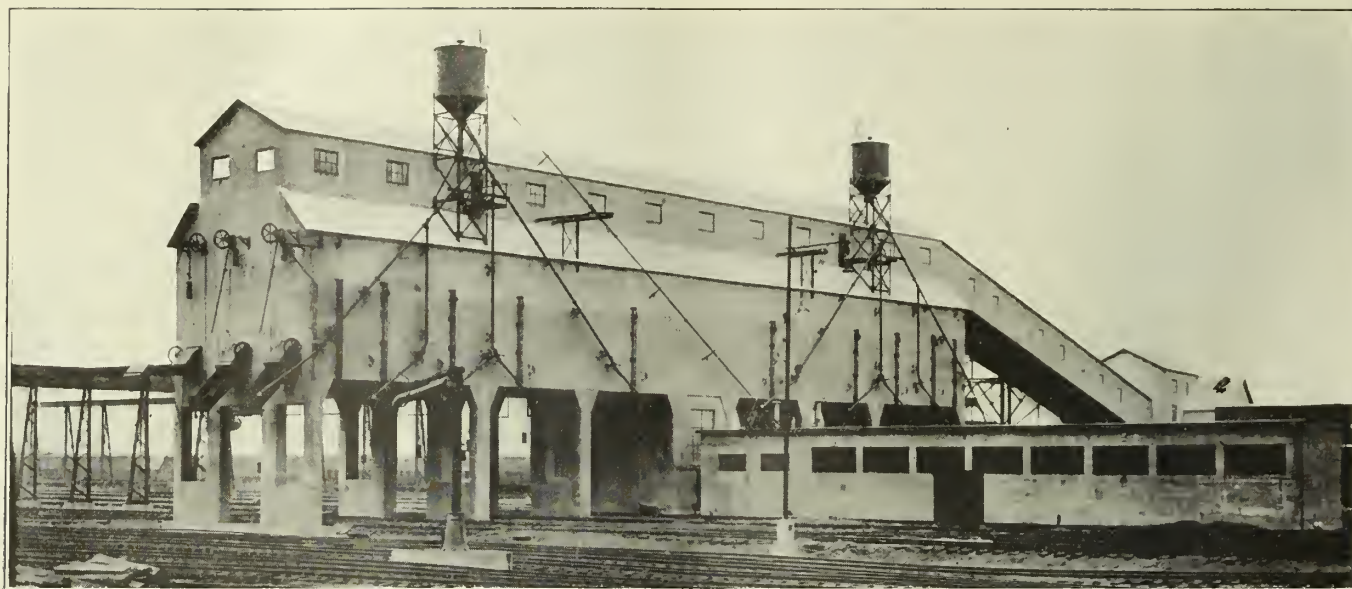
By reason of demand for increased facilities for rapidly and economically handling locomotives, the Central Railroad of New Jersey, has had constructed at Communipaw, N. J., a modern locomotive terminal which for its size, convenience and up-to-date features of construction, is not excelled by any other plant in the country. The work was designed and executed by Westinghouse Church Kerr & Co., engineers and constructors, of New York City, in co-operation with and under the direction of Joseph O. Osgood, chief engineer, and A. E. Owen, principal assistant engineer, of the Central

Railroad of New Jersey. The plant is located on the south side of the main line tracks about one mile west of the passenger terminal and is in close proximity to the freight yards, which are located on the opposite side. Located with the freight yard on the one side and the passenger yard on the other, the terminal facilities are arbitrarily divided so that the freight and passenger engines are handled separately.

The sufficient track arrangement provides the necessary flexibility to permit of the free use of either of the houses for passenger or freight as may be found necessary or desirable. It has been possible to provide a layout of tracks leading up and into the terminal, especially designed for the quick handling of passenger power, formerly cared for in the two old engine houses at Fiddlers and Communipaw, located on the north side of the main tracks, and through which were handled 30,823 locomotives during the first four months of the present year, or an average of 255 locomotives per day. During the summer months the number of engines handled per day is about 300 which includes all the usual



Machine Shop, Engine House and Turntable, Communipaw Locomotive Terminal, Central R. R. of New Jersey.



Concrete Coaling Station and Sand House, Communipaw Locomotive Terminal, Central R. R. of New Jersey.

performances of cleaning fires, dumping ashes, coaling, supplying sand and water, washing boilers, and inspecting, together with any light running repairs that may be necessary.

These completed improvements consist of a power house to serve not only the engine terminal, but also to take care of all electrical requirements of the railroad from the Jersey City water front to Newark Bay. Two roundhouses, one 34-stall, 100-ft. and one 32-stall, 90-ft., two 100-ft. turntables, machine shop, blacksmith shop, storehouse and office, material platform, oil house, cinder pits, coaling station, sand storage, roundhouse office and toilet building, engineers' locker building and telephone tower with all equipment and service inside of building and in yard.

The ground is principally cinder fill, varying in depth from two to ten feet, on an underlying strata of blue clay, sand, and bog, except where the old shore line runs across the west end of the property. In consequence all the buildings rest on piles with the exception of the west half of the roundhouses where the ground conditions are favorable for footings. The foundations of the buildings consist of concrete pile caps and piers where the concentrated loads are imposed, with reinforced concrete wall girders supporting the building walls. The power house, however, rests on a concrete slab four feet thick, extending under the entire building. This slab is supported on piles spaced equally under the entire mattress. All the buildings are constructed of reinforced concrete, steel, and brick with steel sash, wooden doors, and concrete floor. The roofs of all buildings except the coaling station are covered with three-ply felt roofing.

Power House: The power house is 135 feet long and 92 feet wide with concrete boiler and machine foundations. The building proper is of brick with a structural steel frame for supporting boilers, stack, and coal bunkers; steel sash and doors. Six 250 horse-power Babcock & Wilcox water tube boilers arranged in three batteries of two each are installed and space is provided for an additional battery. Boilers are fed by two reciprocating, duplex, outside end packed, plunger type pumps, either of which is capable of furnishing the maximum amount of water needed for the boiler plant. Stokers are installed. A lined steel stack 10 feet 6 inches in diameter and 75 feet in height above the roof furnishes natural draft aided by automatically controlled turbine type blowers. Feed water and steam piping are of the loop type. A Cochran feed water heater provides feed water at a temperature of about 200 degrees.

Hopper bottom cars deliver coal into a track hopper. The coal is then elevated by means of a bucket elevator, discharging into a flight conveyor which distributes the coal into the bunkers, located over the boiler room. The coal is fed by gravity to the stokers through chutes with gates operated from the boiler room floor. Ashes are dumped from the stoker into a hopper directly underneath. The hopper terminates in a gate. A bucket on a car traveling on an industrial track is manually pushed underneath the hopper, loaded by gravity with ashes and then manually shoved to a point below an electrically driven hoist which elevates the bucket and automatically dumps it into a hopper above the railroad siding. The ash and coal handling arrangement is such that the railroad car is used to bring in coal and load with ashes without changing its position.

Three 600 kilowatt 2200 volt alternating current General Electric turbo generators are installed with space provided for a fourth unit. One steam driven exciter and one motor driven exciter are installed. Two 2500-cubic feet compound steam two stage air compressors furnish air for the engine terminal, also for the operation of switches and signals in the terminal yard between Communipaw and Jersey City and to Elizabethport and Newark on the main line and on the Newark branch. The plant operates normally condensing. In cold weather the exhaust steam is used for heating the several buildings in the terminal. A mixing condenser is located in the engine room basement. As the water used for condensing purposes is taken from the Jersey City mains and metered, condensing water is used over again and cooled in a cooling tower. An automatically controlled motor driven centrifugal pump located in the basement of the plant is used for raising water into elevated tanks when necessary. There is also a 1500-gallon underwriters pump connected with high pressure fire lines in the yard and buildings. Jacket circulating water is returned to the water system through a duplex steam pump.

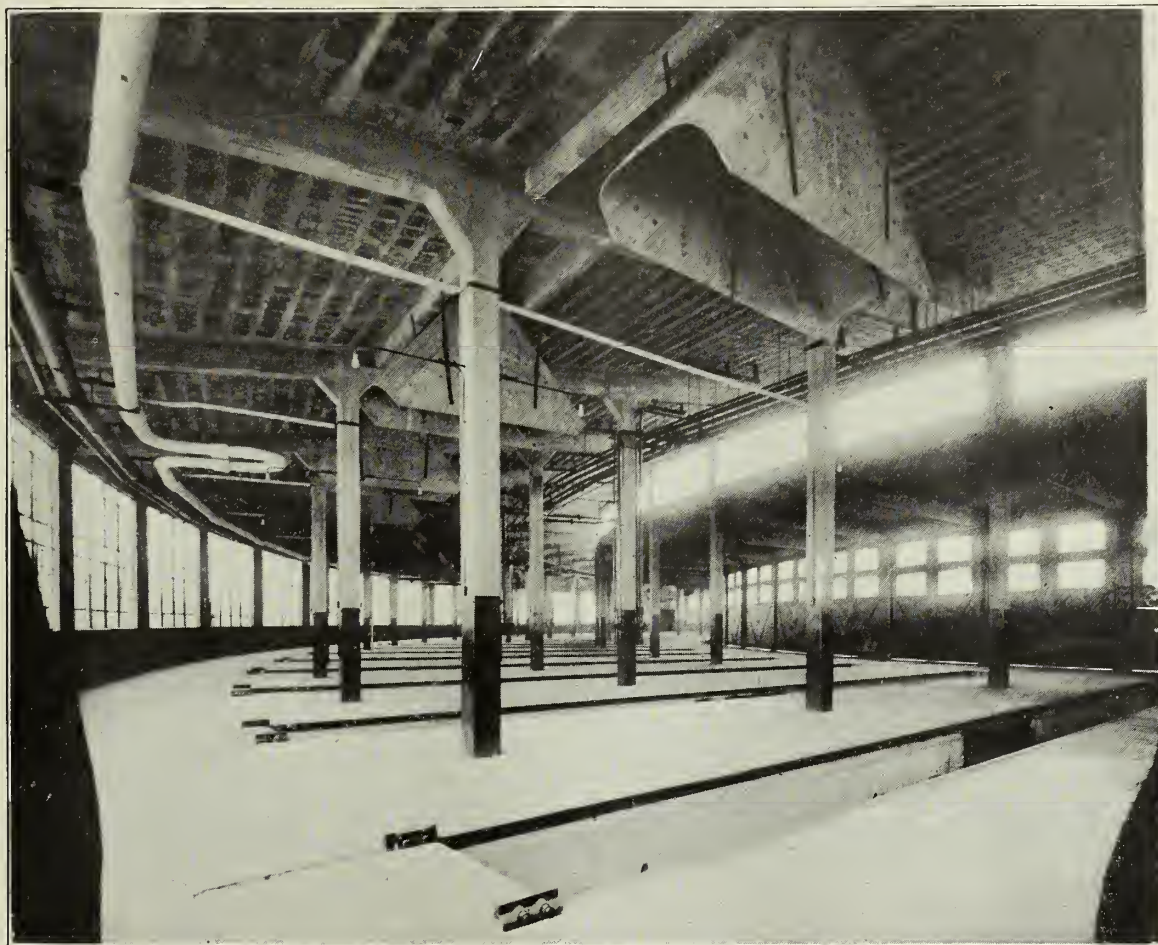
The main switchboard is located on the engine room floor with high tension switches in the basement where the transformers are located. Current is generated at 2250 volts and stepped down to 550, 220, and 110 volts for use at the terminal proper. A ten ton Maris hand power crane spans the engine room floor.

Roundhouses: The roundhouses are constructed with reinforced concrete columns, piers and roof girders with hollow tile and concrete roofs. The rear wall consists of con-

crete piers approximately five feet wide with steel sash between, with an 8-inch brick wall below these windows. This arrangement permits a maximum window space both for lighting and ventilation. The roof line is broken at the first row of columns at the front of the building so as to give a row of hinged sash over each stall. Additional ventilation is provided for by means of three-chamber four-inch hollow tile set in the rear wall above the windows and in the locomotive door lintels. There are also ventilating openings above the sash in the roundhouse monitors. This arrangement follows the Central R. R. of New Jersey standard practice

one driver and truck drop pit and in the 100-foot house two driver and one truck drip pits, each extending over three stalls which have pneumatic jacks for wheels and half ton cranes for handling driver boxes, etc. The entrance doors to the stalls are hinged to pintle posts which are entirely separate from the building construction proper and so fastened to the building columns that the accidental wrecking of a door will not damage the building structure.

Turttables: Each roundhouse is served with a 100-foot deck turntable of heavy construction operated by an electric tractor. Owing to the extreme depth of these turntable



Interior of Roundhouse, Communipaw Locomotive Terminal, Central R. R. of New Jersey.

and provides an outlet for any gases that may collect under the ceiling which is a flat arch giving an unobstructed path for gases to pass out through the ventilator openings. Both houses are heated by indirect system. The fans and heaters are located in the fan houses of which there are two in each house. The hot air is delivered through underground ducts and is discharged through outlets located in the pits and around the rear walls. The floor wearing surfaces are concrete throughout and are reinforced along the sides of the pits to provide bearing for jacking. Each house is provided with steam, air, and water service on columns.

A boiler washing plant has been installed in connection with the 90-foot house which serves 32 stalls. The piping is such as to permit of the system being extended to the 100-foot house should it be desired at a later date. Asbestos smoke jacks are at present installed but the roofs of the houses are so designed and constructed that they could sustain the weight of cast iron jacks should it be found desirable to install them in place of the asbestos jacks. Both houses are lighted by means of Tungsten lamps, the wires therefor being carried in conduits under the floors and in the columns. There is installed in the 90-foot roundhouse,

pits and the shallow grade of the sewer in the vicinity, it was found necessary to provide against the contents of the sewer backing up into these pits. This was accomplished by constructing a deep sump into which both pits are drained. Automatic ejectors discharge this drainage into the nearest sewer at a higher level.

Machine and Blacksmith Shops: Adjoining and directly connected to the 100-foot roundhouse is a machine and blacksmith shop building, the total length of which is 200 feet, the total width 80 feet and the height is 28 feet, over all. A monitor 13 feet wide extends over the entire length of the building and is provided with continuous top hung steel sash operated from the machine shop floor. Toilet and locker room facilities are provided in a small extension located between the main building and the 100-foot roundhouse. Access to this toilet room and locker room may be gained either from the machine shop or the round house.

The machine shop space is 140 feet long by 80 feet wide and has a concrete floor throughout. The equipment consists of small lathes, crank planers, and other similar machines as may be required for light running repairs. Two motor driven line shafts near the north wall furnish power

for the small machines. A motor driven wheel lathe for driving and truck wheel work is located near the center of the building and is served by 4-ton over head trolley. One of the roundhouse tracks is extended through the machine shop into the blacksmith shop. In the southeast corner of the machine shop, space is provided for pipe work. Besides two pipe forges, this space contains an 8-inch pipe machine, pipe racks, benches, etc.

The blacksmith and boiler shop is located at the east end of the building and is separated from the main or machine shop by a fireproof wall. This space is 40 feet wide and 80 feet long and the south half is occupied by the blacksmith shop which is equipped with five down draft forges, each served by a half ton jib crane. A 2000-pound steam hammer served by a 5-ton jib crane is located in the center of the blacksmith shop space. The equipment of the boiler shop consists of motor driven punch and shears, hand bending rolls, flange fire and screw flanger. Heating of the building is by direct radiation and lighting by Tungsten lamps varying from 25 to 500 watts. A concrete ramp is located at the northeast corner of the building. This leads to the material platform by means of which material may be brought directly to the machine and blacksmith shops from the storehouse.

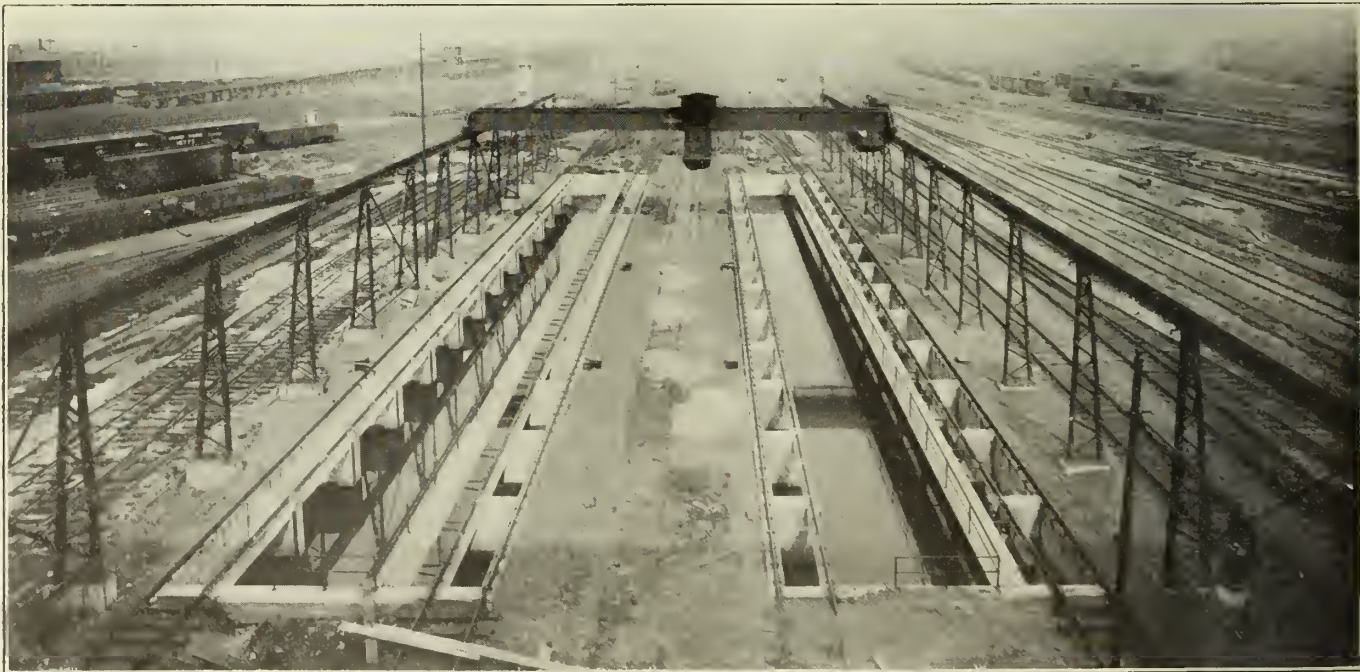
Storehouse and Material Platform: The storehouse is 100 feet long and 60 feet wide and directly adjoins the blacksmith shop building. Its construction is fireproof throughout. Steel bins and counters are used for storing material, so that, except for combustible contents, the fire hazard is reduced to a minimum. The building is at present one story in high but the foundation walls and columns are designed heavy enough for a second story should it be found necessary to construct this addition at a later date. The easterly end of the building is divided by fireproof partitions into offices for the general foreman and the storekeeper and the toilet and wash room. The material platform is 48 feet wide and 80 feet long and extends 12 feet in width along the north side of the storehouse. This structure is built of reinforced concrete and hollow tile with concrete wearing surface.

Oil House: For the storage of various kinds of oil used at the engine terminal an oil house is located at the extreme east end of the material platform. This building is 20 feet

wide, 48 feet long and one story in high and is provided with a basement 10 feet high in which the various oil storage tanks are located. The measuring pumps and boxes for filling the storage tanks are located on the main floor where space is also allowed for storage of waste and grease cakes. The building is lighted by Tungsten lamps and heated by direct radiation at a high temperature to render the oil fluid in cold weather.

Coaling Station: The most interesting structure of the group on account of its size and construction is the coaling station. The main building spans eight tracks and serves an additional track at each end. The structure is 168 feet long, 34 feet wide, and 55 feet high and is of reinforced concrete throughout. The bunkers rest on special steel I-beam girders encased in concrete and the hopper bottoms are built of reinforced concrete and hollow tile. The sides of the bunkers are heavily reinforced to withstand the side pressure of the coal when the bunkers are filled. A monitor extending the full length of the structure is provided with steel trusses with 2-inch plastered concrete sides and is provided with an asbestos roof. The coal is received from the cars by two receiving hoppers from which it is discharged by means of reciprocating feeders into bucket conveying elevators. These conveying elevators carry the coal to the top of the hopper house where it is discharged on two 30-inch belt conveyors running up the conveyor bridge over the top of the bunkers. Traveling trippers running on rails above the bunkers discharge the coal into various compartments.

There are three longitudinal bunkers having a capacity respectively of 430 tons of bituminous, 813 tons of broken, and 430 tons of buckwheat coal. These bunkers are each divided into four compartments by transverse concrete partitions. Each track is served by three coal chutes so that an engine on any one of the ten tracks may be coaled with either bituminous, broken, or buckwheat coal. The conveying machinery is divided into two separate and distinct units from the track hopper to the tripper over the bunker. Each unit having a conveying capacity of 100 tons per hour. Provisions are made however whereby either track hopper, elevator, or conveyor of one unit may discharge its contents onto the elevator or conveyor of the other unit and in addition the tripper are so arranged as to discharge into either one of the three bunkers. This flexibility reduces the possibility of shutting down the entire plant due to a break down or



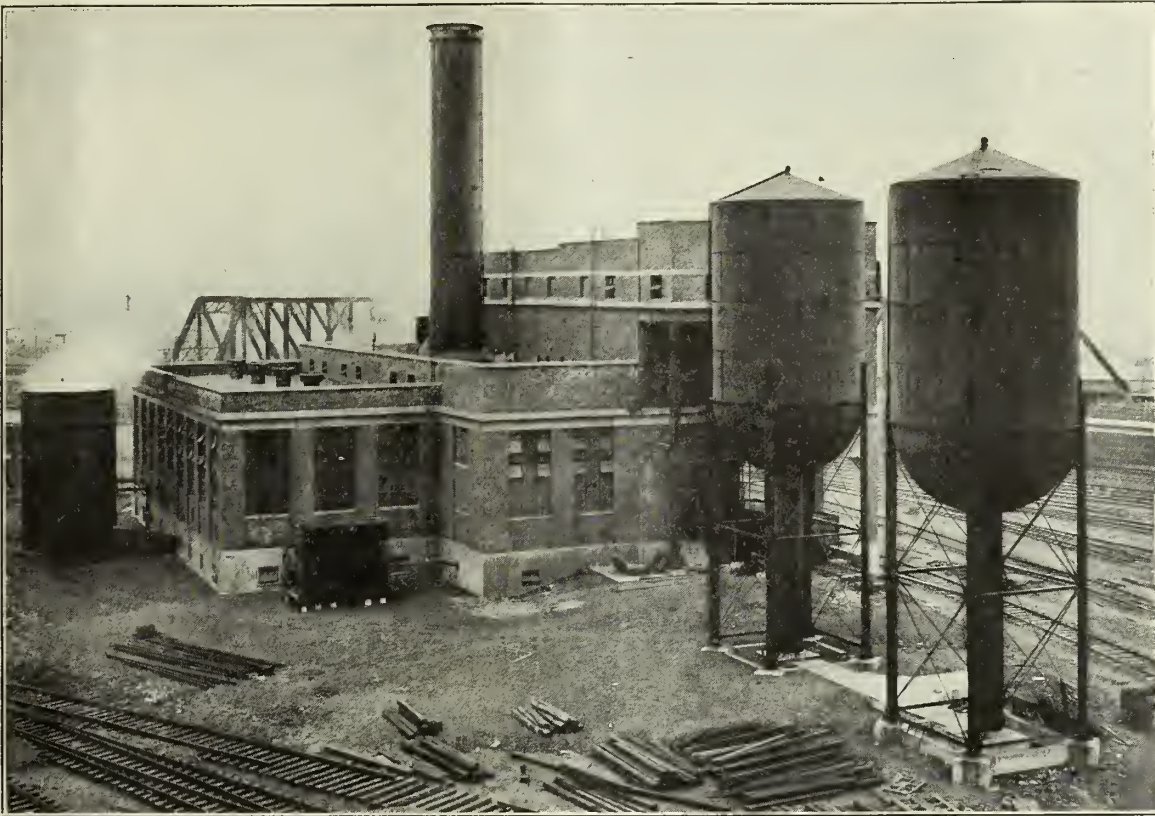
Cinder Pits from Coaling Station, Communipaw Locomotive Terminal, Central R. R. of New Jersey.

other emergency to a minimum. The entire machine equipment is electrically driven.

Suitable stairways, platforms, and walkways are provided from which an inspection of the apparatus may be safely made while the machinery is in operation. Guards are placed over all exposed gears as a protection to the attendants and in addition there are eleven emergency stations from which the entire machinery may be shut down by pressing a button. West of the coaling station and south of the machine shop and store house are the coal storage tracks having a capacity of 40 cars. Provision is made for thawing out frozen coal in the cars on these tracks by means of live steam. Under

inches span and 26 feet above the rail. Aside from the economy and speed in handling engines over the pit this arrangement permits of the coaling of engines from cars by means of the clam shell bucket should occasion arise.

Miscellaneous Buildings: Among the miscellaneous buildings are the engineers tool storage building and the roundhouse toilet and office building. These buildings are 20 and 22 feet wide and 55 and 52 feet long respectively. Both buildings are heated by direct radiation and lighted by Tungsten lamps. The engineers tool storage building is equipped with steel lockers of special design for storing the locomotive engineers' tool chests, etc.



Powerhouse, Communipaw Locomotive Terminal, Central R. R. of New Jersey.

the center bay of the coaling station at the ground level there is a toilet and locker room for use of hostlers, cinder-pit and coaling station employees.

Sand House: Provision for the storing and drying of sand are made in a building west of the coaling plant. This building is of reinforced concrete throughout and is 103 feet long, 16 feet wide, and 14 feet high. The green sand is dried by means of two coal stoves of standard Central R. R. of New Jersey design located in a separate room in the east end of the building. The dried sand is then screened and elevated by means of compressed air to two storage tanks located on top of the coaling station. From these tanks the sand is delivered to the locomotives through cast iron delivery pipes and wrought iron telescoping spouts serving each of the ten tracks.

Cinder Pits: The cinder pits are located about 60 feet east of the coaling plant and are of the submerged type. They are each 200 feet long, 30 feet wide and 12 feet deep and are of heavy reinforced concrete throughout. Each pit serves two tracks which are 26 feet apart center to center, the pits are parallel and are about 58 feet between centers with a track for cinder cars between. The cinders are cleaned out of the pits by a four ton electric traveling crane operating a one and five-eighths yard clam shell bucket. This crane is located on a steel runway 240 feet long, 99 feet 6

The roundhouse office and toilet building is divided by a tile partition into an office room at the east end and toilet and locker room with steel clothes lockers and toilet facilities at the west end. The building is so situated that an unobstructed view of all inbound and outbound tracks in the terminal yard is obtained by the engine dispatcher in the office. The telephone tower is located at the east end of the yard and the operator has full view of all outbound engines so that he can notify the tower man as to their location. This is a wooden building with the operator located on the upper floor.

Tunnel: A tunnel is provided from the power house to the roundhouses for carrying all steam, air, and water service piping, and in addition, all wires and cables for light and power in the buildings. This tunnel is of heavy reinforced concrete construction, water proof, and is six feet wide, seven feet high, and 367 feet long, with a branch 60 feet long running to the 90-foot roundhouse. The tunnel is well lighted and affords ample working space for making repairs.

Water Service: The water piping is divided into two systems. The supply is taken from a 16-inch water main of the Jersey City water service and is discharged by city pressure through altitude valves into two 100,000-gallon steel elevated tanks and then through the low or service system of piping

to eight water columns in the yard for filling engine tanks and also into all of the buildings for general use. A high pressure system of piping is carried around the property and into the various buildings from the firepump in the power house for fire protection.

Sewers: A complete system of sewers has been installed to take care of all roof drainage and all drainage from engine pits, power house, toilets, turntables, etc., and in addition catch basins have been installed throughout the yard for track drainage.

Yard Lighting: The engine terminal yard is lighted throughout by 15 125-volt alternating current flaming arc lamps. Four of these lamps are suspended from reinforced concrete poles located around the inner circle of the roundhouses, the remainder being suspended from tubular steel poles located at convenient points. Provisions are made for lowering these lamps to the ground for trimming. All conduits and wires for this lighting are underground.

Fuel Oil Pit: Fuel oil is piped from an oil pit of 8000-gallons capacity located between the west end of the two roundhouses.

This work was authorized Oct. 23, 1912, the work being started the following month and the roundhouses being made ready for occupancy one year later. The work involved the use of 27,000 yards of concrete and approximately 1000 tons of structural steel. Nearly one and one half millions of bricks and 500 tons of reinforcing steel also were used. In the preparation of the above quantity of concrete and for other purposes, there were required 175,000 bags of cement, 26,560 yards of gravel and stone, and 16,000 yards of said. For the construction of the concrete forms, for scaffolding, sheet piling, etc., about 842,000 feet of lumber were required. Nearly 55,000 yards of material were handled in the work of excavating and filling the site on which the plant is located.

Express Refrigerator Cars for the Illinois Central R. R.

The cars referred to in this description have been designed for the handling of perishable commodities from the southern fruit districts, and in view of the intention of hauling them in fast trains, they have been mounted on trucks of the passenger car type. The weights and speeds involved have prompted the use of axles having 6 by 11-inch journals, which is believed to be the first application of journals of this size to cars operating in a service of this kind.

There have lately been delivered to the Illinois Central R. R. by the American Car & Foundry Co., 150 express refrigerator cars, designed with particular reference to their adaptability for being handled in fast trains. They are nominally 50 feet in length and of 40 tons capacity, and weigh about 75,700 pounds each. The underframes are of steel and the superstructures are of wood, in accordance with advanced practice in refrigerator car design. The trucks are of the four-wheel pedestal type such as are regularly used in passenger service. The wheels are 36 inches in diameter and out of consideration of the loads to be carried and the speed to be attained, the wheels have been mounted on axles having 6 by 11-inch journals.

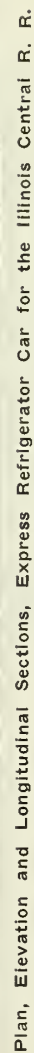
The underframes are constructed with fish-belly center sills, there being two web members of 5/16 inch plate placed 13 15/16 inches on centers. These webs have a uniform depth of 28 1/2 inches for a distance of 7 feet 3 inches either side of the transverse center, and from these points taper to a depth of 9 3/4 inches at the center plates. The flanges of these members consist 3 by 3 by 1/4-inch angles on either side at the top, and

4 by 3 by 9/16-inch angles similarly disposed at the bottom. A cover-plate 5/16 by 20 inches is used on the top only. The ends of the center-sill members beyond the bolsters are reinforced by means of cheek-plate castings and terminate at the 10-inch by 15-pound channel end sills to which they are secured through the medium by 3 by 3 by 5/16-inch angle iron connections. A portion of the top outwardly extending flange of the end sill is cut away at the center to permit of the attachment of the special spring buffing apparatus, and is backed up at this point by channel pressed from 3/8-inch plate with flanges turned toward the center of the car. The bolsters are 38 feet 10 3/8 inches apart and are made up of dished members pressed from 5/8-inch plate and placed back to back in pairs on either side of the center sills.

The top and bottom cover plates at the bolsters are of 7/16 inch material 16 inches in width. The top plates are straight while the bottom plates are tapered to reduce the width at their outer ends to that of the over all width of the bolster members at the point of their attachment. Heavy pressed steel fillers are placed between the center sill girders in line with the planes of the bolsters. The outer ends of the bolsters are diagonally braced against the center sills at a point just back of their attachment with the end sills, by means of 4-inch by 5 1/4-pound channels. The outer transverse members of the underframe consist of pressed steel cross ties, one of each being placed a distance of 5 feet 9 7/16 inches either side of the middle of the frame, and a series of floor beams consisting of 5-inch by



Express Refrigerator Car for the Illinois Central R. R.

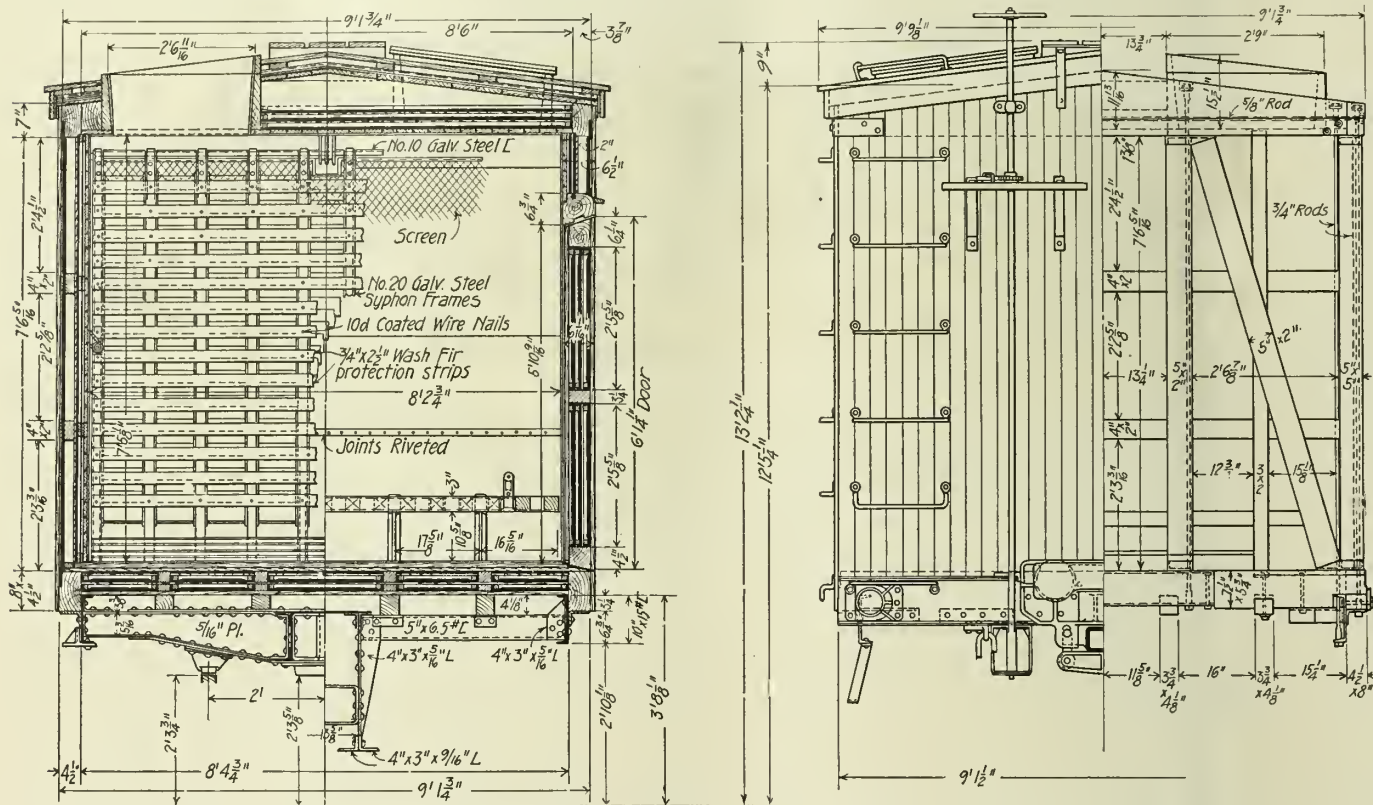


6½-pound channels, two of the latter being uniformly spaced between the cross ties and the bolsters at either end, while those of another pair are located 1 foot 3¾ inches either side of the middle of the frame. At each of the cross ties, fillers pressed from ¼-inch plate are inserted between the center sill girders and top and bottom cover plates of ¼-inch plate 8 inches in width are used. The floor beam attachments to the center sills are through the medium of long 4 by 3 by 5/16 angle iron connections, the outwardly extending legs of which are trimmed so as to give them the form of gussets. These various transverse members make connection at their outer ends with the webs of the 10-inch by 15-pound channel side sills, the attachment of these members with the end sills being strengthened through the use of 3 by 3 by ¼-inch angle iron knee braces.

The superstructures of these cars are built with long leaf yellow pine framing members, and are supported on the under-

cinnati, Hamilton & Dayton systems; and the circumstances connected with the acquisition of the latter by the former, in 1909. The information given in the announcement was that the investigation would be conducted in connection with the application of the eastern roads for the 5 per cent increase in freight rates, and that it would be directed by Louis D. Brandeis, special counsel of the commission. Representative H. Robert Fowler of Illinois laid before the commission recently a letter dealing with alleged financial transactions involved in the purchase of the C., H. & D. Mr. Fowler said he thought it would be disclosed on investigation that the Baltimore & Ohio had been required to bear a big burden of "financiering," in which the firm of J. Pierpont Morgan & Co., was intimately involved.

The inquiry, accordingly was begun on the following day, with Chairman Harlan, of the commission, presiding, and



Cross Sections, Express Refrigerator Car for the Illinois Central R. R.

frame through the medium of four intermediate longitudinal floor stringers and the 4½ by 8-inch supplementary side sills. The latter rest on 4½ by 3 by ¾-inch angles riveted to the steel side sills proper. The sides, floor and roof are thoroughly insulated and the interior lining is of 13/16-inch tongued and grooved yellow pine. The inside length of the car is 49 feet 11¾ inches, height 7 feet 5⅞ inches and width 8 feet 2¾ inches. The distance between the ice bunkers, which are of the Bohn collapsible variety having a capacity of 10,152 pounds of ice, is 43 feet 4 inches. Wooden roofs of the torsion-proof variety are applied. Ice hatches are located in each of the four corners and are provided with insulated plugs and covers with adjustable latches to permit of ventilation when needed. Running boards, grab irons, ladders, etc., are applied in accordance with the requirements of the Interstate Commerce Commission.

Interstate Commerce Commission Inquires Into B. & O. and C. H. & D. Finance.

The Interstate Commerce Commission announced, May 28, that it would begin at once an investigation into the financial relationship of the Baltimore & Ohio and the Cin-

daniel Willard, president of the Baltimore & Ohio as the first witness. It is understood that Mr. Brandeis is desirous of showing that if the Baltimore & Ohio were not drained by holding up the Cincinnati, Hamilton & Dayton, it would not be in need of the five per cent rate increase as it claims.

Mr. Willard said, in his testimony, that the Baltimore & Ohio guaranteed \$12,500,000 first and refunding mortgage bonds of the Cincinnati, Hamilton & Dayton, as well as \$11,557,000 of purchase money notes. The Baltimore & Ohio, he said, also obligated itself in respect to another issue of so-called 4½ per cent cash bonds. There was no guarantee of interest to be paid for two years. Later for a year interest was to be 3 per cent and 4½ per cent after July 1, 1914. Mr. Willard said the deficit of the Cincinnati, Hamilton & Dayton July 1, 1913, was \$18,000,000 and that this year it probably would be about \$29,000,000. In July, 1909, he said, the deficit was \$3,490,000. Asked to explain the increase, Mr. Willard stated that \$1,200,000 could be accounted for by a "charge off" on the books of that amount as a result of the purchase, in 1904 by the old management of the Cincinnati, Hamilton & Dayton of 110,000 shares of Pere Marquette stock at 125. In 1911, under the terms of

an agreement with the Baltimore & Ohio, it was sold to Morgan & Co. for \$11,200,000 less than was paid for it.

Mr. Brandeis asked if the Cincinnati, Hamilton & Dayton last year had not fallen short by \$350,000 of earning enough to pay off the interest on about \$18,000,000 of underlying bonds on roads owned by it. Mr. Willard said he believed the figures given were correct. Mr. Brandeis declared the deficit this year would be much larger. Mr. Willard testified that it had been estimated the control of the Cincinnati, Hamilton & Dayton would be an additional source of profit to the Baltimore & Ohio by increased interchange of business and that anticipations in that respect had been largely exceeded, but that costs of operation had exceeded the estimate. In conclusion Mr. Willard said: "As matters stand today I feel the Baltimore & Ohio has been thoroughly justified in the advances it has so far made."

spanning roller seat. The truck bolster is a 24-inch rolled steel I-beam placed horizontally and serves only in taking switching shocks and carrying the center pivot castings. The angle cross ties of the truck extend through openings in the side frame and are riveted on both sides of the web to the flange of the frame.

The journals are 6 by 11 inches. The wheels applied are of three different makes, for comparative wearing test; two of forged steel and one of cast steel. The journal boxes are arranged with shims for raising the car when wheels have been turned. The brake beams are supported by removable brackets attached to side frames. The two sides of the car body form girders which carry the entire load, there being no intermediate or center sills. The body bolster and end sills form the cords of a wide girder which receives the draft attachments. The cast steel pedestals



Seventy-Ton Self Clearing Coal Car, Standard Car Truck Co.

Following Friday's hearing the inquiry was temporarily adjourned, pending discussion in conference by members of the commission. It is stated that it was first planned that the investigation should be conducted by Commissioner Harlan. When the inquiry was begun a majority of the commission was present. It is said, however, that the burdens on the members of the commission are so numerous that a majority cannot attend an inquiry immediately and that during the forthcoming conference an effort will be made to fix a date on which to resume the investigation.

Seventy-Ton Self Clearing Coal Cars, Standard Car Truck Co.

The illustration shows one of the eleven 70-ton self-clearing coal cars recently built by the Standard Steel Car Co. for the Standard Car Truck Co. Ten of these cars are assigned to the Erie Railroad. The main feature of the car is the four-point bearing double-action truck. This style of truck has been thoroughly tested under several flat and ore cars during the past six years. The car body and load is supported at the center line of the truck side frame by a special radial roller device which works in harmony with the well-known Barber lateral motion roller device now in general use on a large number of freight cars and locomotive tenders in the United States and Canada. The cast steel truck side frames are special I-beam drop girder type. The truck springs are of the M. C. B. standard for 35-ton cars, arranged in four groups of two, for each frame; two groups on the outside of the web of the frame and two on the inside; all equalized into proper bearing by spring caps and a

which are attached near the ends of the body bolsters are fitted to and interlock with the crown face of the radial roller cap. The car is 42 feet 9½ inches over buffer castings; 10 feet extreme width; 10 feet 6¾ inches extreme height, 9 feet 3 inches inside width; and its capacity is 2646 cubic feet.

The car is equipped with the following specialties: Enterprise Railway Equipment Co.'s dumping mechanism; Miner friction draft gear No. A-18; Simplex couplers; Blackall ratchet hand brake; McCord journal boxes; New York air brake; Creco brake beams; Bronze Metal Co.'s journal bearing; and the Carmer "pull-up" type of uncoupling device. One of these cars will be on the exhibit track at the master mechanic's and master car builder's convention at Atlantic City, June 10-17, 1914.

What a railroad does with the accumulation of records at stations and offices, was asked by a passenger on a Baltimore & Ohio train recently. The superintendent who was on the train explained that such documents are handled as prescribed by the Interstate Commerce Commission, and that certain classes of records are kept on file for seven years, others for five years, and so on, after which they are forwarded to the headquarters of the company to be placed in the archives of the custodian of records. Such records as tariffs, general orders, notices to the public, etc., the superintendent explained, are preserved permanently and the papers of the different departments of the service are stored away in such a manner that they can be located at short notice, which means that an expert system of filing is maintained.

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HAROLD A. SMITH	- - - - -	Assistant Manager
W. M. CAMP	- - - - -	Editor
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SATURDAY, JUNE 6, 1914.

Since the hearings and argument in the rate advance case were closed, two new points have arisen which are undoubtedly receiving the consideration of the Commission. The investigation of railway financing which Congress ordered, brought up the query whether if the Baltimore & Ohio had not bought the Cincinnati, Hamilton & Dayton, it would have had the same need of greater revenue that it now has. The other point, is the effect of the Supreme Court's tap line decision on the relations of the railways to industrial or plant roads. Evidently Commissioner Harlan's estimate of the revenue the railways can and must save by refusing all allowances to industrial roads will have to be revised downwards. The allowances heretofore paid must be shown to be unfair and in the nature of rebates, before they can be discontinued. This whole subject of free service and allowances is a very complicated one. It cannot be determined as the Commission planned by cutting it all off and applying through rates from the point of delivery to tracks of the railway company. It will take long investigation and study to cover varying conditions and all parts of the country; and possibly more litigation.

Whatever may be the determination in the rate case, it cannot be justly claimed that the Commission's ac-

tion regarding free service and allowances to industrial roads, will at an early date yield any considerable additional revenue to the railways.

The United States Supreme Court has before it awaiting decision a number of exceedingly important transportation cases. It is sincerely to be hoped that none of these will be postponed until after the summer vacation. Some of them were argued many months ago and results have been looked for on every decision day. One of these is the Shreveport case, in which the Texas Railway Commission and the Interstate Commerce Commission are at sword's points; and it is far more important than the famous Minnesota rate case. Another is the Los Angeles switching case which involves the determination of principles involved in the proposition that railways must charge for spotting and switching service. Then there are the long pending intermountain rate case and the pipe line case. Any unnecessary delay in these cases is expensive to the country. It is true that the principles involved are too important for hasty action; but at the same time there ought to be as much expedition as is consonant with justice. There are many things hanging on these decisions.

Draft Gear Consideration Still Postponed.

Another year has passed without any consideration of the subject of draft gear by the Master Car Builders' Association. It has had a Committee on Coupler and Draft Equipment for several years. This committee has done arduous and valuable work in connection with couplers. It has co-operated with the manufacturers and experts and has probably made as great progress as possible toward a one-standard coupler. Nevertheless it is extremely unfortunate that the association has for some years practically ignored the subject of draft gear which is, perhaps, the most important part of the modern freight car. It is the point of weakness of the whole car, because its function is to protect the coupler itself and all that lies back of it. If there is no adequate protection in the draft gear the entire superstructure of the car is alternately jammed and jerked with disastrous results. If heavier and stronger couplers are needed it is largely because of inadequate draft gear. The underframe, the car end, the roof, and the door are all disabled because the draft gear does not properly perform its functions.

With the enormous and constantly increasing cost of maintaining equipment, the first attention should be given to the vital point. Apparently the M. C. B. Association is afraid of the subject or not prepared to deal with it for it has singled it out for neglect. The proceedings of the convention offer no literature of any value on the subject. It has been left to the individual roads to investigate and experiment, without any scientific co-operation. The association has not even defined the function of draft gear nor de-

vised any standards of tests. Over three-fourths of all new cars are now equipped with friction gear; and many roads in repairing cars substitute friction for spring, although the general policy is to replace with the same kind that was on the car. But there is no collating of the results of experience and no such systematic study of the subject as ought to come from a technical association; and as the M. C. B. Association has given to other subjects.

Although the subjects of coupler and draft gear are closely related, it seems that they would better be divided and separate committees appointed. As year after year goes by, the neglect of so important a subject results in great economic waste. There should at least be some standards for the service expected of gears—some recognized tests of relative value. But beyond this there ought to be some such study as has been given to couplers, brakes and car-wheels. History is in the making every day, but the record of it is fragmentary and unreliable. Is this because the subject is really so much more difficult than any other connected with car construction—or is it not rather because no leader has arisen to take hold of the subject in convention with vim and mastery? The work of Godfrey Rhodes in connection with freight train brakes is remembered by the older members and ought to be known to all. Where is another Rhodes to take hold of this subject of draft gear and get the association out of its condition of sluggish inaction on a vital subject?

Freight Car Repair Bills.

Commenting on the ten per cent allowable advance in the charges for interchange freight car repairs promulgated by the Master Car Builders' Association some eighteen months ago, the Railway Review voiced its hearty endorsement of the plan but gave expression to a doubt that ten per cent was a sufficiently wide margin of increase to produce the desired results. The committee on prices for labor and material reporting at last year's convention, offered a suggestion, which was given the approval of the association, that an advance of $16\frac{2}{3}$ per cent be made in the labor cost, same absorbing the previously authorized ten per cent advance, as being more nearly in keeping with the cost of such work to the roads when consideration is taken of the various items of overhead expense, switching charges, etc. The inadequacy of even this margin of increased revenue for mere reimbursement to the roads for the cost to them of repairing foreign cars has become so evident that the arbitration committee of the Master Car Builders' Association has proposed an increase of 65 per cent on the labor cost in repair bills in order that overhead charges may be met with some measure of fairness. The executive committee of the above organization has taken the view that this proposal deserves consideration, and accordingly has arranged for its being brought up for discussion at the com-

ing convention, where it is to be hoped, some definite measure of fairness can be provided for by adjusting the basis of these charges so that at least, it will not be an occasion for loss for a road to administer the needed repairs to the cars of a foreign line or transportation company.

The fact that the suggestion above mentioned, originated with the arbitration committee, should have considerable weight with the members in causing them to act on it favorably. The members of this committee more than any other members of the association, are given occasion to observe the defects and inequalities in the working of the rules of interchange, as well as the relations between the subscribers and the non-subscribers to those regulations. Strange to say, it is largely to these latter that the thanks of the association should be finally due for the placing of repair charge practice on a sound basis. As the arbitration committee remarks in proposing its 65 per cent advance, there are some of these non-subscribers who, in making out their bills, insist on covering not only the cost of material and labor, but all of the overhead expense such as supervision, depreciation on plant, use of facilities, switching, etc., and possibly, which after all, is only fair, a margin of profit on the work. Clearly enough, those who observe the rules in billing back to these same companies, are placed in an unfair position and one that should not be allowed to continue.

As we have previously observed in commenting on this situation, a liberal advance on the bills for foreign-car repairs, would have in addition to its material effect, a moral effect that the Master Car Builders' Association has been striving for for years,—that is the creation of a disposition whereby foreign cars may be given unbiased attention when in need of repairs. Is it any wonder, if these cars can be repaired only at a loss, that they are so frequently given inadequate and even improper repairs? Can any relief be expected as long as the roads are required to do this work on a charity basis? Viewed from the standpoint of the average road with average rolling stock and repair equipment, it seems that a decided advantage might be gained by tacking on to the bills otherwise designed to cover material, labor, and overhead expense, a liberal margin of profit. The effect of this arrangement would be to give every road having repair facilities an inducement to pay as close attention to the foreign car coming into its yards, as the rules would permit, and to avoid paying this form of tribute to the foreign roads, each home road would be more diligent than ever about keeping its own equipment in first class condition. The rules operating as they do at present, are a temptation to the small road to let the larger roads carry the burden of repairs to its equipment, which is a plain imposition on the larger roads; on the other hand, the small road finding it expedient to let its neighbors make its repairs under rules providing for a fair margin of profit on the work, would have a right to expect and demand

that the work be properly and conscientiously done. Undoubtedly an excess margin of profit on repair work on foreign cars, would work harm and hardship in much the same proportion as does the present inadequate basis of charging. That the arbitration committee should propose a 65 per cent advance on labor costs to cover overhead expense is a safe indication that charges under the revised plan would be about right. If the figure aims to cover cost only, it is no more than adequate; if it allows for a profit, it is no more than fair.

Foundations for Small Buildings.

A very important matter in building construction is the character of the foundation. In large, heavy or costly buildings this fact is always appreciated, but it seems that in minor buildings the practical economy of durable foundation is overlooked as often as it receives attention. For illustration, in building section tool houses, station coal bins, cheap storage houses, out buildings, etc, it is common practice for the carpenters to support the sills on wooden posts. For this purpose they sometimes cut up fence posts, square sticks of timber, or even old telegraph poles or old track ties, planting them in the ground or sometimes standing them upon a flat stone placed a foot or two under ground. At any rate carpenters, in general, seem to have indifferent ideas about the durability of foundations; and, in a question as simple in essence as this one really is, there is evident need for knowledge that it would be inexcusable for an engineer not to possess. In briefer terms, there is, commonly speaking, need for better foundations under cheap buildings than one ordinarily finds to be the case. It costs money for labor and material to renew rotten sills or to rebuild or shore up structures that have fallen into decay or that have leaned over because poor foundations permitted them to sink to the ground level, whereas buildings constructed of almost any kind of lumber, if kept off the ground, or with proper circulation of air under them, will last a long time.

In these days concrete has come to be so extensively used and is so easily and cheaply made that there would seem to be no excuse for founding a building of any character on material that is liable to rot off or rot out in a few years, and the difference in expense of the two kinds of foundation is so slight in proportion to the cost of any of the simple structures that it is not at all extreme to say that the permanent material should almost invariably be used. The building of concrete foundations under the corners of a small building, or at suitable intervals under larger structures to support sills of considerable length, involves no more labor than that of digging a hole two or three feet square, to a depth below frost; throwing concrete loosely into the hole, to form a slab six inches to a foot thick, and then building on this a simple column up to sill level. The form for such a column

may consist of four boards nailed together, like a box without ends, or even an old spike keg. These can be removed after the concrete is set, or they may be left in place, filling the earth around them. The adoption of such simple and relatively inexpensive foundation work in general practice would obviate a great deal of renewal work which frequently becomes necessary where sills stand on wooden blocks or are buried in the earth, as in platform construction.

There is another method that is perhaps even better in many cases, and that is to mold building blocks at a concrete mixing plant, in some convenient location, and carry them in stock for use as they may be required. In situations where only a small amount of concrete foundation would be needed these blocks would be shipped to the point in lieu of sending cement and gravel to the site. The plan of using ready-molded blocks for pipe-carrier foundations in interlocking work was adopted a number of years ago, with much satisfaction, and is now very extensively used. Such blocks, either in interlocking work or for building foundations are readily portable and can be dug up and used again in cases where old plants or buildings are abandoned or pulled down. With rotten timber, however, the case is different.

A writer who was seeking to explain to farmers how many useful things could be made from single units or patterns of reinforced concrete made up into shapes which he calls "concrete lumber," has, we think, hit upon a good point, and one which has an application to a field wider than that of agriculture. Concrete molded into slabs, reinforced with steel bars or wire netting, can easily be combined into stone benches, by planting two of the slabs in vertical position, with a third slab placed across the top; or two of the slabs may be laid on edge, a few inches apart, with a third slab placed on the top, forming a small culvert or cover for a drain; or the said slabs may be placed to form steps, or they may be laid down to form a pavement or sidewalk; or they may be stood up to retain vegetable or flower beds, or to form the sides of hotbeds, and so on. Parallel opportunities could be found in railway work. For illustration, there is frequent demand for curbing for station platforms or to retain earth about bulkheads where the original construction was not designed with sufficient thoroughness, and where cribbings of old ties are frequently found doing such service. Old bridge or trestle timbers have been, and are now, much used for such purposes, but wooden bridges are being largely rebuilt with steel and concrete, and cars also of steel, so that old bridge and car timbers will not likely be as plentiful in the future as they are at the present time or have been in the past. While the foregoing remarks pertain mainly to things that are very commonplace, yet we think they will bear such consideration as to warrant the practice of always bearing in mind the importance of permanent foundation construction for small buildings as well as for the larger ones.

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

The Trust Bills and Business.

"Finally, we are told that the trouble with business is psychological, that the material conditions are all favorable. Well, is not that precisely the point that Mr. Wilson's visitors were making? What they are asking is that one of the causes of that psychological condition be removed. If the trouble were in things over which we have no control—if it were in bad crops, or the exhaustion of capital through overconfident enterprise—the President might well say that his visitors were looking in the wrong direction for relief; but just in so far as the trouble is psychological, they are justified in insisting on the importance of the effect of anything the Government may do, or leave undone, on the temper of the business world. If there were a clear case for these bills, a case grounded on their inherent merits and necessity, it would be right to pass them, whatever their immediate effect upon business. But with their case highly doubtful in itself, with no time for their proper consideration or amendment, and without any sign of serious public demand for their enactment, the all but universal desire on the part of the business world for their postponement is, in the present condition of trade and industry, entitled to most serious consideration."—New York Evening Post.

If Higher Freight Rates.

"If the Interstate Commerce Commission sees fit to grant the petition of the railroads of the eastern district for higher freight rates, the credit of these weaker roads will improve at once and there is no doubt but that the stimulus that renewed buying of railroad supplies would give to the steel trade would lead to a revival and even to a boom in general business, including heavy additions to the freight traffic of the railroads themselves. Not only railroad securities but those of industrial corporations would be benefited. If the railroads of the eastern district get what they have asked similar concessions will be made to the railroads in other parts of the country and all will partake of the advantages to be gained therefrom."—New York Commercial.

Missouri Pacific.

"B. F. Bush, president of the Missouri Pacific, has reason to be glad that the holders of the \$25,000,000 notes which matured yesterday decided to extend their securities for another year. If the company had defaulted, and the proposed reorganization had been carried out, Bush would doubtless have lost his place. The bankers who proposed the reorganization would have appointed their own president. Bush has had a hard, up-hill fight, and his friends in the railroad world would like to see him win. With the notes out of the way for a year, and bumper crops promised, the company stands a good chance. It would stand a much better chance, however, if its president could get the support of some new directors. If it be true, as was recently reported, that the Goulds have sold their stock, there should be no difficulty in getting new blood into the Missouri Pacific management."—New York Evening Post.

Waterway Improvement and the Attitude Toward the Railroads.

Chairman Lawton T. Hemans, of the Michigan Railroad Commission, in a recent discussion of the American transportation question with a representative of The Saturday Night, a Detroit publication, indicated that the movement

of the nation's commerce is dependent alike upon the railroads and the waterways and that the development of these highways of trade should be carried on uniformly and with full measure of public support. "Can you tell me," asked Commissioner Hemans, "why we get so excited when we hear that the government is going to do something for American ships, and why on the other hand we seem to care so little about doing anything for American railroads? Some of us are deeply perturbed because American ships may have to pay tolls for carrying freight through the Panama canal; but none of us is clamoring for the purpose of a free right of way, for instance, for any American railroad that carries freight. We cheerfully spend millions of dollars on the Lime Kiln crossing and the Livingstone channel to promote shipping on the great lakes, and many more millions for locks at Sault Ste. Marie. And we take pictures of these waterways improvements and put them on post-cards which we proudly send to our friends. But I wonder what would happen to the statesman who would suggest that we appropriate funds from the public treasury to break down heavy grades on some of our railroads so that they could haul freight at less expense. As far as public aid is concerned, I can see no difference between the man who invests in ships and the man who invests in railroads."

Roosevelt Opinion on Government Ownership.

In an article in The Outlook, May 23rd, Ex-President Roosevelt says:

"When the time came for us to leave Chile, we went southward on the railway to Puerto Varas. Incidentally I may remark that the railways in Chile are owned by the state, and that the men I met who were best informed and most trustworthy, expressed great regret that they had not been kept in private hands. These men stated that there was always a deficit in the management of the railways, and that they were a burden on the government and unprofitable to the citizens generally."

President Wilson on Business Depression.

In reply to petition of three large associations of manufacturers for a postponement of further anti-trust legislation, President Wilson said that in his judgment nothing was more dangerous for business than uncertainty; that it had become evident through a long series of years that a policy such as the Democratic party was now pursuing was absolutely necessary to satisfy the conscience of the country and its perception of the prevailing conditions of business, and that it was a great deal better to do the thing moderately and soberly now than to wait until more radical forces had accumulated, and it was necessary to go much further.

The President also said that while he was aware of the present depression of business, there was abundant evidence that it was merely psychological, that there is no material condition or substantial reason why the business of the country should not be in the most prosperous and expanding condition. He urged upon his visitors the necessity of patriotic co-operation on the part of the business men of the country in order to support rather than to oppose the moderate processes of reform, and to help guide them by their own intimate knowledge of business conditions and processes.

He told his visitors that it was his earnest desire to serve and not to hinder or injure the business of the country in

any way, and that he believed that upon reflection they would see that the course he was urging would, in the long run not only, but in the short run also, be the wise and serviceable course.

In a later interview, the President said that he thinks the present depression of business radiates from railroad offices and is confined to those industries that are practically de-

pendent upon the carriers for prosperity. The depression in the railroad business has been communicated to the steel industry and other industries related thereto, and in turn has been reflected in the money market by a tightening of credit. The psychological aspect of this depression, the President added, lies in the fact in its last analysis it is based upon the timidity with regard to the future.

Hall-Scott Motor Cars for the Pacific Great Eastern Ry.

There have recently been delivered to the Pacific Great Eastern Ry. two 65-foot gas-engine propelled motor cars as manufactured by the Hall-Scott Motor Car Co., San Francisco, Cal. The power plants each of these cars is rated at 150 horsepower and the cars are capable of hauling trailers at satisfactory rates of speed. In addition to the power cars above mentioned, the manufacturers are at present engaged in the construction of a third car for the same road, this car to be fitted with a 250-horsepower engine which will enable the unit to haul three 65-foot trailers and yet maintain a reasonable schedule for local passenger service. The three trailers to be used in this connection are being constructed in accordance with the Hall-Scott Company's specifications, by the Canadian Car & Foundry Co., Montreal, Que.

The principles involved in the propelling of the Hall-Scott design of motor cars are in general similar to those employed in the automobile, power being derived from a water-cooled gas engine and transmission being by mechanical means through a clutch, three-section longitudinal driving shaft provided with flexible couplings, and a selective gear set mounted in a case on the forward axle of the rear truck, and by means of which any one of four speeds, either forward or reverse, may be obtained. The arrangement of

passenger compartments for the purpose of fastening the interior wood finish. The flooring is of wood, double thickness, with deadening felt between the two courses.

The interior finish in the main passenger compartments is of west coast mahogany trimmed with hardware of polished brass. The floor plan is such that there is provided a main passenger compartment 22 feet 7½ inches long in which are seating facilities for 34 persons, a smoking compartment 12 feet by 7½ inches long seating 18 passengers, a 12-foot baggage compartment, and a 12-foot engine compartment, the latter at the forward end of the car. Entrance to the passenger compartments is by way of the vestibuled platform at the rear. The engine and baggage compartments are provided with side doors and intercommunication between the several compartments is had through swinging doors in all transverse partitions.

Trucks and Brakes: The trucks of this car are of the M. C. B. type, with spiral and elliptic spring suspension, swing bolsters and inside hung brakes. The axles are 5 inches in diameter and the journals are 4¼ by 8 inches in size. The wheels are of chilled cast iron 33 inches in diameter. The wheel base of the trucks is 7 feet. Westinghouse straight and automatic air brakes are used, there be-



Hall-Scott Motor Car for the Pacific Great Eastern Ry.

these several parts is indicated in the partial plan and elevation of the running gear of the car shown herewith.

The Car Body: The cars for the Pacific Great Eastern Ry., shown in the half-tone illustration, are of steel construction, both in the under framing and in the superstructure. The underframing consists of two 7-inch channel outside sills, and two 7-inch I-beams, as intermediate sills; the latter running the entire length of the car, and arranged for the support of the gasoline engine and the coupler assembly at either end. The cross members of the frame are 4-inch channels, riveted to the sub-frame sills and to the outside sills through the medium of steel knee fastenings. The end sills are of 7-inch channel sections, while the body bolsters are made up in each case of two steel plates 1 by 8 inches in size with cast steel fillers. Side posts and carlines are each a continuous piece of 3-inch channel section, fastened to the outside sills through the medium of steel knee fastenings. The outside sheathing and roof plates are of No. 12 sheet steel. The steel channel side posts have ash fillers in the main

ing one air brake cylinder on each truck. Hand brakes at either end of car, of gear-wheel type are also applied. A double cylinder air compressor, water cooled, directly driven from the main gasoline engine, supplies air for the brakes and for other uses.

Power Plant: The power plant is of 150 horsepower capacity consisting of a six cylinder, four cycle, water cooled engine, the cylinders of which are 8 inches in diameter by 10 inches in stroke. The engine is cooled by means of a large capacity radiator placed directly in the front of the car. A large diameter fan, driven at a constant speed, provides for a positive blast of air through the radiator, the water in which is circulated by means of a centrifugal pump.

Both the high tension magneto and the battery systems of ignition are used. The 75-gallon gasoline storage tank is placed underneath the floor of the car, there being provided a plunger type gasoline pump to convey the fuel from this point to the carburetor. Forced lubrication is effected by means of a gear driven pump which picks up the oil from

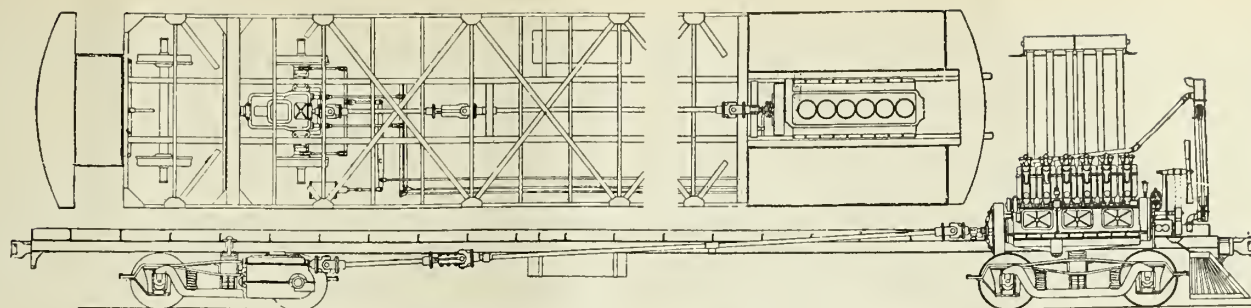


Diagram Showing Nature and Arrangement of Power and Transmission Apparatus on Hall-Scott Motor Cars.



Interior of Engine Compartment, Hall-Scott Motor Car, Pacific Great Eastern Ry.

the sump in the lower crank case and forces it through the various bearings from which it drains back to the crank case to be used over again. The engine is electrically started, the current being derived from a gas-electric generator set used in connection with storage batteries for the purpose of lighting the car.

Transmission: The transmission as previously stated, consists of a forged steel shaft in three sections placed below the floor level and suspended between the two 7-inch I-beam center sills. The first section is held in position in rabbitted journal boxes mounted on steel plates which in turn are riveted to the sub-frame members. The second section, connecting the first section to transmission drive shaft, is provided with slip joints to compensate for the truck movement. The clutch is placed within the engine flywheel. It is simple in design, consisting of a lined split steel band around a cast steel pulley. The clutch is designed to allow of a maximum amount of slip without burning and at the same time so that it will not slip when thrown into the holding position. The gear set consists of a series of heat treated spur and bevel gears arranged to give four speeds forward and reverse. All gears run in a bath of oil, the transmission drive shaft is supported in Timken roller bearings. The gear case is suspended upon the front axle of rear truck in a manner similar to that found in electric motor axle suspension. The gear changes are effected through the medium of two operating levers in the engine room, while the reverse change is effected by air through the medium of a standard air valve operating lever. In order to make both axles of the trailing truck available for trac-

tion purposes, they are provided with sprocket and chain connections outside the journal boxes as seen in half-tone illustration of the exterior of the car.

The total operating cost of this type of car exclusive of crew expense and using gasoline as fuel, as determined by a close record of all items for one year, has been found to be 9.4 cents per mile. By using distillate as fuel, it is figured that this cost can be reduced to 8.5 cents.

Steel Passenger Cars.

By F. M. BRINKERHOFF.

The following analysis of the problem of steel passenger car design was presented in a paper before the February meeting of the New England Railroad Club. In it discussion is given many of the most important considerations entering into the design of the successful steel passenger coach, with particular reference to greater strength of superstructure construction, lessened weight in both body and trucks in its relation to lessened cost of operation, and the nature of brake apparatus best adapted to the control of trains in which such cars are comprised.

Great responsibility rests with those entrusted with the development or selection of steel passenger train car designs for a railroad system. The aggregate sum involved for construction of an equipment of all-steel cars for a railroad of any considerable size amounts to many millions of dollars. It is, therefore, of the utmost importance that before designs and specifications are adopted, full consideration be given to all of the many factors which combine to make a successful and satisfactory steel passenger coach from the view-points of the passenger department, the transportation department, the mechanical department and the traveling public.

The large sums involved not only for first cost of the cars,



Interior of Passenger Compartment, Hall-Scott Motor Car, Pacific Great Eastern Ry.

but for the operating expenses as affected by the weight of the car, and also the relative cost of maintenance and repair of various types of car body structures, warrant a very thorough investigation of the weight, cost of operation and the behavior of the many steel passenger train cars now in service, not only under normal conditions, but also when subjected to the test of derailment or collision. The careful perusal and analysis of illustrated records of accidents, involving steel and also wooden cars, will be of considerable value by leading to the conception of certain fundamental principles to be kept in mind when designing and constructing steel passenger train cars.

It is confidently expected that a steel passenger train car, properly maintained and repainted at suitable intervals, should be serviceable from thirty to forty years, or somewhat longer than the average wooden car. Assuming that the cost of power for hauling one pound of car weight per year averages one cent, it is obvious that, before a railroad company adopts a method of steel passenger train car design, time will be well spent for an investigation of the most searching and conscientious character, into the various methods of constructing steel passenger train cars in order to secure for service a car of minimum weight, though still possessing suitable strength and all other necessary characteristics. Twenty dollars per ton per year for thirty or forty years is a pretty heavy penalty to pay for accepting a hasty or undeveloped design involving unnecessary weight. On the other hand, saving in weight must not be made to the detriment of maintenance costs.

General Design: In designing steel passenger train cars to meet the exacting service requirements of this day, of close competition between transportation systems, and of low rates per passenger mile, it is necessary that full advantage be taken of the strength and other physical properties of the materials entering into the construction of the car, in order that the finished structure may combine, to as great extent as possible, the following essential features: Safety and comfort of passengers; low cost of operation; low cost of maintenance, and moderate first cost.

Safety of Passengers: It is entirely proper that the feature of increased safety to passengers, as secured by the adoption of cars of steel construction, be made the first consideration of the problem, "lest we forget," in our effort to attain other desirable features, that not only from humanitarian motives but from every view-point, personal injury cases, no matter how caused, are an economic loss many times in excess of the cash sums involved in settlements. In consideration of safety, not only should the capacity of the car body structure to resist collision and derailment shocks be regarded, but co-operation with the claims department may disclose to a trained observer many little details of finish, hardware, clearances, etc., which may have caused personal injury in the past, and which can easily be avoided in a new car design.

Except in cars of special type or cars constructed with blind ends, wherein the end sill is also the buffing sill, all the shock of collision impact will be received by the centre sills through the medium of the draft gear and the buffing device. It is manifestly of the utmost importance that every precaution be taken in the design of the car to secure the centre sills against buckling in any direction, due to shock or load applied to the buffing sills, either in a longitudinal or a vertical plane. The source of the longitudinal shock is obvious, and that a vertical load on end of centre sills occurs when cars override in collision or derailment, is equally true. The usual method followed when calculating strength of centre sill construction, is to assume a given shock as divided between the buffing device and the draft gear in a definite proportion.

It frequently occurs, however, that heavy shocks are delivered against a closed knuckle, in which case the loading of the centre sills as assumed in such calculations is not realized, and, should the shock be sufficient, buckling of the sills will occur unless

the draft gear should first fail, in which case the shock will be transferred to the buffing device; and again the load is at variance with that assumed in the calculations, and the entire sills forward of the truck may buckle in the upward direction. Therefore, in order to avoid excessive weight of the deep centre sill construction necessary to meet the above described eccentric loading, it is advisable to support and align the centre sills against deflection, by means of suitable cross-bearers and body end sills attached to the side frames and centre sills. In this manner the centre sills will be relieved of all deflection due to live or dead load, and their full section will be available to transmit the longitudinal shock.

Permissible Weight: This feature must be given full consideration and must be kept constantly in mind by the designer of the car. The permissible weight will vary, of course, for each type of car, and will be governed by character of service, local conditions, including average number of cars in trains, grades encountered, frequency of station stops, schedule speeds required, and other details all worthy of careful study. Generally speaking, a consistently designed steel coach should weigh less than a wooden coach of the same dimensions, and will be materially stronger.

While a steel coach can be designed to be of much less weight than a wooden coach of similar dimensions and still have ample strength, its adoption would seem, for economic reasons, to be warranted only under special operating conditions. There should be no compromising with safety when designing a steel passenger train car, and yet each member entering into the structure must be consistently and constantly studied to determine its permissible weight, and to secure the full development of its strength through its connections with associated members. The same close scrutiny must be given to all specialties and trimming entering into the complete car, in order that unnecessary weight be not incorporated.

Weight of Car per Seated Passenger: This feature, associated as it is with seat spacing and saloon arrangement, must be determined after careful study of the service in which the cars are to be used. By a careful selection of the seat with full consideration of depth, angle, width and height of back and of the covering material, it may be found that a satisfactory distance between seats can be adopted that will materially increase the seating capacity of the car without notable increase of body length and weight. The increased seating capacity thus secured may be equivalent to that of one car in an eight or ten-car train, resulting in a considerable saving in weight of train per 1000 passengers, as well as in length of train as affecting, or being limited by, terminal facilities.

Type of Framing: In order to secure a steel car body structure of maximum strength with a given weight of material, it is necessary to give full consideration to the association of the various members, and to the development of their strength in a harmonious manner, so proportioning the parts and insuring their co-operation by adequate connections, that the structure, when complete, will contain no idle or undeveloped members. For example: It is of interest to note that in circular No. 2, dated Nov. 7, 1913, issued by the U. S. postoffice department, covering the construction of steel postal cars, it is specified that, in calculating the strength to resist buffing shock, only underframe members below the floor line shall be considered, but that these underframe members may be considered as supported against buckling vertically by the superstructure between centre plates, at cross-bearers, to the extent that the strength of superstructure, cross-bearers and attachments is available for this purpose.

This is a clear indorsement of the method of steel car design in which advantage is taken of the side frame of the car to support and align the centre sills, by the introduction of frequent cross-bearers, and thus, by virtually dividing the length of the centre sill into a series of short columns, be enabled to use much lighter centre sill construction than would be necessary if the centre sills had to be self-supporting between

bolsters, and act in compression without the co-operation of the side frame. It is, of course, essential that ample section be used in the centre sill construction to withstand the expected strains, but by the use of adequate cross-bearers, well connected to sills and side frames, it will be found possible to design suitable centre sills of practically uniform section for their entire length and thus effect a great economy in weight, as compared with fish-belly centre sills frequently used in passenger car construction. Full attention must be given to the strength of body end sill and the draft sills in order to secure the centre sill structure forward of the bolsters against destructive strains from collision impact shocks.

The body end sill, with its cover-plates and connections, should be designed to transfer all vertical loads from the centre sill to the side frames, supporting and aligning the centre sill against deflection in any direction. Aside from the feature of reduction in weight that will be secured by the use of properly supported centre sills of uniform depth, as outlined above, the unobstructed underframe is particularly desirable for the application and inspection of equipment. The rigidity of an all-steel car underframe makes the use of an adequate draft gear practically imperative, and the installation of an effective buffing device will be of great operating value. The importance of these two features increases as the car weight and train speeds increase, but they should be included even in the lightest steel cars.

When studying the side-frame construction, consideration should be given to the possibility of utilizing the entire side of the car as a truss or girder with the side plate as top member, instead of using the belt rail as the top member of the girder formed by the side below the windows. The former method gives a truss construction of about seven feet in height, instead of a girder of about three feet, as by the latter method. The necessary width of posts for the truss can be secured by alternate wide and narrow piers between windows, and the saving of weight for equivalent strength will be notable.

This method of side construction, utilizing the entire side of car as a truss, was never possible in wooden passenger train car construction on account of the window openings. In steel, however, it is entirely practical to so proportion and reinforce the window piers that a very effective truss construction can be obtained. As stated in a previous paragraph, it is only by taking full advantage of the special characteristics of the steel, that an all-steel passenger train car can be secured in which will be combined maximum strength with a given weight. This side-truss construction is a case in point.

Vestibule Construction: The use of wide-vestibule construction for steel passenger cars, besides greatly assisting in maintaining the desired warmth of cars in cold weather and meeting other operating requirements, can, by consistent association of its members, be made to serve as a very effective defence of the car body proper when subjected to severe collision impacts. The relative strength of the car-body structure and of the vestibule should be such that the vestibule will fail first and thus, in collapsing, the wrecking of its members will, to a considerable extent, absorb the impact shock. For obvious reasons, the vestibule frame members should be so connected to the car-body frame as to permit the removal and repair of a damaged vestibule without disturbing the body of the car.

Form of Roof: Probably a change in no other feature of a car will cause so much comment, favorable and unfavorable, as a change in the outline of the roof from the standard form prevailing on any road operating a large number of cars. There is, of course, much to be said in behalf of uniformity in appearance of rolling stock when operated in the same service, and especially when new equipment is to be used intermixed with old. To the car roof, as with every other feature of the steel car, must be given close scrutiny, and the design adopted must pass its examination in weight, strength, adaptability, first cost, maintenance cost, and, in this instance, appearance, for an attractive appearance has a material value and influence in

creating a favorable public opinion of the standard of the railroad is not to be overlooked.

A carefully designed roof can greatly add to the ultimate shock resistance of the car structure. The side decks virtually acting as flanges for the tops of the side frame, will preserve its alignment and prevent spreading of the side plates and posts. This function of the side deck, with its deck sill, should not be overlooked in any case, but will be of most importance when considerable compression is taken by the side plate. The roof construction can also be made to afford a considerable element of safety on occasion when the car may have been derailed on an embankment or bridge and overturned. Some forms of roof have greater possibilities in this respect than others.

Elimination of Joints: One of the greatest destroying agents of any steel structure is corrosion. The steel car is particularly exposed to its attacks. Consequently, such joints between the members which may possibly admit of retaining moisture are particularly to be guarded against. Probably the most vulnerable joint and the one occurring most frequently is the junction between post and sash rest. This joint is complicated by the presence of the movable sash and, as a possible lodgment point for dirt and moisture, must be designed with the view of being as self-cleaning as possible. This same danger exists at deck sash, and all other points where abrupt changes of surface outline may form pockets.

Sharp edges of steel members are also difficult to protect against corrosion as they can never be satisfactorily painted, and in cleaning the car such paint as was originally applied is soon worn off. When possible to design the structural parts in such form as to eliminate overlapping joints, a direct saving of weight may be accomplished. Constant attention to such features will result in desirable reduction in weight.

Brake Rigging: No greater safeguard against injury to passengers or rolling stock can be provided on a car than an adequate brake equipment. While the power obtainable from the air-brake cylinder can be increased to any desired extent, the means for effectively applying this force to the brake shoes and to secure maximum retardation, is a matter requiring thorough study in all details, both of foundation and truck brake gear.

In a recent test of a modern air-brake equipment on cars fitted with clasp brakes, two shoes per wheel on all eight wheels, stops were made from speeds of 55 miles per hour in 16 seconds, during which the cars proceeded 720 ft. The cars tested are 72 ft. in length overall, and weigh, complete with motive power, 119,500 lbs. each. As the electro-pneumatic brake equipment employed provides for the simultaneous application of the brakes on every car of the train, regardless of the train length, the above rate of braking would permit of bringing a train of ten such cars from a speed of 55 miles per hour to a standstill while traversing a distance equal to its own length. It is of interest also to remark that the tests referred to were protracted to the extent of making 258 test stops from speeds ranging from 30 miles per hour to 57 miles per hour. The total distance traveled during the tests was 270 miles.

Trucks and Clasp Brakes: The same analysis of the weights of truck members as influenced by the design, will disclose means for marked reduction in truck weight while in no way reducing the strength of the complete structure. The extensive use of passenger trucks without equalizer bars on a large steam railroad system, warrants the full consideration of this type of truck, with a view to securing the marked reduction in weight thereby made possible. Newly designed trucks should either be fitted with clasp-brakes or be designed with provision for their ultimate application. It is seldom that a fully efficient clasp brake rigging can be applied to a truck designed for simple brakes. The best braking results will therefore be secured by designing the truck specially for clasp brakes, as otherwise the sacrifice of many features advantageous to the clasp brake system will have to be made later, on account of truck frame interferences or limitations.

Aside from the improved stopping capacity secured by the use of clasp brakes, there is a notable increase in mileage per shoe, realized on account of the more efficient working temperature of the clasp shoe system, with its lower pressure per square inch of working surface. This saving appears in regular service, aggregating about two million car miles, to amount to approximately 18 per cent. An incidental and very important result of the use of clasp brakes is the minimizing of hot journal troubles by their use. This is obviously due to the fact that during braking the two shoes press with equal force on opposite sides of the same wheel. There is, therefore, practically no disturbance of the journal brass, which consequently retains its accustomed accurate fit on the journal. This same clamping action of the brake shoes relieves the journal boxes and pedestal guides of considerable of the strain and wear incident to the simple brake, and as there is no binding of the journal boxes in the guides when braking occurs, the riding quality of the truck is not affected at such times.

Journal Loads: It is obvious that the six-wheeled truck can be dispensed with and a great saving of weight of complete car secured if the car body weight be kept within the necessary limits. This brings to mind the question of weight of sleeping cars and the possibility of such a design being developed as to permit of a material reduction in weight. The production of a design of sleeping car to weigh 125,000 lbs. complete would not seem impossible.

The system of high-truss side frame herein outlined is applicable to any type of car-body structure. It is seldom that the failure of the underframe is the cause of injury to passengers in derailment or collision, but rather the inadequacy of the upper body. It would seem, therefore, that a redistribution of the strength members might result in producing a structure affording maximum protection to passengers, with somewhat of a reduction in weight. As the centre sill is ordinarily the heaviest single member in the car, its permissible weight is a subject of great importance. This method of minimizing the weight of centre sill construction relieves it of all vertical load, through its cross-bearer connections to high side frames, which, when designed in the form of a truss, have ample strength to carry the entire load of the car and also to support and align the centre sills against buckling.

In considering the design of a steel car, the possibility of its eventually being equipped with electric motive power apparatus should not be overlooked. The necessary clearances for motors sometimes require certain specific arrangement of draft gear, sills and bolsters. Considerable expense may be saved in the subsequent equipment of cars with electrical apparatus if due consideration is given this subject before the cars are constructed. The clearance required for axle driven generator for electric lighting should also be provided, even though its use at first may not be contemplated.

Standards: An eminent engineer once remarked, in connection with the preparation of the design of certain steel passenger train cars: "When standards are adopted, progress ceases." This remark was accompanied with the admonition that only after careful determination had been made that this road's prevailing standard item of design or material was unsuitable for the new conditions accompanying the use of the steel cars in question, was the old standard form to be abandoned for a new one. Of course standards are desirable for many reasons, but close adherence to standard parts may lead to a failure to accomplish the highly desirable reduction in maintenance costs of which steel cars are capable when consistently designed.

Specifications: It is important to prepare adequate specifications covering the details of construction and of material desired to be incorporated in the cars. A clearly drawn specification will not only enable the competing car builders and specialty manufacturers to submit proposals which will be very readily comparable as to price, and that at the lowest possible figure because of being based on definite information, but the

drawing of complete specifications will also be a very valuable assistance to the designer in checking up the accuracy of his work and in avoiding considerable embarrassment later when called upon to explain charges for "extras." A simple method of procedure in compiling specifications is to commence at a definite point, as, for example, the body centre plate, and proceed on a mentally conducted exploration trip throughout the car; first the underbody, then within the body via the vestibules, finally arriving at the roof. If, while on such exploration trips, the designer's visualizing power is in good working order, many points that might otherwise be raised at a less opportune time will become manifest and can be solved at leisure.

Upon the issue of a new set of specifications and drawings, a flood of requests for further explanations and details will pour in upon the designer from the builders. It will greatly simplify the tabulation of bids on a comparable basis if the answers to all such requests for information are furnished to all bidders, regardless of which particular bidder asked the questions. This will keep all bidders supplied with the same information for estimating purposes.

Conclusions: A few desirable preliminaries to the preparation of an economical design of steel passenger train cars are:

First. That all department heads and the executive officers of the road co-operate in analyzing the features they desire incorporated in the design of car for companies' service, giving due consideration to the economic value of such features as traffic winning, labor saving, or weight eliminating.

Second. That "standards," even to the length of the car body as affecting the weight of car per seated passenger, be thoroughly investigated as to their economic value, otherwise the desired reduction in weight may not be realized. The use of steel in car construction often warrants a change in standards.

Third. That the matter of safety of passengers be made the subject of special research into the known behavior of steel passenger train cars when subjected to stress of derailment and collision.

Fourth. That the weight, operating cost and maintenance cost of the various types of steel passenger train cars now in service be investigated, to determine their relative economic value for railroad service.

Fifth. That in any new truck design, provision be made for the application of the most efficient form of clasp brake rigging.

The present state of the art of steel passenger train car construction, though very promising, does not warrant the setting aside of all existing wooden cars and the substitution of all steel equipment. The enormous expense involved by such action will be only warranted after careful investigation of the operating characteristics of steel cars now in service, and further development of designs to meet the shortcomings as disclosed by such investigations. The time-honored railroad warning—Stop! Look! Listen! has a most significant application at this time and to this subject.

American Society for Testing Materials.

The 17th annual meeting of the American Society for Testing Materials will be held at Atlantic City, N. J., June 30 to July 3, 1914, with headquarters at the Hotel Traymore. There will be business meetings on each of the four days of the convention, with a recreation period on the afternoon of July 1, and a smoker on the evening of July 2. Following is the program of the meeting, in full.

FIRST SESSION, TUESDAY, JUNE 30, 10 A. M.

1. Minutes of sixteenth annual meeting.
2. Annual report of the executive committee.
3. Report of Committee C-5, on Fireproofing Materials; Ira H. Woolson, chairman.
4. Report of Committee D-11, on Standard Specifications for Rubber Products; E. B. Tilt, chairman.
5. Testing of Rubber Belting, by W. E. Campbell.

6. Development and Use of an Autographic Friction Testing Machine for Mechanical Rubber Goods, by John M. Bierer.

7. Report of Committee E-5, on Regulations Governing the Form but not the Substance of Specifications; Edgar Marburg, chairman.

8. Report of Committee E-6, on papers and publications; Edgar Marburg, chairman.

9. Election of Officers.

10. Miscellaneous Business.

SECOND SESSION, TUESDAY, JUNE 30, 3 P. M.

On Non-Ferrous Metals.

11. Report of Committee B-1, on Standard Specifications for Copper Wire; J. A. Capp, chairman.

12. Report of Committee B-2, on Non-Ferrous Metals and Alloys; William Campbell, chairman.

13. Rational Test for Metallic Protective Coatings by J. A. Capp.

14. Sampling and Methods of Analysis of Tin, Terne and Lead-Coated Sheets, by James A. Aupperle.

15. Initial Stress and Season Cracking in Drawn Brass Rods, by Ernst Jonson.

16. Some Considerations Affecting Specifications for Wrought Non-Ferrous Alloys, by Wm. Reuben Webster.

17. Study of the Strength of Non-Ferrous Castings—A Comparison of Different Test Specimens, by L. P. Webster.

THIRD SESSION, TUESDAY, JUNE 30, 8 P. M.

18. Annual Address by the President.

19. Are the Effects of Simple Overstrain Monotropic? by Henry M. Howe. The discussion of this paper will be formally opened by Mr. J. E. Howard and Mr. J. S. Macgregor.

20. Hardness Tests: The Relation between the Brinell Ball and Scleroscope Readings, by J. J. Thomas.

21. Discussion of the Present Policy Governing the Adoption of Standards, by Edgar Marburg.

FOURTH SESSION, WEDNESDAY, JULY 1, 8 P. M.

On Steel.

22. Report of Committee A-1, on Standard Specifications for Steel; C. D. Young, chairman.

23. Report of Committee A-4, on Heat Treatment of Iron and Steel; Albert Sauveur, chairman.

24. Report of Committee A-8, on Standard Specifications for Cold-Drawn Steel; C. E. Skinner, chairman.

25. Report of Committee A-6, on the Magnetic Testing of Iron and Steel; C. W. Burrows, chairman.

26. Magnetic Habits of Alloy Steels, by J. A. Mathews.

27. A Failed Axle: Investigation of an Internal Transverse Fissure, by Robert Job.

28. Uniform Hardening of Steel, by Albert F. Shore.

The afternoon of Wednesday, July 1, will be reserved for recreation.

FIFTH SESSION, WEDNESDAY, JULY 1, 8 P. M.

29. Report of Committee A-3, on Standard Specifications for Cast Iron and Finished Castings, by Richard Moldenke, chairman.

30. Some Notes on Chilled Cast Iron, by E. B. Tilt.

31. Report of Committee A-2, on Standard Specifications for Wrought Iron, by S. V. Hunnings, chairman.

32. New Vibratory Testing Machine and Results Obtained by Its Use, by S. V. Hunnings.

33. Report of Committee D-7, on Standard Specifications for the Grading of Structural Timber, by Hermann Von Schrenk, chairman.

34. Report of Committee E-4, on Methods of Sampling and Analysis of Coal, by S. W. Parr, chairman.

SIXTH SESSION, THURSDAY, JULY 2, 10 A. M.

On Cement and Concrete.

35. Report of Committee C-1, on Standard Specifications for Cement; George F. Swain, chairman.

36. Proportioning Aggregates for Portland-Cement Concrete, by Albert Moyer.

37. Testing Concrete Aggregates, by Cloyd M. Chapman.

38. Blast Furnace Slag as Aggregate in Concrete, by W. A. Aiken.

39. Value of the Autoclave Test for Portland Cement, by H. J. Force.

40. Examination of the Reasons for Concrete Failures, by Russell S. Greenman.

41. Determination of Time of Setting of Cements, by G. M. Williams.

42. Relation between Deformation and Deflection in Reinforced-Concrete Beams, by G. A. Maney.

43. Volume Changes of Portland Cement and Concrete, by Alfred H. White.

44. Some Observations Concerning the Use of Turned Sections in Tensile Tests on Reinforcing Bars, by Edgar P. Withrow.

45. Electrolysis of Portland Cement and Reinforced Concrete, by H. J. Force.

SEVENTH SESSION, THURSDAY, JULY 2, 3 P. M.

On Lime, Ceramics and Road Materials.

46. Report of Committee C-7, on Standard Specifications for Lime; Henry S. Spackman, chairman.

47. Strength of Lime Mortar, by W. E. Emley and S. E. Young.

48. Report of Committee C-3, on Standard Specifications for Brick; A. V. Bleininger, chairman.

49. Report of Committee C-4, on Standard Specifications and Tests for Clay and Cement Sewer Pipes; Rudolph Hering, chairman.

50. Report of Committee C-6, on Standard Tests and Specifications for Drain Tile; A. Marston, chairman.

51. Abrasion Machine for Testing Clay Products, by Mont Schuyler.

52. Report of Committee D-4, on Standard Tests for Road Materials; L. W. Page, chairman.

53. Melting Points of Bitumens, by J. G. Miller and P. P. Sharples.

The evening of Thursday, July 2, will be reserved for a smoker.

EIGHTH SESSION, FRIDAY, JULY 3, 10 A. M.

On Preservative Coatings.

54. Report of Committee D-1, on Preservative Coatings for Structural Materials; Percy H. Walker, chairman.

55. Report on a Permeability Test for Paints and Varnishes, by A. M. Muckenfuss. This paper will be followed by a general discussion on "The Permeability and Porosity of Preservative Coatings," to be opened by Messrs. F. I. Gibson, D. A. Kohr, A. M. Muckenfuss, G. W. Thompson and G. D. White.

56. Quantitative Determination of Body and Solvent in Varnish, by A. L. Brown.

57. Paint Protection for Portland-Cement Structures, by Henry A. Gardner.

58. Examination of Chinese Wood Oil, by E. E. Ware and C. L. Schuman.

59. Specifications and Tests of Glue, by Oscar Linder.

NINTH SESSION, FRIDAY, JULY 3, 3 P. M.

On Testing Apparatus and Methods.

60. Report of Committee E-1, on Standard Methods of Testing; Gaetano Lanza, chairman.

61. Report of Committee D-2, on Standard Tests for Lubricants; A. H. Gill, chairman.

62. Viscosity Measurement and a New Viscosimeter, by Alan E. Flowers.

63. Improved Type of Axial Strainometer, by Arthur C. Alvarez.

64. Simple Compression Machine for Testing Structural Materials, by W. O. Lichtner.

65. Efficiency Testing Machine for Drills, Taps, Dies, etc. T. Y. Olsen.

66. Miscellaneous Business.

The committee on nominations has reported the following names as candidates for officers for the coming year: for president, A. W. Gibbs; for second vice-president, A. A. Stevenson; for secretary-treasurer, Edgar Marburg; for members of executive committee, Robert Job, F. W. Kelley, A. Marston and S. S. Voorhees.

Redistribution of Express Business.

According to information recently made public, the American Express Co., the Southern Express Co. and Wells, Fargo & Co. have been awarded the express contracts on most of the railroads at present operated over by the United States Express Co., which is retiring from business. The American Express Co. has been awarded the contracts on the following roads: Lehigh Valley, Philadelphia & Reading, Central of New Jersey, Kanawha & Michigan, Marietta, Columbus & Cleveland, Lakeside & Marblehead, the Chicago, Rock Island & Pacific, and that portion of the "Frisco" system which includes the New Orleans, Texas & Mexico, the Louisiana Southern, the Beaumont, Sour Lake & Western and the Orange & Northwestern. The Southern Express Co. obtained the contracts on that part of the "Frisco" lines between Kansas City and Birmingham, Ala., consisting of the Kansas City, Fort Scott & Memphis and the Memphis & Birmingham roads. Wells, Fargo & Co. obtained the contracts as follows: The remainder of the "Frisco" system covering all western lines, the Baltimore & Ohio, the Delaware, Lackawanna & Western and the Cincinnati, Hamilton & Dayton roads.

Senate Hearing on Federal Direction of Railway Securities.

This week the senate committee on interstate commerce held a hearing on the Rayburn bill for federal control of the issuance of railroad securities. Among those who gave testimony were Interstate Commerce Commissioner Judson C. Clements, and representing the railroads were President Robert S. Lovett, of the Union Pacific; A. H. Harris, general counsel of the New York Central; J. P. Blair of the Southern Pacific; and Edward S. Jouett, general counsel for the Louisville & Nashville R. R.

Senator Lippincott, one of the members of the committee, suggested there ought to be no objection to permitting the railroads keeping duplicate accounts which the proposed bill prohibited. Commissioner Clements replied that this was a dangerous practice, for it was always a temptation to the concealment of matters which the regulatory body and the public ought to know.

Senator Brandegee asked commissioner Clements if he did not believe the railroads were being so closely supervised by the department that it might ultimately lead to government ownership of roads.

"I dread the day when government ownership may come," said Commissioner Clements, "and I hope it will not come. I believe, however, that the public is honest and fair-minded enough to concede that they are entitled to reasonable profits, and will be willing to pay the rates that will yield those profits without forcing the government to take them over."

Senator Brandegee suggested that the tendency of increasing federal supervision was forcing the government into the position of controlling all the income of roads without assuming any responsibility. He intimated that ultimately capital would refuse to invest in railroad securities under these circumstances. Commissioner Clements said he

did not believe this would be true. "What the public demands and has a right to have," said the commissioner, "is knowledge that roads assume an indebtedness for the purpose of bettering the service, not exploiting the road for purely financial purposes."

Senator Saulsbury, of Delaware, asked the commissioner if he did not believe that directors' meetings ought to be open to the public. "That might not be possible at all times," said Mr. Clements, "but I believe the actual important happenings of such meetings ought always to be disclosed."

Senator Saulsbury asked the commissioner if he did not think railroads ought to sell bonds by advertising for bids and also buy supplies in the same way, and thus prevent officers of railroads from being interested in contracts for supplies. "It might be a good thing," replied Mr. Clements, "but if the Interstate Commerce Commission had to supervise all the transactions it would never get through with its work. It already has too much to do."

Mr. Lovett objected to the section which prohibits a person serving on more than one railroad board, whether there is any competition or not, without the consent of the interstate commerce commission. "Take the case of the road I know best, the Union Pacific," he said. "We own every share of the stock of the Oregon Short Line, by which we get to Portland from Salt Lake City. Under the terms of this bill we could not have the same traffic officers, we could not have the same president, the head of the whole system could not unify his management. It would prevent the standardizing of equipment of maintenance and operation. It would mean the turning of the wheels of progress backward and destroying the continuity of management. The Union Pacific is not peculiar in this respect. Should this bill pass and be enforced, the New York Central would terminate at Buffalo; the Pennsylvania would be cut in two at Pittsburgh and the Baltimore & Ohio would terminate at Parkersburg, W. Va.

"The Southern Pacific, a continuous line from New York to San Francisco and through to Portland, Ore., would be divided into seven or eight parts. The steamship line from New York to New Orleans would be one part; then would come the so-called Morgan railroad, a Louisiana corporation, all the stock of which is owned by the Southern Pacific, which would take us to La Fayette, La., where another distinct corporation, the Louisiana Western Railroad, takes up the line and carries it to the Texas border, where a Texas corporation, as required by the law of that state, takes up the line. There are other changes of control through the State of Texas, while the Southern Pacific direct owns the line through New Mexico, Arizona and California to the Oregon line, where the Oregon and California Railroad, a subsidiary, takes up the line. All of these roads, however, have the same standards of operation, they have practically the same officers and the rules of maintenance and equipment are the same. They are practically one railroad.

"I called the attention yesterday of Interstate Commerce Commissioners Clements and Hall to this situation, and they said they might obviate the difficulties by permitting us under such circumstances to continue with the same officers and directors. They may do so, and it might work out all right in our case, but I submit that this is rather a remarkable proposition. It is practically asking Congress to pass a law to condemn a condition and then relying on a pardoning power to excuse what would otherwise be a violation of the law.

"There has never been, to my knowledge, any objection to the control of a continuous line of railroads by one management. That has always been rather regarded as a benefit, and a big benefit to the country.

"Now we come to a most important phase of this question. Many of these companies that own links in the big chains have issued bonds and other securities, the value of which would be seriously affected by such a splitting up of the railroad."

"You do not apprehend that the value of stocks and bonds already issued would be affected by such proceedings," inquired Senator Pomerene.

"When we divide up what has been a successful management into a lot of boards really responsible to nobody," retorted Mr. Lovett, "naturally the public would not be sure that in every case a result satisfactory to the security holders would be worked out."

"Would you be satisfied if this clause regarding the directors were limited to prohibiting them from serving on boards of competing railroads," asked Senator Brandegee.

"If such a regulation were made and were not retroactive," said Mr. Lovett, "I think the railroads would have no objection to it, providing, of course, the test of competition be made the Sherman law and not merely competing lines."

"Another clause of the bill to which I particularly object is that which prevents the issuance of new securities except where they are, in the language of the bill, necessary in the public interest to the proper performance of its service for the public. Such a provision would absolutely prohibit the purchase, for instance, of a branch line. Such a purchase could not be considered necessary in the public interest to the proper performance of its service for the public."

"The proper performance of the Union Pacific's service for the public is the operation of the Union Pacific line and keeping it open for the transportation of freight and passengers. No discretion is vested in the interstate commerce commission. The law is clear. The only duty of a railroad to the public is in respect to its own line."

"I am satisfied that the lawyers advising bankers who would think of buying the bonds issued to pay for the purchase of a branch line or the construction of a line into new territory would not be willing to take the opinion even of the interstate commerce commission as to the right of the road to issue securities under this law for any such purpose. Their opinion to that extent would prevent our selling the bonds or raising the money. The opinion of the commission might protect the directors of the railroad from a criminal prosecution in the event of trouble over the bonds, but I think that the directors would be civilly liable to the purchasers of the bonds should they turn out to be worthless."

"This provision of the law would also prevent us from making improvements out of cash on hand. The Union Pacific, for instance, has a large amount just now and by replenishing the treasury by the sale of bonds may provide the cash for improvements when needed. This is a universal practice of railroads—to make improvements out of cash on hand and sell the bonds when the market is right."

"Couldn't you arrange in advance for the commission's permission?" asked Senator Saulsbury.

"We would have to state in detail, according to this bill, just what we proposed to do with the money," said Mr. Lovett, "and we might change our minds about what we wanted to do."

Mr. Lovett explained the difficulties about waiting for a long time before the commission for permission to sell securities and explained that this would result in a lower price or the good market passing.

Mr. Ripley said that the proposed law in retarding the issuance of new securities would put a dead stop to all new construction of branch lines and roads in the wilderness. He advocated the widest possible publicity for all security issues.

Mr. Harris urged that the best thing that could be done at this time would be to provide that all railroads should give notice to the Interstate Commerce Commission before issuing any new stocks or bonds. The proper method of dealing with the common carriers of the country engaged in interstate business, he declared, was by a federal incorporation act.

Court Favors Minority Interests in St. J. & G. I. Ry.

Judge Thomas C. Munger, of the United States District court, at Lincoln, Neb., granted, May 27, the injunction sought by minority stockholders of the St. Joseph & Grand Island Ry., accompanying it with a memorandum opinion which involves the settlement of the long pending litigation between the minority stockholders of the road and the Union Pacific, the majority stockholders. The gist of this opinion is that control of the affairs of the St. Joseph & Grand Island must be given to the minority stockholders of that company by the Union Pacific within the next sixty days, or a receiver will be appointed by the federal court.

The petitioners alleged that the affairs of the line were being regulated for the benefit and advantage of the Union Pacific. They asked for an injunction restraining further activities until a complete accounting could be had. They also asked that a receiver be appointed for the St. Joseph & Grand Island road. The action was started two years ago in the district court of Clay county, Nebraska, and was later transferred to the federal court, Samuel Untermeyer making the initial argument for the minority stockholders.

Judge Munger holds that the road's affairs under the present operation are being managed in violation of the Sherman antitrust act, and that ownership and control of the St. Joseph & Grand Island by the Union Pacific impairs the usefulness of the smaller road. In the course of his opinion the court says:

"If a railway may be permitted to absorb one competing company, because the amount of such competition is relatively small, the process may be continued until many such small units have been gathered into the great system of noncompetitive railway transportation. We hold that an unreasonable restraint of trade, within the meaning of the Sherman act, is shown by the evidence. Such ownership and control also impairs the power of the St. Joseph & Grand Island Railway Co., while dominated by the Union Pacific Railroad Co., to seek to compel the latter road to establish a joint through route with joint rates between Kansas City and points west of Grand Island on the Union Pacific Railroad, and to seek an agreement for such joint routes and rates with other railway companies, such as the Chicago, Burlington & Quincy Railroad and the Chicago, Rock Island & Pacific Railway to points on their lines, and beyond the reach of the St. Joseph & Grand Island Ry."

Wage Controversy on Western Railways.

A controversy on the subject of wages, between the enginemen and firemen and the western railways, reached a stage this week where a strike of great magnitude is impending. Concerning the questions at issue, and the status of the negotiations, A. W. Trenholm, general manager of the Chicago, St. Paul, Minneapolis & Omaha Ry., and chairman of the conference committee of managers representing the western railways which has been dealing on behalf of these railways with a committee representing their engineers and firemen, who have requested general revision of rules governing compensation and in addition increases in rates of pay, made public the following statement under date of June 1:

"The negotiations which have been going on for about

three months between committees representing the Western railways and their locomotive engineers and firemen regarding the wages and schedules of these employees, were suspended today. The railways concerned in the negotiations number 98 and include practically all lines in the United States west of Lake Michigan and the Illinois Central Railroad, including this road, and all lines in Canada west of Fort William, except the Grand Trunk Pacific. The total mileage of the railways involved is approximately 140,000 miles. The number of engineers and firemen involved is about 55,000 and the wages now paid annually to them amount to about \$67,750,000.

"The final request submitted by the employees' committee proposed increasing the number of arbitrary allowances, reducing the number of hours of work after which overtime would be paid by 50 per cent in passenger service and 20 per cent in freight and other service, increasing the rate for overtime 100 per cent in passenger service and 50 per cent in freight and other service, and in addition, advancing substantially the rate per hundred miles for all service, as well as creating many new positions. These and the other concessions requested would increase the pay rolls of the railroads represented more than \$33,000,000 a year or approximately 50 per cent.

"The original requests of the engineers and firemen were presented on October 10, 1913. These original requests, if granted, would increase their wages approximately \$27,000,000 per year, or 40 per cent, according to a careful estimate by the conference committee of managers on the basis of the pay rolls as of October, 1913. Upon receipt of these requests, the individual western railways gave notice of their desire to terminate the wage schedules in effect with their engineers and firemen and to enter into negotiations for the purpose of making new agreements. The main object of the new agreements proposed by the railways was to secure uniformity as well as simplification of the wage schedules, which have become complicated and frequently require extra payments for services which are a part of the regular work of engineers and firemen.

"The actual negotiations began in February, 1914. It was claimed by the employees' committee that the adoption of the proposals of the railways would involve a reduction in the compensation of the engineers and firemen. For reasons which were fully presented, the conference committee of managers did not believe that the railways would be justified in making any increases in the wages of the employees, to say nothing of the enormous increases requested. But it was not intended to make any reductions in wages. Therefore, the conference committee of managers advised the employees' committee that if the latter would accept such a revision of the rules as was suggested by the managers, the managers' committee would join with the employees' committee in adopting revised rates of pay which would secure to the employees as large compensation as they had been receiving.

"In the original proposal of the employees there was not a word even hinting that it was desired that the basis for computing overtime in train service which, except in some places in passenger service, is universally 10 hours, should be reduced. When, however, the employees' first proposal was definitely rejected, instead of modifying their request, the employees' committee came back with another proposition which asked practically all of the concessions requested originally, and, in addition, reduction in the basis for computing overtime of engineers and firemen from 10 to 8 hours.

"The employees know that it would be impracticable to reduce the actual day in train service to 8 hours. To do so it would be necessary to shorten practically all railway divisions, to relocate yards and shops—in fact, largely to re-

construct the railways at a prohibitive cost. The employees know the only effect of changing the basis of a day's wage from 10 to 8 hours would be enormously to increase the overtime paid.

"The conference committee of managers believed that the original requests of the engineers and firemen were unreasonable. Naturally it regarded the new requests of the committee as much more so. It believed that, in view of present business conditions, there could be no justification for the railways taking any step that would add greatly to their expenses. It believed that the two committees were so far apart that any agreement on a revised schedule was highly improbable. It, therefore, suggested to the employees' committee on May 25, 1914, that all proposals of both sides be withdrawn and that the schedules in effect on October 10, 1913, be restored and kept in effect not less than one year. This suggestion in the employees' committee rejected. A repetition of the refusal of the managers' committee to grant the excessive request made was followed by the suspension of negotiations at the instance of the employees' committee until July 14, pending the result of a strike vote of the engineers and firemen to be taken on the various railroads involved.

"The conference committee of managers recognizes the fact that railways are engaged in a public service. It recognizes the fact that, therefore, the managers of railways have no normal right to accede to unreasonable requests of employees the granting of which would unduly increase the expenses of railway operation, because, in the long run, the public is the chief sufferer from whatever impairs the adequate maintenance or efficient and economical operation of railways. This committee also recognizes the fact that should the western railways be tied up by a strike the results would be calamitous, and that here again the public would be the chief sufferer. Finally, the committee recognizes the fact that in the long run public opinion usually determines the outcome of controversies between railways and their employees. For this reason the committee believes that it is its duty to the public to make a full statement of the requests which the employees have made and of the committee's reason for rejecting them." Following this the statement summarizes in considerable detail the principal requests made by the employees.

New Form of Balance Sheet Prescribed by Interstate Commerce Commission.

A new form of balance sheet for the railroads is to be used in the future in accordance with an order by the Interstate Commerce Commission, an outline of which will be incorporated in the 1914 annual report of the commission. According to railroad accountants and experts it is a marked improvement over previous forms of balance sheet and will afford the public a more concise and clearer understanding of the financial position of the various companies than has been possible in the past. The accounting methods of the railroads will, therefore, need to be changed very materially to conform to the new style of balance sheet.

Previous accounting methods have provided for the inclusion in current assets (or what has been commonly termed "working assets") the item of "marketable securities." In the future, however, this item will be included in the investment account. In this manner it is hoped to show the cash and current asset position of a road, or as it may be desired to term it, the working current asset position on any given date used for the purpose.

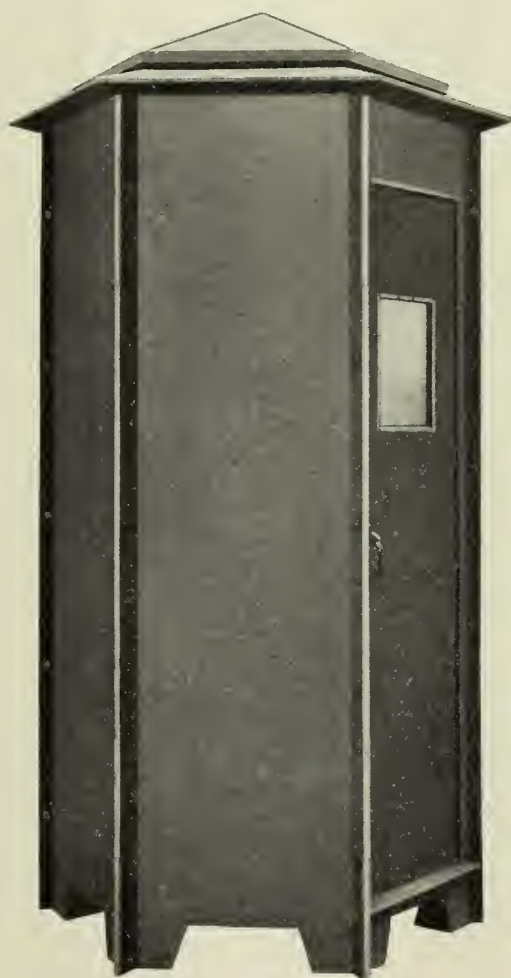
The inclusion of marketable securities in current assets has for a long time past been regarded by many railroad experts as unfair. At best the liquidation price of such securities can only be approximated, and there is no assurance that the

approximation would come anywhere near the mark were a road compelled to dispose of them. For this reason the commission has decided that the railroads must carry this item among their investments. In the past the difficulty of including such items in the current assets has been that the estimated marketable value of such securities on the date covered by a report may be many millions out of the way by the time an annual report is made public.

Cast Iron Booths for Railway Purposes.

The Paul Dickinson company of Chicago, has lately introduced a novelty in small railway structures in the form of cast iron buildings adaptable to a variety of purposes. These include the use of the structures as telephone booths, shelter stations, latrines, oil or other small store houses, or as watch boxes. These buildings, being made in sections, are easy to handle because of the lightness of the parts entering into their construction, and may be readily set up at any desired point without the use of derricks or other special erecting equipment.

The buildings are made, preferably hexagonal or octagonal



Dickinson Cast Iron Telephone Booth.

to afford the largest possible amount of floor space with a minimum of wall space. The sides or panels being interchangeable, the buildings may be enlarged or reduced in size at will. The holes for assembling are spaced uniformly and the joints are made with particular reference to their being weather resisting. Lighting and ventilation facilities are provided either in the top or in the sides as may be preferred. The buildings are made to rest on cast iron feet of such proportions as to permit of their resting securely on ordinary soil, without its being necessary to provide other special foundations. Besides being of non-absorbent material and

of sanitary construction, the buildings are fire and moisture proof—a series of qualities that are much to be desired in structures utilized for the purposes above named.

THEORY OF ARCHES AND SUSPENSION BRIDGES.—By J. Melan, professor of bridge design at the German Technical School at Prague. Published by the Myron C. Clark Publishing Co., Chicago, and by E. and F. N. Spon, Ltd., 57 Haymarket, London, England. Cloth, 6x9 ins., 303 pages; price, \$3.00.

This is an authorized translation of Melan's work by D. B. Steinman, professor of civil engineering at the University of Idaho and author of "Suspension Bridges and Cantilevers." Prof. Melan's work and researches on the theory of arches and suspension bridges are well known throughout the world, and in Europe three editions of the book have been published. To give the work still wider scope Prof. Steinman undertook the translation with a view that in addition to its use as a work of reference by those engaged in the design of higher structures it would also be found well adapted for a text book for advanced or post-graduate students in structural engineering.

* * *

The report of proceedings of the annual meeting of the American Wood Preservers' Association, at New Orleans, Jan. 20-22, 1914, has been published in a volume of 498 pages. Several of the committee reports and papers, as well as an account on the proceedings in detail, were published by the Railway Review in its January and February issues. Copies of these proceedings may be had from the secretary of the association, Mr. F. J. Augier, Mt. Royal station, Baltimore, Md., at \$2.50 per copy in paper binding and \$3.50 in cloth binding. The next meeting of the association will be held in Chicago, Jan. 19-21, 1915.

* * *

The underlying fundamental facts of the difference between wrought iron and steel, respecting corrosion, are set forth in concise form in a 15-page pamphlet published by Reading Iron Co., Reading, Pa. The title is "Steel, Wrought Iron and Corrosion—A Review."

* * *

Hubbard & Co., of Pittsburgh, Pa., have published a book of white prints of the track tools manufactured by that concern. It is a book of 140 pages showing a detailed drawing of each style of tool manufactured, with all dimensions, weight, etc. Besides track tools there are a number of other tools, used by miners, woodchoppers, coopers, street pavers and others.

Dynamometer Test of Transom Draft Gear.

RADIAL GEAR REDUCES DRAW-BAR PULL ON CURVES.

Railway cars are at a disadvantage as compared with vehicles for ordinary roads, in that the wheels are attached to the axles rigidly, the axles revolving with the wheels. This occasion strains on the vehicle and the track, especially in curving. Many attempts to remedy this have been made, in the shape of loose wheels, compound and divided axles, etc., but none of them have proved successful under conditions of service. The location of the draft attachments at the end of the underframe is general by acknowledge not to be an ideal one. The leverage is so great that the wheel flanges are necessarily crowded against the rails in curving to a greater degree than would be the case if the point of draft attachment were at the pivoting point of the car. Many efforts have been made to devise practical radical draft gears, which would lessen the resistance in curving and thus lessen the strain and wear and at the same time conserve the power of the locomotive.

The Transom draft gear, manufactured by the Commonwealth Steel Co., is a practical radial gear without complication, pulling from and receiving buffing shocks on the body

bolster. It reduces the pulling length of the car by about ten feet, is self centering, and hence reduces lateral strain on coupler and car body, and also the liability to jump the track. Theoretically the locomotive should be able to pull more cars equipped with this gear than it can cars equipped with gears at the end of the car body. The Transom gear, which has been illustrated in these columns, consists of three main pieces; the body bolster, coupler, extension, and yoke. The bolster and yoke furnish a harness for spring or friction gears which are encased in the bolster.

Some thousands of freight cars have been in extended use, equipped with this gear, giving remarkably efficient service. The question of reduction of resistance and draw-bar pull on curves was tested in November, of last year, on the Illinois Central Railroad between Central City and Princeton, Ky., by representatives of the engineering department of the University of Illinois, with the use of the dynamometer car. The general superintendent of transportation of the Illinois Central, Mr. J. M. Daly, was in charge of the test.

Two empty trains of 19 cars each, all alike except as to draft gear, and built at the Pullman shops at the same time, were sent from Chicago to Central City in one train. There they were loaded with coal and made up into separate trains, for the test. The rating of the Mikado locomotives, Central City to Princeton, is 1400 ton gross. The first train was equipped with a friction gear applied as usual, and weighed 1458.1 tons, including weight of caboose, dynamometer car and office car. It was run on Saturday and the track between mile posts 169 and 174 were considered the best for testing purposes owing to the large number of curves and heavy grades. On the next day the train equipped with Transom gear was run, it weighing 1471.3 tons with the same number of cars. The cars had been

weighed uncoupled at both ends, to insure accuracy. The report of the test is as follows:

Test of Transom Gear vs. Gear Attached in Usual Manner.

Mile post	End gear		Transom gear	
	Pull	Time	Pull	Time
169.2	10,000	1:42:54	8,400	11:45:5
169.6	14,000	1:44:14	11,800	11:46:10
171.9	10,000	1:50:24	9,500	11:52:50
172.4	12,000	1:51:34	12,100	11:53:50
172.7	17,400	1:52:19	15,900	11:54:40
173.1	20,900	1:54:00	19,000	11:55:5
174.1	21,250	1:58:44	20,900	12:00:5
174.2	22,600	1:58:15	22,300	12:01:0
	128,150		119,900	

This tabulation shows that the train equipped with Transom gears required 6.4 per cent less draw-bar pull than the other, although weighing 13 gross tons more.

Commenting on this record and the additional tonnage of the train equipped with Transom gear, and the slight reduction in its time from that of the other train, Mr. Daly estimates that the real draw-bar pull of that train was about 7 per cent less on curves than the other. This "of course means a reduction of the wear of rails and flanges on curves and would permit a great many trains to get over the hill which now stall on it, which creates all kinds of expense in pulling drawbars out, overtime, 16-hour law expense, in addition to the element of danger it creates." It would also permit the addition of another loaded car to the train, still leaving a reasonable margin.

This test proves beyond doubt the claim made for the radial feature of the Transom gear. Other advantages claimed for it, and the manner of the application to different cars will be shown in future articles.

The Railway Supply Man's Point of View

The railway companies which are placing equipment orders, are not failing to take advantage of all the conditions and to get the lowest prices possible. It is probably true that some orders have been taken at prices which not only do not yield any profit but will net a loss. Some orders have been split among a number of establishments, because of the unwillingness of builders to take more than a very limited amount at the prices offered.

Last year, at the Atlantic City convention, the general feeling was one of exuberance in view of the flourishing state of business. This year the "psychological" effect of that damnably iterated phrase "watchful waiting" has got onto everybody's nerves. "Hope deferred maketh the heart sick." There are people who can sit and hold a pole all day without getting a bite. They like to fish. But that is "sport," while business is said to be business. Just now a good many people doubt the latter aphorism. It makes a difference in knocking the golf balls about, whether you are doing it because you really need the recreation or are simply doing it because there is nothing else to do. "Too much mustard" of irritating agitation at Washington, makes the watchful waiters feel as though they were sitting on a bunch of nettles.

"*De gustibus non disputandum.*" Teachers of taste in advertising, often betray the need of instruction on their own part. Just now we are told that "Reason Why" copy is the thing. "Of all sad words of tongue and pen, the saddest are these," "Reason Why." The expression is tautological and adopted from the vocabulary of ignorance. Used as a verb it has some precedent in literature; but as a noun or adjective it is

indefensible. It is put forth as against such words as "best," "largest," etc. There is a lot of "bunk" in this copy service discussion—witness approval of the word "Dominant," which means lording it over others, as against good old Anglo-Saxon expression of claims.

Iron and Steel Industry.

A note of despondency was sounded this week by a few men high up in steel production. Some months ago it was discounted that by June certain disturbing factors would be determined, such as the freight advance and trust legislation. These factors still stand, hence the disappointment aggravated by further apprehension. Considering conditions, a good business is being done, and a spirit of determination is apparent to sit tight and wait.

On the Pier.

It's not a "shilling shocker" but it's shocking just the same. "Car insurance" for June, "by request" is a compilation of Crandall's car tunes. Appropriately for Atlantic City it is devoted to week ends, and exposures.

Mr. Mason followed his usual correct and pleasing practice of sending, in advance, neat engraved invitations to visit the bower of McConway & Torley Co. R. S. V. P. in person at spaces 501-503-505.

The B-J journal box cooler is designed to overcome train delays, and the results of its use indicate that it has fully ac-

complished this purpose. A tank of water is clamped to the journal box, and a thermostatic valve is so adjusted that when ever the journal reaches a pre-determined heat, the water is spread over the entire length of the journal, cooling it evenly, and preventing the expensive delays incident to the occurrence of hot boxes. The extent to which the valve is opened and the cooling agent supplied to the journal is also commensurate with the degree to which the temperature in the journal box is raised. The B-J cooler can be seen in the space of the Transportation Utilities Co. (Nos. 564 and 565 in the Annex).

The H. W. Johns-Manville Co. enters some new fields with the J-M automatic car seal and the Jones speedometer and recorders. They may be seen at spaces 572 and 573.

The new "Thor" electric drills manufactured by the Independent Pneumatic Tool Co. are claimed to "mark an epoch in the mechanical world." They are equipped throughout with ball and roller bearings, and have universal motors for direct and alternating current.

The Central Railroad of N. J. runs a special convention train from New York, Tuesday. On June 17th, a special will run from Atlantic City to New York, leaving at 3:30 P. M., if a sufficient number give notice, in advance, that it is desired, to Mr. C. E. Chambers, at Atlantic City.

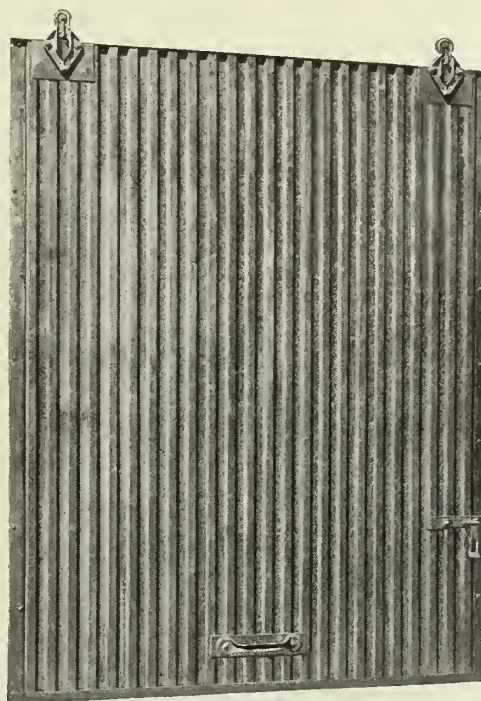
The American Car Roof Co., of Chicago, has been recently organized to handle the Christy all-steel roof for freight cars. Mr. H. A. Christy, the president, has been actively interested in railroads and railroad accessories since 1871. At that time he was in the lumber business and for twenty years sold large quantities of ties to the various railroads. Since then he has been connected with a railroad in Kansas and later as vice-president was interested in the Chicago, Cincinnati & Louisville R. R. Among other duties he is also chairman of the board of the American Ship Building Company. Mr. Christy Brown is vice-president and general manager of the company. Both of these gentlemen will be at the Atlantic City convention.

The use of a sanitary composition flooring in passenger car equipment is steadily becoming more general, and of the various constructions for supporting the composition flooring, the "Chanarch," exhibited by the Transportation Utilities Co. in their space (Nos. 564 and 565 in the Annex), presents most novel advantages. It consists of sheets of steel, corrugated in such a fashion that the cross section has the appearance of a series of little arches, so designed that the space between the arches is wider at the bottom than at the arch. In this way, the composition is fastened to the steel without the use of wire, screen, or less convenient types of construction. By the use of "Chanarch," which is strong enough to need no supporting floor, in a seventy-foot car, there is possible a saving in weight of from four to five hundred pounds over other types of construction.

Weatherproofing plays a very important part in the construction of all passenger equipment, especially steel cars, and that sold by the Transportation Utilities Co., under the name of "Duplex" embodies a new principle. The brass side and bottom strips for coaches, and the brass side strips and bottom rubber strip for Pullmans are applied to the sash on a plane parallel with the sash, and covering the battens over which the sash travels, giving a device which works with rather than against the wind pressure from the outside of the car. With the old type of weatherproofing,—the wedge method—the wedge locked the sash out against the wind pressure, the result being that when the wind pressure was greatest and the necessity

greatest for weatherproofing, the tendency would be for the outer part of the sash to be pushed in and away from the batten, thus leaving an opening for cinders and making it impossible for the window to make a tight joint when the pressure was removed, allowing the air to enter the car by passing up over the curtain box. "Duplex" weatherproofing does away with all of these difficulties, and in addition, by a novel meeting rail construction, permits the window to be opened about one inch and still be tight at the top and sides. All of these points can be seen by examining the model which will be on exhibition in the space of the Transportation Utilities Co.

In the space of the Transportation Utilities Co. there is exhibited the "Titanlike" steel freight car door. This door is a departure from the standard practice. It is the lightest and strongest type of steel door construction, consisting of two sheets of steel with special corrugations, riveted and welded



"Titanlike" Steel Freight Car Door.

together in a manner suitable to give the greatest strength and rigidity. It is finished in enamel baked on, and is practically indestructible. Its use will be obvious to any one who looks it over.

Vocational Education and Apprenticeship.

Mr. Geo. M. Basford was a witness this week, before the United States Commission on Industrial Relations which is holding hearings in New York.

He said that he had made considerable study of the apprenticeship plan as practiced by the railroads and that an apprenticeship course should be intense, not lasting more than three years, and including plenty of shop training. The boys should be selected in the first place. "I believe trades cannot be taught in schools. The best way to teach is in the workshops, with practical surroundings. I believe that industrial training by corporations is a genuine paying investment for the corporation and the boy. It will pay a corporation manufacturing anything, a farmer, a paper-hanger, a plumber, anybody who works with his hands, to train apprentices."

Vocational education in vocational schools he considered useless without the apprenticeship plan to carry the school

work further. The schools should not attempt to teach the trades; but should try to prepare the raw material and stimulate mental development. The corporation should have undisturbed control over apprentices. "We have not yet gotten to the point where the public schools can understand the industrial boy. The corporations with which I have been connected have found they could do better by training their own boys themselves. Some day, perhaps, educators will understand the shop-boy."

He cited the case of one railroad which had ceased to recruit the ranks of its engineers from college graduates. Instead, it has founded a corporation school, where high school graduates of about sixteen are taken in hand and made into practical engineers. "The first thing for the public school educators to do, is to go into the shops and learn the actual conditions and demands for boys. As public schools are conducted today, this cannot be done. One thing the public schools could do, now, that would be practically helpful, would be to give courses in manual labor, that would serve to bring out certainly whether boys had mechanical ability."

Supply Trade Notes.

—The Detroit Lubricator Co. will exhibit a new Detroit flange lubricator for the first time at the coming M. C. B. and A. R. M. M. conventions at Atlantic City. A No. 22 Bullseye locomotive lubricator, air cylinder, lubricator and



Colonel Harlow D. Savage.

transfer filler in operation will also be shown in space 637 reduces wear to a minimum.

—The Eymon Continuous Crossing Co., capital stock \$150,000, has been organized at Marion, Ohio, to manufacture the patent of James H. Eymon, of Marion, for a railroad crossing which, it is said, eliminates the shock and reduces wear to a minimum.

—The International Car Co. plant at Forty-second and Loomis streets, Chicago, was attacked by fire on June 2. The loss is estimated at \$100,000.

—Harlow D. Savage, general eastern sales manager of the American Arch Co., has been elected vice-president of that company. Colonel Savage was born at Memphis, Tenn., April 16, 1880. He was educated in the public schools and at Kenyon Military academy. Previous to his connection with the American Arch Co. he was with Ashland Fire Brick Co. from June, 1907, to March 1, 1914. He is an officer and

a director in various corporations and has for some time been military aid to the governor of Kentucky with the rank of colonel.

—R. C. Munro has resigned the position of western representative of Wendell & McDuffie Co. and has joined the railway sales department of the Acme Supply Co. of Chicago.

—G. Fred Collins, who has been representing the Protectus Paint Co., at Pittsburgh, Pa., has resigned to engaged in other business and the company has abolished its Pittsburgh office.

—H. P. Webb, Wainwright building, St. Louis, Mo., has been appointed railway sales agent for the St. Louis territory by the Union Fibre Co., Winona, Minn., manufacturers of insulating materials for refrigerator cars, railway building and cold storage plants. During the last few years Mr. Webb has been in the railway supply business at his present address, and previous to that time, he was connected with the purchasing departments of several railroads at St. Louis.

RAILWAY NEWS.

Boston & Maine.—The expenditure of \$25,000,000 by the Boston & Maine R. R. for betterments and equipment within the next five or six years is recommended by H. I. Miller, who has just completed his investigations. Of this amount, \$14,848,500 should be spread over a three-year period, as follows: \$6,610,500 for the first year, \$4,806,000 for the second and \$3,432,000 for the third. An outlay of \$1,000,000 a year is required for freight car renewals, and inside of five years \$4,496,000 will be needed for bridges. At least \$1,450,000 should be expended on locomotive terminals during the next two years, while an expenditure next year of \$988,000 for modernizing division yards should expedite traffic. Of the 1,242 locomotives, 451 should be sold or scrapped, but no large expenditure for new locomotives is needed at present. Of the 2,026 passenger cars, 740 have been built since 1900, 737 are from 15 to 25 years old and 549 from 25 to 55 years old; 800 coal and 150 refrigerator cars should at once be bought, costing \$1,002,000. For the next two or three years 1,000 new freight cars per annum will practically fill vacancies as they occur. Of the 26,000 freight cars, some 17,000 are less than nine years old.

Chicago, Milwaukee & St. Paul.—The Chicago, Milwaukee & St. Paul Ry. has sold to a banking syndicate \$30,000,000 of 4½ per cent refunding bonds. These bonds are part of a large issue authorized by the shareholders some months ago and the proceeds will go toward the payment of maturing obligations.

Cleveland, Cincinnati, Chicago & St. Louis.—Bankers are offering at a price to net 4½ per cent \$3,880,000 Cleveland, Cincinnati, Chicago & St. Louis Ry. equipment trust 5 per cent bonds. These bonds are issued at 80 per cent of the cost of 2500 box and 2500 coal cars.

Grand Trunk.—Morley Donaldson, general manager of the Grand Trunk Pacific Ry., has been quoted as saying that by June 1 the main line of the Grand Trunk Pacific will be ballasted as far west as Prince George, B. C., and all the stations along the line to that point will be completed. By June 5 the steel bridge now in the course of construction across the Fraser river, at Prince George, will be in place and trains will be running over it.

Kansas City, Mexico & Orient.—The Kansas City, Mexico & Orient Ry. will be sold on the steps of the Sedgwick county courthouse at Wichita, Kan., July 6. The order of sale was made June 2 by Judge John C. Pollock in the federal court, Kansas City, Kan. The up-set price will be \$6,000,000. The road will be taken over by a reorganization committee of stockholders.

Missouri Pacific.—The Missouri Pacific Ry. has been rescued from its financial difficulties. It was officially announced June 1 that the plan to exchange \$25,000,000 of three year five per cent notes, expiring on this date, for a like amount of one year six per cent notes, had been declared "definitive." There was a qualifying clause to the arrangement, however, inasmuch as the final date of extension was set forward to June 5. It is understood that the estate of Jay Gould and Speyer & Co., the road's bankers, have virtually agreed to purchase the notes of those who refused to grant an extension.

Mobile & Ohio.—The stockholders of the Mobile & Ohio R. R. will vote on July 14 to issue \$3,000,000 in notes which will cover, first, \$600,000 in reimbursement for expenditures already made on account of additional real estate at Birmingham and Mobile, Ala., and for dock construction at the latter port, besides new yard facilities at Meridian, Miss., and other improvements; second, \$1,200,000 for additional passing and other tracks, double-tracking 57 miles of main line, additional water and coal stations, additional shop facilities, etc., to be constructed in the near future; third, \$1,200,000 for additional equipment now under contract.

New York Central & Hudson River.—The New York Central & Hudson River R. R., according to press reports, plans to spend \$3,000,000 in the improvement of its Pennsylvania division in the erection of new shops and for additional equipment. The principal item in the plans, it is said, calls for the erection of new shops at Jersey Shore, the southern terminal of the Pennsylvania division at the junction of the Beech Creek division. The other \$1,000,000, according to the report, would be expended on new rolling stock.

Pere Marquette.—The receivers of the Pere Marquette R. R. were informed by United States Judge Arthur J. Tuttle in Detroit on June 4 that he "will probably order the issuance of \$4,000,000 of receivers' certificates." The receivers have petitioned for the issuance of \$7,600,000 in receivers' certificates, to cover past obligations of the receivership and those about to be incurred. Judge Tuttle did not say when he would formally order the issuance of the certificates, and the hearing was adjourned until July 7. According to a statement of the court the sale of the road will be ordered at an early date.

Rio Grande Railway.—The Rio Grande Ry., operating a narrow gauge track from Brownsville to Point Isabell, Tex., and the Brownsville street railway system, with three miles of standard track, have been acquired by A. Albert Browne. The purchase price is said to be about \$100,000. This purchase, it is said, follows a movement which began last November headed by D. A. O'Brien for the construction of a standard gauge railroad from Brownsville to the coast.

See St. Louis & San Francisco R. R.

St. Louis & San Francisco.—The sale of the Rio Grande Ry. and the Brownsville Electric Ry., subsidiaries, by the receivers of the St. Louis & San Francisco R. R., has been approved by United States Judge Walter H. Sanborn at St. Louis. The receivers also were ordered to replace the wornout track throughout the Frisco system. Judge Sanborn issued an interlocutory decree notifying creditors to file all claims against the system before October 1.

Southern Railway.—Application has been made to the Georgia railroad commission by the Atlanta & Charlotte Air Line Ry., a part of the Southern Railway system, for authority to issue \$20,000,000 of first mortgage five-per-cent bonds, the proceeds, for the most part, to be used in completing the double-tracking of the road from Charlotte to Atlanta.

Wabash Railroad.—A request that the Illinois public utilities commission fix the valuation of the Wabash Railroad at \$209,000,000 was made June 4 at Springfield by J. L. Minnis, representing the receivers of the road. The hearing dealt with the road's reorganization plans. Former Judge Owen P. Thompson, a member of the Illinois commission, asked why a complete new corporation to take over the road could not be formed. Mr. Minnis replied that such a scheme would be impracticable, because no one could be found to purchase the property. The hearing was adjourned until June 21.

Wheeling & Lake Erie.—The Wheeling & Lake Erie R. R. has completed a new office building at Brewster, Ohio, and division superintendents, roadmasters and division engineers who have heretofore had their offices in Canton have moved into the new quarters at Brewster. The offices of the real estate and claim agents and of the assistant engineer which have heretofore been in the McKinley Hotel, in Canton, have been moved into the station building there, occupying the rooms left vacant by the removal of the above-mentioned officers to Brewster.

PERSONALS.

H. O. Hukill, purchasing agent of the Pennsylvania Lines West of Pittsburgh, has retired after 54 years of continuous service with the company. Effective June 1, W. G. Phelps, hitherto assistant purchasing agent, is appointed purchasing agent, with office at Pittsburgh, Pa. Charles E. Walsh

has been appointed assistant purchasing agent, succeeding Mr. Phelps.

B. W. Duer, vice-president and also general manager of the Georgia & Florida Ry., has resigned the latter office, effective June 1, and has removed his headquarters to Baltimore, Md.

G. V. Peyton has been appointed superintendent of the Columbia division of the Southern Railway, with headquarters at Columbia, S. C., vice W. C. Hudson, who succeeds Mr. Peyton as superintendent of the Washington division, effective June 1. Mr. Hudson will have headquarters at Alexandria, Va.

C. B. Penny has been appointed general manager of the Elkin & Allegheny R. R. See New Roads and Projects under North Carolina.

G. W. Rourke, has been appointed assistant general manager of the Second district of the Chicago, Rock Island & Pacific Ry., with headquarters at Topeka, Kan., succeeding J. B. Smalley, deceased. The appointment was effective June 1. A. B. Ramsdell, division superintendent at Herington, Kan., has been appointed superintendent of the Illinois division, with headquarters at Rock Island, Ill., vice Mr. Rourke.

D. F. Kirkland, superintendent of the Atlanta, Birmingham & Atlantic R. R., at Manchester, Ga., has been appointed general manager of the Georgia & Florida Ry., with headquarters at Augusta, Ga., succeeding B. W. Duer.

M. L. Grossman has been elected assistant to the president of the Georgia & Florida Ry., with headquarters at Baltimore, Md., effective June 1, 1914. Mr. Grossman was elected secretary of the company on May 12, 1914, vice C. T. Earnest, resigned.

Harry H. Shelton has been appointed general counsel of the Virginia & Southwestern Ry., with office at Bristol, Tenn.

F. H. Alfred, general manager of the Pere Marquette R. R., has been appointed chief executive, succeeding William A. Garrett.

R. G. Fitzpatrick, superintendent of the Wichita Valley Ry., at Wichita Falls, Tex., has been appointed superintendent of the Fort Worth & Denver City Ry., with headquarters at Childress, Tex. O. E. Maer, superintendent of the Fort Worth & Denver City, has been appointed superintendent of the Wichita Valley Ry., with headquarters at Wichita Falls. These appointments were effective June 1.

F. W. Charske has been appointed auditor of freight accounts of the Union Pacific R. R., with office at Omaha, Neb., vice W. H. Anderson, retired under the pension rules of the company.

J. B. White, trainmaster of the Baltimore & Ohio R. R., at Weston, W. Va., has been appointed assistant trainmaster with office at Brunswick, Md., succeeding C. L. Todd.

C. S. Lake, general superintendent of the Seaboard Air Line Ry., has removed his offices to the Royster building, Norfolk, Va. The offices of C. E. Hix, superintendent transportation and W. F. Williams, superintendent telegraph, have also been removed to Norfolk. The headquarters of the operating department of the Seaboard Air Line hitherto have been at Portsmouth, Va.

P. G. Walton, effective June 1, has been appointed superintendent of the North Carolina division of the Seaboard Air Line Ry., with headquarters at Hamlet, N. C., vice W. A. Gore, resigned.

W. D. Johnson, assistant superintendent of the Duluth, South Shore & Atlantic Ry., has removed his headquarters from Thomaston, Mich., to Superior, Wis.

J. Welborn has been appointed auditor of the Texas State R. R., with office at Rusk, Tex.

H. O. Halsted, assistant to general manager of the Pere Marquette R. R., has been appointed superintendent of the transportation, with headquarters at Detroit, Mich., succeeding X. H. Cornell, resigned to take service with another company.

Samuel M. Felton, president of the Chicago Great Western R. R., has resigned as a receiver of the Pere Marquette R. R. Paul H. King, Grand Rapids, Mich., has been appointed to succeed Mr. Felton.

W. F. Stark, superintendent of the Dayton & Union Ry., Dayton, Ohio, has tendered his resignation to the directors and hopes to retire from the active management by July 1.

TRAFFIC.

Willis Callaway, commercial agent of the Winston-Salem Southbound Ry., at Jacksonville, Fla., has been appointed

Florida agent of the Atlanta, Birmingham & Atlantic R. R. at Jacksonville, succeeding H. E. Patridge, Jr., resigned to engage in other business.

John S. Campbell has been appointed agent at Portland, Ore., representing the freight and passenger departments of the Pennsylvania lines. F. N. Kollock, district agent, has been assigned to other duties.

R. E. Tipton, has been appointed general freight and passenger agent of the Galveston, Houston & Henderson R. R. at Galveston, Tex., succeeding W. F. McClure, resigned to take service with another company.

G. A. Weller, assistant general freight agent of the Ann Arbor R. R., with headquarters at Toledo, Ohio, has been appointed assistant general freight and passenger agent, with headquarters at Toledo, effective June 1.

John McAuliffe, Jr., has been appointed foreign freight agent of the New York, Central & Hudson River R. R., with headquarters in New York Produce Exchange building, 6 Beaver street, New York.

T. F. Ramsey has been appointed traveling freight agent of the Chicago & Alton R. R., with headquarters at Pittsburgh, Pa., succeeding A. J. Wyant, who has taken service with another company.

P. K. Gordon, general agent of the passenger department of the Sunset Central lines of the Southern Pacific Co., at San Francisco, Cal., has been appointed general agent at San Francisco, vice C. M. Burkhalter, who retires after 33 years continuous service with the company.

W. F. McClure, general freight and passenger agent of the Galveston, Houston & Henderson R. R., at Galveston, Tex., has been appointed traveling freight agent of the San Antonio & Aransas Pass Ry., with headquarters at San Antonio, Tex., effective June 1.

ENGINEERING.

J. S. Browne, division engineer maintenance of way of the New York, New Haven & Hartford R. R., at Providence, R. I., has been appointed assistant engineer maintenance of way, with office at New Haven, Conn. W. T. Spencer has been appointed division engineer of the Providence division, vice Mr. Brown; Paul Sterling, division engineer of the Western division, at Waterbury, Conn., vice Mr. Spencer; W. D. Warren, division engineer of the Midland division, at Hartford, Conn., vice Mr. Sterling, and H. E. Astley, formerly track supervisor at Boston, division engineer of the Central New England Ry., at Hartford, Conn., in place of Mr. Warren.

M. C. Cleveland, whose appointment as valuation engineer of the Lehigh Valley R. R., was noted in a previous issue of the Railway Review, was born at Grantville, Mass., March 26, 1876. He was educated at Case School of Applied Science and began his railway career in 1902. From June, 1902, to May, 1903, he was instrument man on construction for the Baltimore & Ohio R. R.; May, 1903, to April, 1904, assistant engineer of the Toledo, St. Louis & Western R. R.; April, 1904, to September, 1905, assistant engineer on two divisions of the Cleveland, Cincinnati, Chicago & St. Louis Ry.; September, 1905, to June, 1907, engineer maintenance of way of the Peoria & Eastern division of the same road, and from June, 1907, to October, 1910, division engineer of the Michigan Central R. R. Mr. Cleveland was special engineer for the vice-president of the New York Central lines West of Buffalo from October, 1910, to August, 1911. He was then appointed engineer maintenance of way of the Chicago, Indiana & Southern R. R., which position he held until May 15, 1914, when he resigned to become valuation engineer of the Lehigh Valley.

E. C. Carter, chief engineer of the Chicago & North Western Ry., with headquarters at Chicago, has resigned. Mr. Carter will take a long vacation and afterwards engage in consulting work.

Mr. Carter was born January 11, 1854, at Waverly, Ill. He was graduated from Rensselaer Polytechnic Institute, Troy, N. Y., and entered railway service in 1870, as a rodman with the Jacksonville & Southeastern Ry. He was with the Cairo & St. Louis Ry. and then from 1876 to 1877 was draftsman and mechanical engineer for the Springfield Iron & Steel Co. He returned to railroad work in 1877 as assistant engineer of the Chicago & Alton R. R. on its Kansas City extension. He was with the United States government on Mississippi river observation in 1878 and then from 1879 to 1880 was assistant engineer of construction, Indianapolis, Decatur & Springfield Ry. Mr. Carter was resident engineer of the Wabash, St. Louis & Pacific Ry. from 1880 to 1884; from 1884 to 1885, assistant to chief engineer of that road, and from 1885 to 1887, assistant and contracting en-

gineer of the Detroit Bridge & Iron Works. He went with the Chicago & North Western Ry. in 1887 as principal assistant engineer. He has been chief engineer of that road since December, 1899.

MECHANICAL.

Harvey Shoemaker has been appointed mechanical superintendent of the Bangor & Aroostook R. R., with office at Derby, Me., vice R. Q. Prendergast, resigned, effective June 1.

Ernest Kuehn has been appointed inspector motor cars, of the St. Louis Southwestern Ry. of Texas, with headquarters at Texarkana, Tex., effective June 1.

A. C. Hinckley, superintendent of motive power and machinery, of the Oregon Short Line R. R., has moved his headquarters from Salt Lake City, Utah, to Pocatello, Idaho.

David Gratton, general foreman of the Oregon Short Line R. R. at Salt Lake City, Utah, has been appointed master mechanic, with headquarters at Pocatello, Idaho.

J. C. Schepp has been appointed master mechanic of the



E. C. Carter, Who Has Resigned as Chief Engineer of the Chicago & North Western Railway.

Texas & Pacific Ry., with headquarters at Texarkana, Tex., to succeed G. M. Lovett, assigned to other duties.

OBITUARY.

Walter J. Eddington, general foreman of the Atchison, Topeka & Santa Fe Ry., at Corwith, Ill., died at his home in Chicago, May 29, aged 65 years.

Frank L. Borton, western superintendent of the Star Union line of the Pennsylvania system, at Chicago, died at Evans-ton, Ill., June 2, aged 51 years.

D. C. Cheney, fuel inspector of the Chicago, Milwaukee & St. Paul Ry. at Chicago, died May 29, aged 58 years.

Frederick C. Tucker, superintendent of transportation of the Macon, Dublin & Savannah R. R., with headquarters at Macon, Ga., died in that city May 26, aged 40 years.

Henry W. Gays, general manager of the Ottawa & New York Ry., died at Ottawa, Ont., May 31. He was born at Brant, N. Y., March 21, 1849. Previous to his connection with the Ottawa & New York Ry., Mr. Gays was general manager of the St. Louis, Chicago & St. Paul Ry., and the Chicago, Peoria & St. Louis Ry.

NEW ROADS AND PROJECTS.

California.—With reference to a report that the San Pedro, Los Angeles & Salt Lake R. R. is preparing to build its own line between Riverside and Daggett, Cal., an officer of the company says that no definite action has been taken.

Georgia.—The chamber of commerce, Cordele, Ga., and the board of trade, Panama City, Fla., have started a movement

looking toward the extension of the Georgia, Southwestern & Gulf R. R. to Panama City. Over a year ago plans were made for the extension of the line to the Gulf and a portion of the proposed route was surveyed, but the work was dropped after a few months, with very little accomplished.

Idaho.—The officers of recently incorporated Butte, Boise & San Francisco Ry., reported in the Railway Review of May 23, are: L. O. Lenard, Boise, Idaho, president; T. F. Halveston, Boise, vice-president; W. M. Rank, San Francisco, Cal., vice-president, and L. W. Ensign, Boise, secretary and treasurer.

Nebraska.—The Rock Island, Omaha Terminal Ry., capital stock \$10,000, has filed articles of incorporation, proposing to operate a railroad in Douglas county, Nebraska. The incorporators are F. P. Holmes, George L. Delacey, Bruce Fullerton, Fred Funke and Frank H. Barnes, all of Lincoln, Neb.

North Carolina.—The Elkin & Alleghany Ry., which now operates from Elkin to Doughton, N. C., is to be extended to Sparta, the county seat of Alleghany county, a distance of 23 miles. C. B. Penny, representing I. M. Taylor & Co., who, it is reported, will finance the work, will be general manager. It is also said that the road will be extended to Jefferson, Ashe county, upon completion of the Sparta line.

Texas.—With reference to a report that the Quanah, Acme & Pacific R. R. is preparing to continue construction from Roaring Springs, Tex., to Roswell, N. M., an officer of the company says that no extension is contemplated at this time.

Washington.—The Klickitat Northern R. R., Vancouver, Wash., has been incorporated to construct a railroad from Wrights, Wash., on the Spokane, Portland & Seattle Ry., north to timber lands near the Klickitat river. The capital stock is \$100,000. F. A. Bennett and others are interested.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Chicago, Indianapolis & Louisville Ry. is in the market for 5 Santa Fe (2-10-2 type) locomotives.

—The Rutland Railroad has ordered one superheater six-wheel (0-6-0-5) switching locomotive from the American Locomotive Co. This engine will have cylinders 19x26 ins., driving wheels 51 ins., and a total weight in working order of 144,000 lbs.

—The Kewanee, Green Bay & Western R. R. has placed an order with the American Locomotive Co. for one superheater mogul freight locomotive (2-6-0-s type), cylinders 19x26 ins., driving wheels 56 ins., and total weight in working order, 141,000 lbs.

Freight Cars.

—The Illinois Central R. R. has ordered 1000 all-steel box cars from the American Car & Foundry Co., 1000 from the Pressed Steel Car Co., 500 from Standard Steel Car Co., and 500 from the Haskell & Barker Car Co.

—The Charlotte Harbor & Northern Ry. has ordered 30 phosphate cars from the Pressed Steel Car Co.

—The Minneapolis Traction Co. is inquiring for 60 flat cars.

—The Stewart Iron Co. is in the market for 8 gondolas.

—The Aurora Elgin & Chicago R. R. is contemplating the purchase of 10 gondolas.

—The New York Central Lines, according to report, have ordered 4300 freight cars from the American Car & Foundry Co. and 3000 cars from Standard Steel Car Co.

—The Erie Railroad is in the market for 800 50-ton steel hopper cars.

—The Delaware, Lackawanna & Western R. R. has ordered 400 steel hopper cars from the American Car & Foundry Co. and 350 from the Cambria Steel Co. An inquiry for 200 automobile cars has been issued.

Passenger Cars.

—The Southern Pacific Co., it is said, is in the market for 46 motor passenger cars.

—The Central New York Southern R. R. has ordered 2 70-ft. gasoline motor cars from the McKen Motor Car Co.

—The Minneapolis & Northern Ry. has received one 55-ft. gasoline motor freight and express car from the McKen Motor Car Co. This company has also delivered one 70-ft. 200 h. p. gasoline motor car to the Minneapolis, St. Paul & Sault Ste. Marie Ry.

—The Arkansas North Western R. R., Bentonville, Ark., has ordered one 70-ft. car from the McKen Motor Car Co.

Iron and Steel.

—The United States Steel Products Co., it is said, has booked 30,000 tons of rails for the Government Railways of Queensland, Australia.

—A report says that the Tata Iron & Steel Co., of Sakchi, India, has begun shipping rails to the Pacific coast. Belgian rail makers are selling some rails in this country, a lot of 1000 tons of girder section recently having been taken by traction interests in Texas.

—The Seaboard Air Line Ry. has ordered 12,000 tons of 85-lb. rails and 5000 tons of 90-lb. rails.

—The Northwestern Pacific R. R. has ordered 2200 tons of rails from the Illinois Steel Co.

—The New York, New Haven & Hartford R. R. recently ordered 4500 tons of rails from the Bethlehem Steel Co., and 4500 tons from the Pennsylvania Steel Co.

—The Cumberland Valley R. R. has ordered 2400 tons of rails from the Pennsylvania Steel Co.

Bridges.

—The Chesapeake & Ohio Ry. has deferred the time for receiving bids for the proposed bridge over the Ohio river near Portsmouth, Ohio, as there still remains considerable surveying and other preliminaries that will delay the matter fully 30 days.

—The grade crossing commission, Buffalo, N. Y., has received bids for concrete and stone work for the Walden avenue crossing of the Erie Railroad and for the Hertel avenue crossing of the New York Central & Hudson River R. R.

—The Western Maryland Ry. has ordered 1000 tons of bridge steel from the American Bridge Co.

—The Pittsburgh & Lake Erie R. R., Baltimore & Ohio R. R., Erie Railroad, Buffalo, Rochester & Pittsburgh Ry., the traction company, city and county, it is said, will construct a 290-ft. span viaduct at Gardner avenue, New Castle, Pa., at an estimated cost of \$250,000.

—The Chicago, Milwaukee & St. Paul Ry. is reported as ordering 478 tons of bridge steel from the Wisconsin Bridge & Iron Co.

—The Baltimore & Ohio R. R., according to report, will construct a viaduct at Cross street, Baltimore, Md., at an estimated cost of \$125,000.

—The Illinois Central R. R., it is said, has applied to the government for permission to erect a new bridge at Blackfort, Ky.

—The Philadelphia & Reading Ry., and the city will erect an overhead bridge at Green Lane, near Fern Rock, Pa. The apportionment of the cost \$107,000 has not been decided.

—The Pennsylvania Railroad has awarded contract for a seven-span bridge over the Schuylkill river at Earnest, Pa., about 2000 tons of steel, to the Phoenix Bridge Co.

—The Houston & Brazos Valley R. R. and Brazoria county, Tex., awarded the contract for the proposed bridge between Freeport and Velasco, Tex., about 500 tons, to the Virginia Bridge & Iron Co.

—The Northern Pacific Co. has ordered 2450 tons of bridge steel from the American Bridge Co. for a viaduct over the Green river in King county, Wash.

—Judge V. P. Barnum has ordered the Erie Railroad to submit amended plans for the elimination of grade crossings, at Youngstown, Ohio. The work involves an expenditure of about \$2,000,000.

—As a result of a recent court decision the Northern Pacific Ry. is now in a position to resume work on grade separation in Spokane, Wash. The improvements will cost about \$2,500,000. The Guthrie-McDougall Company were awarded the contract, which was later cancelled, for the concrete work and grading amounting to about \$1,000,000.

Buildings, Terminals, Etc.

—The Northern Pacific Ry., Spokane & Inland Empire R. R. and the Coeur d'Alene & St. Joe Transportation Co., it is said, will erect a union depot at Coeur d'Alene, Idaho, to cost \$50,000.

—The Canadian Pacific Ry. has awarded contracts for shops and other divisional point works at Empress, Sask., and at Shaunavon, Alta, at a cost of about \$100,000.

—See New Roads and Projects under Nebraska and reference to the Rock Island, Ill., Omaha Terminal Ry.

—The Chicago, Burlington & Quincy R. R. will erect a station at LaGrange, Mo.

—The Atchison, Topeka & Santa Fe Ry., it is said, will construct an additional freight house at Los Angeles, Cal.

—The Erie & Pittsburgh R. R. (Pennsylvania Company) is reported as having prepared plans for a steel and concrete warehouse at Erie, Pa., to cost \$60,000.

—The Chicago & North Western Ry., it is said, has authorized an expenditure of \$100,000 for shop and yard improvements at Clinton, Iowa.

—The Norfolk & Western Ry. will erect a passenger and freight station at Charlestown, W. Va.

—The Southern Railway, it is said, has let general contract to C. W. Lane & Co., Atlanta, Ga., for the proposed improvements at Buntyn, near Memphis, Tenn. The work will include the erection of a round house, machine and boiler shops, coaling plant and a two-story office building and construction of about 15 miles of track, at an estimated cost of \$750,000.

—The New York, New Haven & Hartford R. R. is taking bids and proposes to erect a new station at Pawtucket, R. I.

—The Oregon-Washington R. R. & Navigation Co. is reported as seeking a site for a roundhouse, shops and yards at Pendleton, Ore.

—Because of the filing of a referendum petition attacking the franchise under which the Southern Pacific Co. planned to build a \$1,000,000 depot at Third and Townsend streets, San Francisco, Cal., the railroad company on May 27 ordered all work stopped. It has since developed that the petition did not bear the required number of valid signatures and there will not have to be an election. The work is being resumed.

—The Northern Pacific Ry. is expected to begin work soon on a new passenger station at Bernard street, Spokane, to cost about \$300,000.

—The Pennsylvania Railroad has opened a new station at New Castle, Pa. The Pittsburgh & Lake Erie R. R., has also completed its new passenger station in that city.

—The city of Richmond, Cal., has filed an application with the railroad commission asking that body to direct the Southern Pacific Co. to erect a stone, concrete, brick or other fireproof structure for a passenger depot. The application represents that the company contemplates the erection of a frame structure.

—The Southern Railway, it is said, will soon begin construction of a new freight terminal at Mobile, Ala. The improvement will cost about \$200,000. It will include two freighthouses, one 30 feet wide and the other 40 feet wide, and each 400 feet long. The larger will have a two-story front for offices. There will be a cotton platform to accommodate 1500 bales, an automobile platform, paved driveways and $2\frac{1}{4}$ miles of terminal tracks. The buildings will be of steel and brick construction, with concrete floors and doors of rolled steel.

—The St. Louis & San Francisco R. R. will erect a new passenger station at Hugo, Okla., at a reported cost of \$60,000.

—Work has been begun on the new ocean and rail terminal of the Great Northern Ry., at Flavel, Ore., at the mouth of the Columbia river. Contracts for work thus far let are said to amount to \$190,000.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE MAY 26, 1914.

Car truck, 1,097,634—Clarence H. Howard and Harry M. Pflager, St. Louis, Mo., assignors to Commonwealth Steel Co., St. Louis, Mo.

Car-coupling-lifting device, 1,097,643—John O. Jones, North La Crosse, Wis.

Body-bolster for railway cars, 1,097,654—Charles A. Lindstrom, Pittsburgh, Pa., assignor to Pressed Steel Car Co., Pittsburgh, Pa.

Anticlimber for passenger cars, 1,097,655—Charles A. Lindstrom, Pittsburgh, Pa.

Car door, 1,097,661—James Mohler, Jr., Ohaton, Alberta, Canada.

Ventilator for dining car kitchens, 1,097,671—Edward Posson, Chicago, Ill.

Car window construction, 1,097,677—Harry H. Schroyer, Chicago, Ill., assignor to The Acme Supply Co., Chicago, Ill.

Flange lubricator, 1,097,704—James Cassidy, Arthur B. Metcalfe and Samuel J. Cassidy, Syracuse, N. Y.

Draft gear, 1,097,738—Thomas Harrison Symington, Baltimore, Md.

Draft link, 1,097,739—Thomas Harrison Symington, Baltimore, Md.

Cheek plate for draft gear, 1,097,740—Thomas H. Symington, Baltimore, Md.

Railroad tie plate, 1,097,790—William Corcoran, Seattle, Wash.

Underframe for cars, 1,097,800—Karl M. Hamilton, Davenport, Iowa, assignor to The Bettendorf Company, Bettendorf, Iowa.

Railroad switch, 1,097,817—William E. Miller, Savannah, Ga. Truck frame, 1,097,819—Harry M. Pflager, St. Louis, Mo., assignor to Double Body Bolster Co., St. Louis, Mo.

Circulating arch tube for locomotive fireboxes, 1,097,830—Harry S. Vincent, Ridgewood, N. J.

Rail fastening device, 1,097,831—Frank Russell White, Washington, D. C.

Automatic train-stop device, 1,097,854—George H. Ennis, Derby, Conn.

Rail-fastening device, 1,097,880—George Rielly, Santa Rosa, Cal.

Clasp brake rigging, 1,097,912—Thomas L. Burton, Pittsburgh, Pa., assignor to The Westinghouse Air Brake Co., Wilmerding, Pa.

Scal for cars and other purposes, 1,097,913—Leon J. Campbell, Chicago, Ill., assignor to The Campbell Industrial Co., Chicago, Ill.

Nut-lock for rail joints, 1,097,918—William E. P. Devane, Adel, Ga.

Tank car, 1,097,928 and 1,097,930—Allen E. Ostrander, Ridgewood, N. J., assignor to American Car and Foundry Co., St. Louis, Mo.

Carline, 1,097,929—Allen E. Ostrander, Ridgewood, N. J., assignor to American Car and Foundry Co., St. Louis, Mo.

Brake step, 1,097,931—Allen Edward Ostrander, Ridgewood, N. J.

Pressed steel sill pocket, 1,097,934—Harry E. Price, St. Louis, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Hopper ore car construction, 1,097,945—John M. Rohlfing, St. Louis, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Lock-lid for journal boxes, 1,097,946—Ernest R. Schroeder, Paterson, N. J., assignor to American Car and Foundry Co., St. Louis, Mo.

Removable deck-screen for steel passenger cars, 1,097,948—Levi Clifton Sparks and August William Louis Hartbauer, St. Louis, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Removable curtain shield, 1,097,949—Levi C. Sparks, St. Louis, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Hopper door mechanism, 1,097,951—Victor M. Summa, St. Louis, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Brake handle, 1,097,952—Sigvald Udstad, St. Charles, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Mail pouch rack, 1,097,958—Victor Willoughby, Jeffersonville, Ind., assignor to American Car and Foundry Co., St. Louis, Mo.

Cast steel door frame, 1,097,959—Victor Willoughby, Jeffersonville, Ind., assignor to American Car and Foundry Co., St. Louis, Mo.

Tank car, 1,097,961—Louis E. Allyn, Pekin, and Flora May Turner, Coal City, Ill., assignors to American Car and Foundry Co., St. Louis, Mo.

Carline, 1,097,962—John McE. Ames, New York, N. Y., assignor to American Car and Foundry Co., St. Louis, Mo.

Uncoupling device, 1,097,963—William Gilbert Armitage, St. Louis, Mo., assignor to American Car and Foundry Co., St. Louis, Mo.

Railway car truck, 1,097,968, 1,097,969 and 1,097,970—Harry E. Doerr, St. Louis, Mo., assignor to Scullin-Gallagher Iron & Steel Co., St. Louis, Mo.

Switch-operating mechanism, 1,097,971—Curtis Dougherty, Cincinnati, Ohio, and Charles F. Jones and Daniel M. Casc, Lexington, Ky.

Switch stand, 1,098,021—Robert J. Davidson and James B. Strong, Hillburn, N. Y.

Rail fastening, 1,098,036—Alexander B. B. Harris, Chicago, Ill.

Locomotive speed-reducing and stopping mechanism, 1,098,041—Georg Koch, Shelton, Conn.

RAILWAY REVIEW

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The American Railway Master Mechanics' Association.

PROGRAM OF THE FORTY-SEVENTH ANNUAL CONVENTION.

The sessions of the forty-seventh annual convention of the American Railway Master Mechanics' Association will be held in the Greek Temple on Young's million dollar pier, Atlantic City, N. J., June 15 to 17, 1914. The arrangements as regards convention headquarters, enrollment, etc., are similar in every way to those announced in last week's issue for the Master Car Builders' Association. The following is the program of the convention:

FIRST DAY.

MONDAY, JUNE 15, 1914.

9:30 a. m. to 1:30 p. m.

Prayer	9:30 a. m. to 9:35 a. m.
Address of president.....	9:35 a. m. to 9:50 a. m.
Intermission	9:50 a. m. to 9:55 a. m.
Action on minutes of convention of 1913	9:55 a. m. to 10:00 a. m.
Reports of secretary and treasurer..	10:00 a. m. to 10:15 a. m.
Assessment and announcement of dues; appointment of committees on correspondence, resolutions, nominations, obituaries, etc.....	10:15 a. m. to 10:25 a. m.
Election of auditing committee.....	10:25 a. m. to 10:30 a. m.
Unfinished business.....	10:30 a. m. to 10:35 a. m.
New business.....	10:35 a. m. to 10:45 a. m.
Discussion of reports on:	
Mechanical stokers.....	10:45 a. m. to 11:00 a. m.
Revision of standards.....	11:00 a. m. to 11:30 a. m.
Safety appliances.....	11:30 a. m. to 12:00 m.
Individual papers on:	
Dimensions for flange and screw couplings for injectors, by O. M. Foster	12:00 m. to 1:00 p. m.
Motors for railway shops, by B. F. Kuhn	1:00 p. m. to 1:30 p. m.
Adjournment.	

SECOND DAY.

TUESDAY, JUNE 16, 1914.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:	
Locomotive headlights.....	9:30 a. m. to 10:15 a. m.
Design, construction and maintenance of locomotive boilers.....	10:15 a. m. to 10:30 a. m.
Standardization of tinware.....	10:30 a. m. to 10:45 a. m.
Superheater locomotives.....	10:45 a. m. to 11:30 a. m.
Use of special alloys and heat-treated steel in locomotive construction	11:30 a. m. to 12:00 m.
Individual paper on:	
Review of the work done by other mechanical organizations, by Dr. Angus Sinclair.....	12:00 m. to 1:00 p. m.
Subjects	1:00 p. m. to 1:30 p. m.
Adjournment.	

THIRD DAY.

WEDNESDAY, JUNE 17, 1914.

9:30 a. m. to 1:30 p. m.

Discussion of reports on:	
Smoke prevention.....	9:30 a. m. to 10:00 a. m.
Revision of standard efficiency tests of locomotives.....	10:00 a. m. to 10:15 a. m.
Revision of air brake and train signal instructions.....	10:15 a. m. to 10:30 a. m.
Train resistance and tonnage rating	10:30 a. m. to 11:15 a. m.
Fuel economy.....	11:15 a. m. to 12:00 m.
Individual paper on:	
Tests of Schmidt superheater and brick arch, by H. W. Coddington	12:00 m. to 12:30 p. m.
Resolutions, correspondence, etc....	12:30 p. m. to 12:45 p. m.
Unfinished business.....	12:45 p. m. to 1:00 p. m.
Election of officers, closing exercises	1:00 p. m. to 1:30 p. m.
Adjournment.	

Senate Passes Repeal of Panama Tolls Exemption.

The United States senate passed, June 11, the bill which has been urged by the administration, repealing last year's measure exempting American coastwise shipping from the payment of tolls in the Panama canal. It was passed with the inclusion of the Simmons-Norris amendment which specifically reserves all rights as to levying of tolls and control of the canal which the United States may have had under the Hay-Pauncefote treaty. The measure now goes to the house, which is expected to accept it as it stands.

Largest Car Surplus Since 1909.

The bi-weekly bulletin of the American Railway Association, giving the statement of car surpluses and shortages to June 1, 1914, shows on that date the largest surplus since the year 1909. The total was 242,572, which compares with a total surplus of 239,406 on the date of the previous report, May 15, 1914, and a total surplus of 60,291 cars on May 31, 1913. The total car shortage is merely nominal.

Supreme Court to Pass on Privacy of Files.

United States Attorney General McReynolds filed in the United States Supreme court, June 4, an appeal from the federal district court in Kentucky denying the application of the government for an order compelling the Louisville & Nashville R. R. to permit examiners of the Interstate Commerce Commission access to its files of correspondence. The attorney general contends that a railroad can have no secrets from the government. The case is one of much importance.

Government Report Promises Record Wheat Crop.

The government's monthly crop report, issued June 8, predicts the greatest yield of wheat this country has ever had. It places the condition of winter wheat June 1 at 92.7 per cent, compared with 95.9 per cent last month, 83.5 per cent last year and 80.3 per cent the 10-year average. The indicated yield is for 638,000,000 bushels, a gain of 8,000,000 bushels over last month. This compares with 523,561,000 bushels, the final yield a year ago. The spring wheat indications are for 262,000,000 bushels and the condition of the crop is 95.5 per cent. This forecast allows for a possible deterioration between now and harvest of around 75,000,000 bushels. Taking the winter wheat crop of 638,000,000 bushels and the spring wheat crop of 262,000,000 bushels, it makes a total out-turn of 900,000,000 bushels, which would be by far the largest crop ever produced in this country. Last year the total yield of all wheat was 763,380,000 bushels, this being the record up to that time. Interest naturally centered in the wheat

production, but other crops, including oats, barley, rye and hay, showed up well. This was particularly true in oats, private reports the last few weeks telling of severe drought and backward growth, but the government report failed to show any such condition. The production is estimated at 1,216,000,000 bushels, compared with 1,104,000,000 bushels a year ago and a final outturn last year of 1,121,768,000 bushels.

Missouri Commission Orders Private Road Thrown Open.

The public service commission of Missouri has issued an order which will oblige the owners of a thirty-mile railroad in the southwestern part of the state to open the line to the public as a common carrier. The railroad is the Sligo & Eastern and is owned, it is understood, by a subsidiary of the American Car & Foundry Co. It extends through a district about fifteen miles wide in Dent, Crawford, Iron, Washington and Reynolds counties, and furnishes the only outlet to the timber cut in that district. As part of the railroad has been operated as a private carrier, it is claimed, shippers were prevented from sending their timber to the general market, but were forced to sell a subsidiary of the American Car & Foundry Co., which thereby was enabled to dictate its own price. The commission ordered the railroad to operate trains over the entire thirty miles, including the eleven miles built as a private line, as a common carrier, and to file a schedule of tariffs with the Missouri public service commission.

Ohio Commission Declines Jurisdiction in New York Central Merger.

The Ohio Public Utilities Commission held a hearing at Columbus, June 9, on the application of the New York Central & Hudson River and the Lake Shore & Michigan Southern railway companies to combine, and at its conclusion dismissed the application on the ground that the commission had not jurisdiction to investigate whether the merger would effect monopolization of lines running through Ohio from Buffalo to Chicago. The proposed merger involves an issue of securities aggregating \$300,000,000. In announcing the decision, Oliver H. Hughes, chairman of the utilities commission, explained that the Ohio law does not confer authority on the commission to determine when competition is eliminated by combination of railroads, though it gives this power in cases of other utilities. Similar petitions have been filed with public service commissions of New York, Pennsylvania, Michigan and Illinois. Albert H. Harris, vice-president of the New York Central, and F. J. Jerome, of Cleveland, general counsel for the Lake Shore, declared after the decision was announced that it will not affect materially the status of proposed merger action. They will press their application in other states.

Ships Must Be Measured to Avoid Delay at Panama.

Col. George W. Goethals, governor of the Panama Canal zone, has issued a circular to shipowners warning them that vessels which use the new waterway must be provided with proper tonnage certificates. The circular says:

"It is important that vessels which expect to use the Panama canal should provide themselves with the proper tonnage certificate, based upon the rules laid down for Panama canal measurement. The rules, regulations, and laws which govern this measurement vary from those for similar measurement on the Suez canal and in the United States and foreign countries, and vessels require a remeasurement in order to conform to the Panama rules. The Collector of Customs at New York, the collectors in some of the other large cities of the United States, and certain properly designated officials abroad have been authorized to measure vessels under the Panama rules, and issue the required certi-

cate, and in order to avoid delay and measurement upon their arrival at the canal, it is strongly recommended that all vessels provide themselves with the proper certificate before their arrival in canal waters."

Affairs of the New York, New Haven & Hartford R. R.

The Interstate Commerce Commission virtually brought to a conclusion June 6, the investigation into the financial affairs of the New York, New Haven & Hartford R. R., which it has been conducting several weeks. Commissioner McChord announced that the inquiry would be discontinued for the present. It is believed no important testimony in relation to the New Haven's financial affairs remains to be taken and that the witnesses already heard have furnished the commission with enough material on which to frame its report to the senate, called for by the Norris resolution directing the inquiry. Chairman Howard Elliott, of the New Haven company, made public the information, on June 8, that the directors of the road have acquiesced to the plan proposed by Gov. Walsh for the separation of the Boston & Maine from the New Haven system. Mr. Elliott recommended the enactment of legislation necessary to permit the sale to a board of trustees of the Boston & Maine stock now held for the New Haven company by the Boston Railroad Holding Co. He said, although the New Haven directors did not consider the proposed action entirely just or necessary, they had consented to the agreement proposed by the Department of Justice, and to Gov. Walsh's plan of disposing of the Boston & Maine stock in order to avoid an extended controversy with the department, and also in the interests of the stockholders, and 90,000 employees, as well as of the general welfare of New England. Two bills designed to effect the foregoing have been prepared as measures of their respective parties for submission to the Massachusetts legislature.

New National Forest in White Mountains.

The national forest reservation commission has approved a little more than 33,000 acres in the White Mountains for purchase by the government. These areas are in two separate tracts, both in Grafton county, New Hampshire, the larger containing 31,200 acres on the watershed of the Pemigewasset river, a tributary to the Merrimac. The tract comes within a mile of North Woodstock on the Boston & Maine R. R., and several good roads lead through it. The land is between 700 and 4300 feet in elevation, and in the lower valleys are a number of abandoned farms now grown up to trees. Most of the conifers have been cut to make paper pulp, but there are good stands of beech, birch and maple of considerable value. With fire kept out there is said to be excellent promise of a new stand of spruce. The price agreed upon by the government is \$4.62 an acre, including both land and timber. The smaller purchase consists of several areas lying on the watersheds of Little river and Gale river, both tributaries of the Connecticut. These lands cover 2000 acres and are contiguous to lands already approved for purchase; hence they go far toward giving the government a solid body of land in this locality. The price for the 2000 acres, land and timber, is \$4 an acre. At the same time that these White Mountain areas were approved, the commission also approved the purchase of the Pisgah forest in North Carolina, from the George W. Vanderbilt estate. These tracts bring the total eastern forests up to 1,077,000 acres.

Cotton Prospects in the South.

President Harrison, of the Southern Railway, speaking of the outlook for this year's cotton crop, in Washington, June 6, said: "The government cotton report issued on June 1 indicates a substantially better condition in the states

traversed by Southern Railway lines than on the corresponding date last year. This bears out information received from our agents. Some uneasiness has been caused by reports of drought in the cotton states east of the Mississippi river, but generally speaking weather conditions along our lines have been most favorable for giving the crop a good start. Wet weather during the early part of the season results in the plant developing a spreading superficial root system which is incapable of drawing a sufficient amount of moisture from the deeper soil during dry periods later in the season and, most of the roots being just below the surface, they are liable to be seriously injured in the cultivation of the crop. On the other hand, a dry May means the development of a good tap root and a deep root system which will insure better growth in the event of unfavorable conditions later in the season. The lack of excessive rains has facilitated the cultivation of the crop and reports from the territory along Southern Railway lines indicate that it is unusually free from grass and weeds. With reasonably favorable weather conditions for the remainder of the season, therefore, a good yield of cotton may be expected in the states east of the Mississippi river."

Safety Record for 46 Months, C. & N. W. Ry.

The latest safety bulletin of the Chicago & Northwestern Ry. includes a statement showing the reduction in the number of accidents for 46 months ending April 30th, 1914, as compared with 46 months on the same basis as the year ending June 30th, 1910. The figures indicate a total reduction of 134 fewer employees killed, a decrease of 32 per cent; 8720 fewer employees injured, a decrease of 26.2 per cent; 859 fewer

passengers injured, a decrease of 23.7 per cent; 172 fewer outsiders killed, a decrease of 19 per cent; 173 fewer outsiders injured, a decrease of 7.5 per cent.

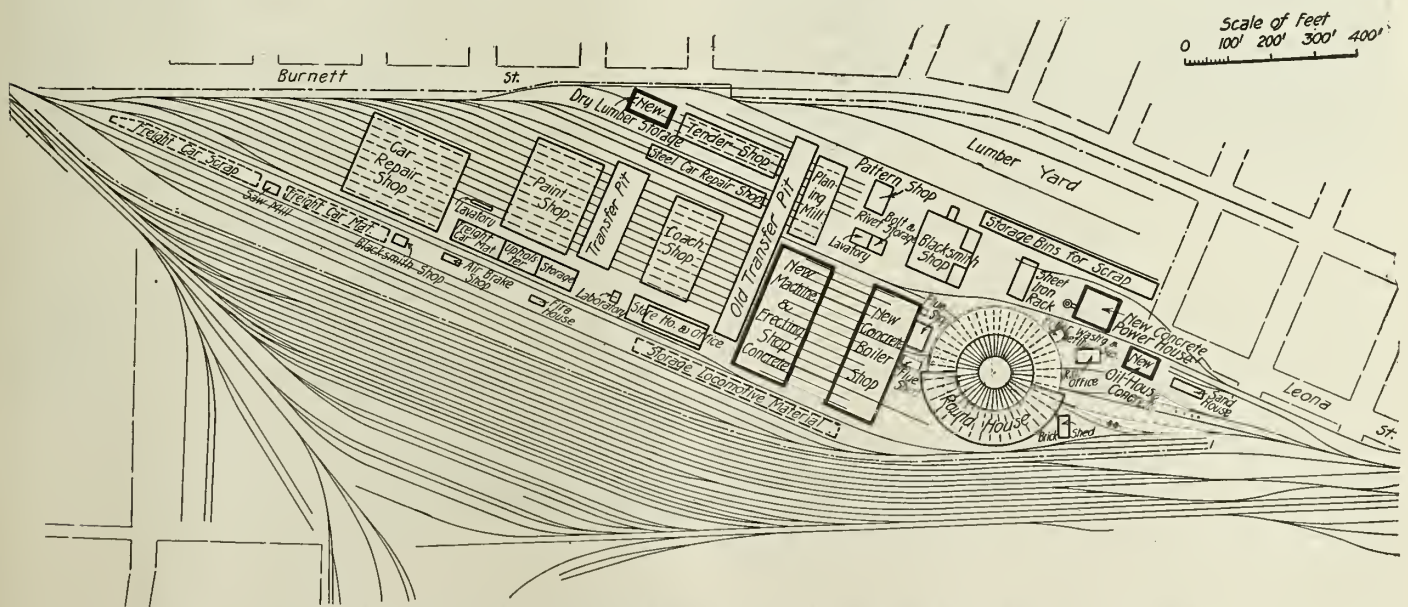
Geological Work in Alaska.

Eleven parties will be sent into Alaska by the United States Geological Survey this year, as a part of its annual campaign of investigating the mineral resources of the country. A party under the leadership of J. W. Bagley and Theodore Chapin will undertake the exploration of the region tributary to Talkeetna river, and will connect with the surveys of the Broad Pass made last year. On returning the party will survey the region between the headwaters of Matanuska and Copper rivers that has been advocated for a railway route. An exploration of the region lying between Lake Clark on the east and the Iditarod district on the west will be undertaken by R. H. Sergent and Philip S. Smith. Here there is a belt of country over 100 miles wide which is almost an entire blank on the map. The gold placer districts tributary to the lower Kuskokwim will be investigated by A. G. Maddren. He will go down the Iditarod river by canoe, portage across the divide to reach the Kuskokwim, and visit the Anniak, Tuluksak and Goodnews Bay placer districts. Stephen R. Capps and C. E. Griffin will carry geologic and topographic surveys across Skolai pass into the White River basin and thence to the international boundary. This is a region where railroad building has been considered. Mr. Capps will give special attention to the investigation of the newly-discovered gold district in the Chisana basin. This work is an extension of the previous reconnaissance surveys in this field.

Concrete Locomotive Repair Shops, Sunset Central Lines, Houston, Texas

Improvements recently completed at the Houston shops of the Sunset Central Lines, consist of a series of reinforced concrete buildings, this same material being employed in the erecting shop in the construction of the 22-foot girders supporting the 150-tons capacity crane. The method of erecting these buildings is interesting also from that fact that, as in the case of the machine and erecting shop, the new building was placed on the same site occupied by the old, the various shop operations in the meantime being executed without interruption.

The car and locomotive repair plant of the Texas & New Orleans R. R. at Houston, Texas, utilized jointly by the several lines comprising the Sunset Central System, has lately been improved by the addition of a number of new buildings which are of very particular interest because of their being entirely of reinforced concrete construction. The general practice in building construction of this nature where panel openings in excess of 25 feet are encountered, is to employ steel in the form of I-beams, girders, or trusses, which are usually supported by



General Layout of Car and Locomotive Repair Plant, Sunset Central Lines, Houston, Texas.

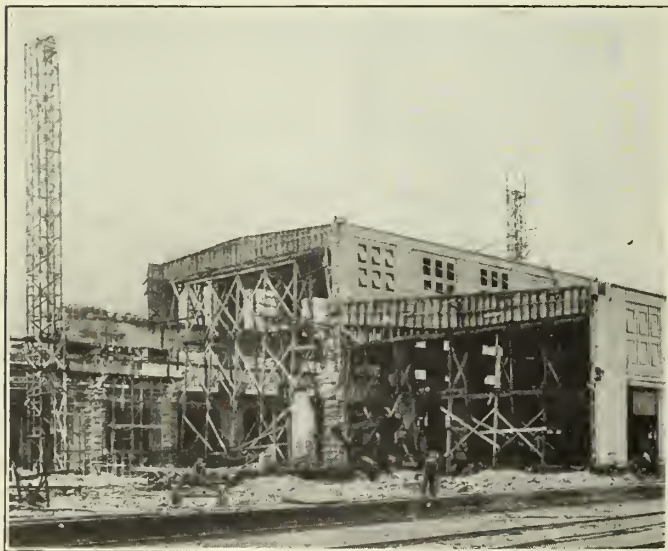
means of steel columns. In the buildings under question, the use of steel, except as needed for concrete reinforcement, was avoided, with the result that, as may be noted from the illustrations, even the crane girders designed to carry the 150-tons capacity crane in the erecting shop, have been fashioned without undue clumsiness of proportion with adjoining members.

In these structures, the engineers of the road incline to the opinion that they have executed the longest concrete roof spans that have thus far been attempted in shop building work. A further point of interest is that these buildings have been erected without expansion joints. From the fact that the buildings have already passed through extremes of temperature without developing cracks, it appears that expansion has been well taken care of in the distribution of the reinforcing material in the concrete. The entire building load is carried by the column foundations which are of the slab type. It was feared unequal settlement might occur when cranes were permitted to lie at isolated points over night or when not in motion and this caused some concern. To overcome this, the area of footings was increased so as to reduce the bearing values under the footings with the heaviest crane load added to what was thought would not cause indenture of the soil. The dead load unit pressure was then determined and all footings designed for the reduced dead loads only, the live loads being disregarded. Investigation was also made to determine the bending stresses in the columns due to eccentric loads resulting from the crane supports, but it was found the effect of this was not serious from any possible condition of loading.

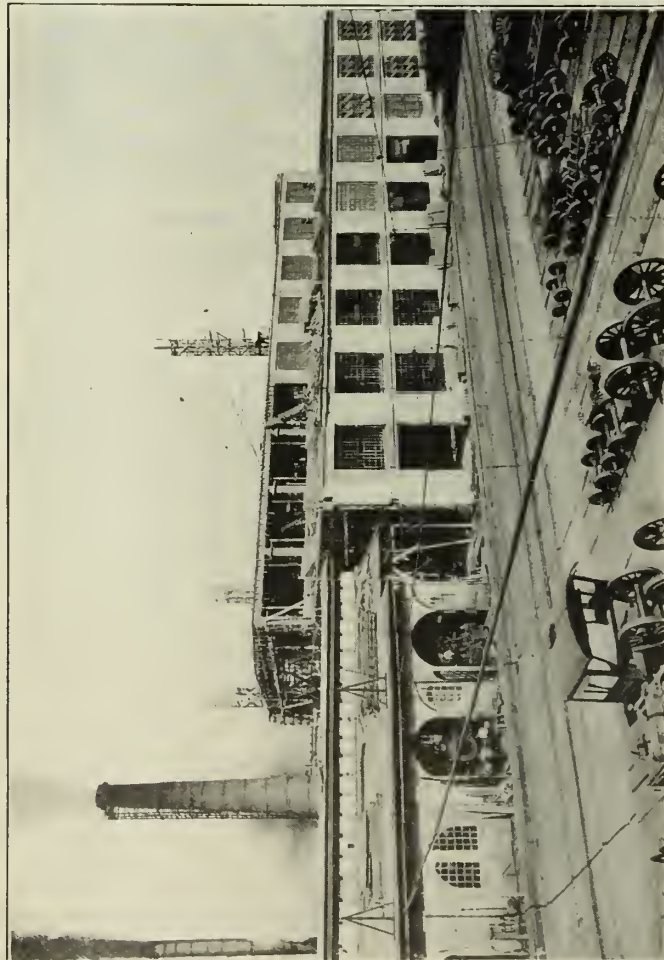
One of the most difficult things to contend with was that the buildings had to be erected over the site of existing buildings and that shop operations could not be interrupted and that



Reinforced Concrete Machine and Erecting Shop Nearing Completion, Sunset Central Lines.



View Showing Method of Construction, Reinforced Concrete Machine and Erecting Shop, Sunset Central Lines, Houston, Texas.



Old and New Machine and Erecting Shop Buildings, Sunset Central Lines, Houston, Texas.

interference must be as little as possible. A number of machines occupied spaces of the new columns and one of the old walls had to be replaced by the new. Shafting had to be temporarily supported and as the footings covered large areas, they were mostly put in at night and on Sundays. Vertical supports for slab and girder centering were made into towers, and trussed upper supporting members had to be provided. The roofs are much higher than in the old buildings, and holes were cut through the old to pass the vertical supports and column centering through, the old roofs being left practically intact for the protection of men and machines against rain and falling building material. Notwithstanding the large numbers of mechanics who were working underneath all during

Owing to the crowded condition of the building site due to the large amount of timber for centering and the necessity of leaving space for shop materials adjacent to the work, the concrete materials had to be prepared under great difficulty and handled by towers and chutes through a considerable distance, much of it being handled through two tower lifts. Irrespective of these disadvantages, very low unit cost figures were attained.

The several buildings constructed entirely of concrete include the machine and erecting shop, the boiler shop, the oil house, and the power-house, brief descriptions of each of which, with their equipment, are as follows:

Architectural floor plan of a building interior, likely a workshop or warehouse, showing dimensions and equipment layout. The plan includes a large open area with a sloped roof section on the left. Key features include a 'Skylight' on the roof, a 'Sash Operating Device' on the right wall, a 'Rolling Steel Door' on the right wall, and a 'Base of Rail' at the bottom. Equipment labeled includes a '15-Ton Crane' and a '150-Ton Crane'. Dimensions are provided in feet and inches throughout the plan.

The shops were built in sections of three and four panels at a time, and as fast as the centering could safely be removed the completed sections of the buildings were put into service.

In order to economize in false work and centering the panel lengths of all buildings were made uniform and as far as possible, the members in various buildings were made of the same or similar dimensions to permit of repeated use of the centering, some of which was in this way used as often as six times. While not as smooth appearing concrete was possible with the last work done, as with the first, the work was successful as to appearance throughout and the cost of centering was held down to a minimum. Crude oil was applied to the centering and no trouble was experienced in the removal of forms.

All lighting wires were run in metal conduits embedded in the concrete work and to prevent mutilation of concrete members for bolting pipe and other fixtures after completion of buildings which could not be anticipated by the motive power department, plate shapes were provided at intervals on walls, columns, and girders, during the process of pouring the concrete. These were anchored into the concrete flush with the finish and of such thickness as to permit tap bolting to secure such fixtures as were later desired to apply.

Only preliminary and general plans had been completed when information was received that funds had been appropriated for the work. As all computations had been completed and foundation investigations had been made, it was a question only of how quickly concrete material and reinforcing steel could be assembled. It was found that the reinforcing rods for foundation work could be secured from stock and that cement, sand and gravel was immediately available, hence actual construction work was under way inside of two weeks after instructions were received to proceed. As the foundation work and preliminary work necessarily consumed considerable time, ample

is 132 by 312 feet in size, consisting of 14 transverse bays each 22 feet in width. On the erecting side, which is 58 feet 4 inches wide in the clear between columns, there are 14 pits, one for each of the transverse bays. The clear height from the engine pit rail to the underside of main roof girder is 51 feet and permits the movement of the heaviest locomotives from the entrance track to a position in any stall in the building, same being accomplished by means of a 150-tons capacity Niles bridge crane. The roof girder span is 67 feet long over all or 65 feet between centers of supports. There is a 15-ton capacity Niles crane placed below the 150-ton crane for use in handling the lighter parts of locomotives. In the machine shop, which is 62½ feet wide between columns and 29 feet high to the underside of the roof girders, there is located a 15-tons capacity crane. The runway rails for the cranes are all carried on reinforced concrete girders; the one for the 150-ton crane, which of itself has a dead weight of 205,000 pounds, has a direct support on the columns, while the smaller cranes have supports for runway girders bracketed onto the faces of the columns, this construction having been followed to hold down the size of the columns.

BOILER SHOP: The boiler shop is 120 feet wide by 314 feet long outside and is divided into two longitudinal bays 56 feet 2 inches and 53 feet wide, respectively, in the clear between columns. One bay is served by means of a 15-ton crane and the other with a 50-ton crane. There are fourteen transverse bays, each 22 feet center to center, and these are opposite the corresponding bays of the machine and erecting shop; the layout providing for tracks which run through between the two buildings.

OIL HOUSE: The oil house is 35 feet wide by 72½ feet long, with a basement the full size of the building for receiving the oil storage tanks. There are five 8000 gallon, two 1000 gallon

and two 480 gallon tanks in the basement, and one 8000 gallon and two 2000 gallon tanks buried outside of the building for storing gasoline and distillate. All of the tanks are connected to self-registering pumps, located in a convenient position in the oil house.

POWER HOUSE: The power house is 84 feet wide by 90 feet long outside, having a boiler room 32 feet 6 inches wide inside. It is of sectional construction, provided with a temporary end so that additional sections may be annexed when required. The boiler room is proportioned to suit the type of boilers installed but is unlike other modern boiler rooms in that it is not arranged with coal bins and ash pits; crude oil fuel being used exclusively by the roads for both road and stationary service. Owing to the extensive supply the use of coal is not contemplated. The stack, which is also of reinforced construction, is 6½ feet in diameter and 125 feet high. Under average conditions in coal plants this would represent a boiler capacity of about 800 hp., but serving as it does the crude oil furnaces of the boilers, a capacity of 1400 hp. is easily attained. One interesting feature in the erection of the boilers and power house machinery was the pipe work. Detail drawings of all steam, water and air piping were prepared and the pipes and fittings were ordered from a Chicago manufacturer complete, bent and fitted for erection. The placing of boilers and machinery and the cutting and bending of pipes by the manufacturer was accomplished so accurately, in accordance with the design, that it was necessary to cut only one length of straight pipe in the assembly of the complete equipment.

Acknowledgment is due George McCormick, assistant general manager of Galveston, Harrisburg & San Antonio and the Texas & New Orleans roads for the information and illustrations appearing in this article.

Convention of the Master Car Builders' Association

The Master Car Builders' Association assembled for its forty eighth annual convention on June 10, 11 and 12, 1914, in Atlantic City, N. J. In the opening session on Wednesday morning, June 10, President M. K. Barnum, general mechanical engineer of the Baltimore & Ohio R. R., delivered an address, the leading features of which are covered in the following abstract.

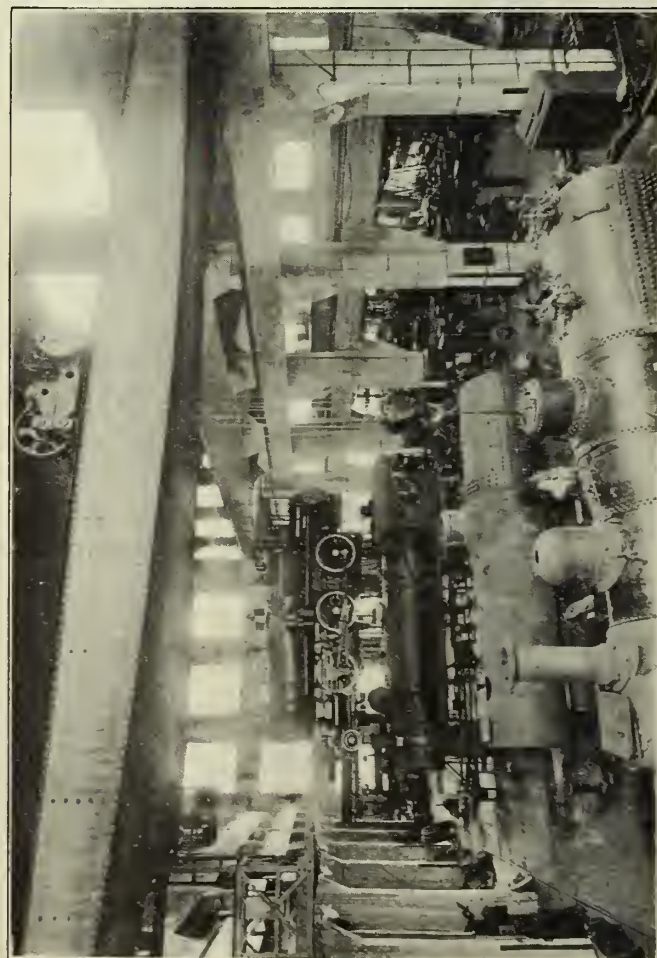
THE PRESIDENT'S ADDRESS.

"The past year has been probably the most trying on record for railroad managements in the United States, as the narrowing margin between gross earnings and expenses has compelled every official to spend most of his time studying new ways of economizing and reducing expenses without allowing deterioration in the physical condition of the property or in the quality of the service. Working under these adverse circumstances I believe that most of you who are responsible for the equipment have obtained very creditable results but some of the problems ahead will be more difficult to solve than any yet encountered.

"One of the most important and difficult matters confronting us is the proper application and maintenance of safety appliances to conform with the federal law and with the orders of the Interstate Commerce Commission. The data available indicate that some roads have not been equipping freight cars with safety appliances as rapidly as they must to finish the work within the time limit or before July 1st, 1916, and it is desired to impress upon every one, the importance of following up this part of the work as vigorously as possible. As there are over 250 different items on a freight car which may constitute a violation of the safety appliance law, it requires careful study to become familiar with them all and it is very essential that a campaign of education be systematically pursued with car foremen, inspectors and repairmen so that they will know



Interior of Reinforced Concrete Boiler Shop, Sunset Central Lines, Houston, Texas.



Interior of Reinforced Concrete Erecting Shop, with Locomotive and Service Cranes in Use.

accurately just what the law requires with regard to each part. Every company should have a man on the mechanical department staff specially qualified and trained to follow up safety appliances and to act as the authority on this subject. There should also be at every shop one or more inspectors detailed to instruct and check up those who are employed in applying and repairing safety appliances.

"Too much emphasis cannot be placed on the importance of maintaining correctly all detail of cars which have once been fully equipped with safety appliances, and in making partial repairs to cars which have not been equipped, it is good practice to make the same in accordance with the law which must ultimately be complied with in full. In cases of doubt as to the exact interpretation of the law it will usually prove a safe guide if we consider the purpose of it being made and what was its intent.

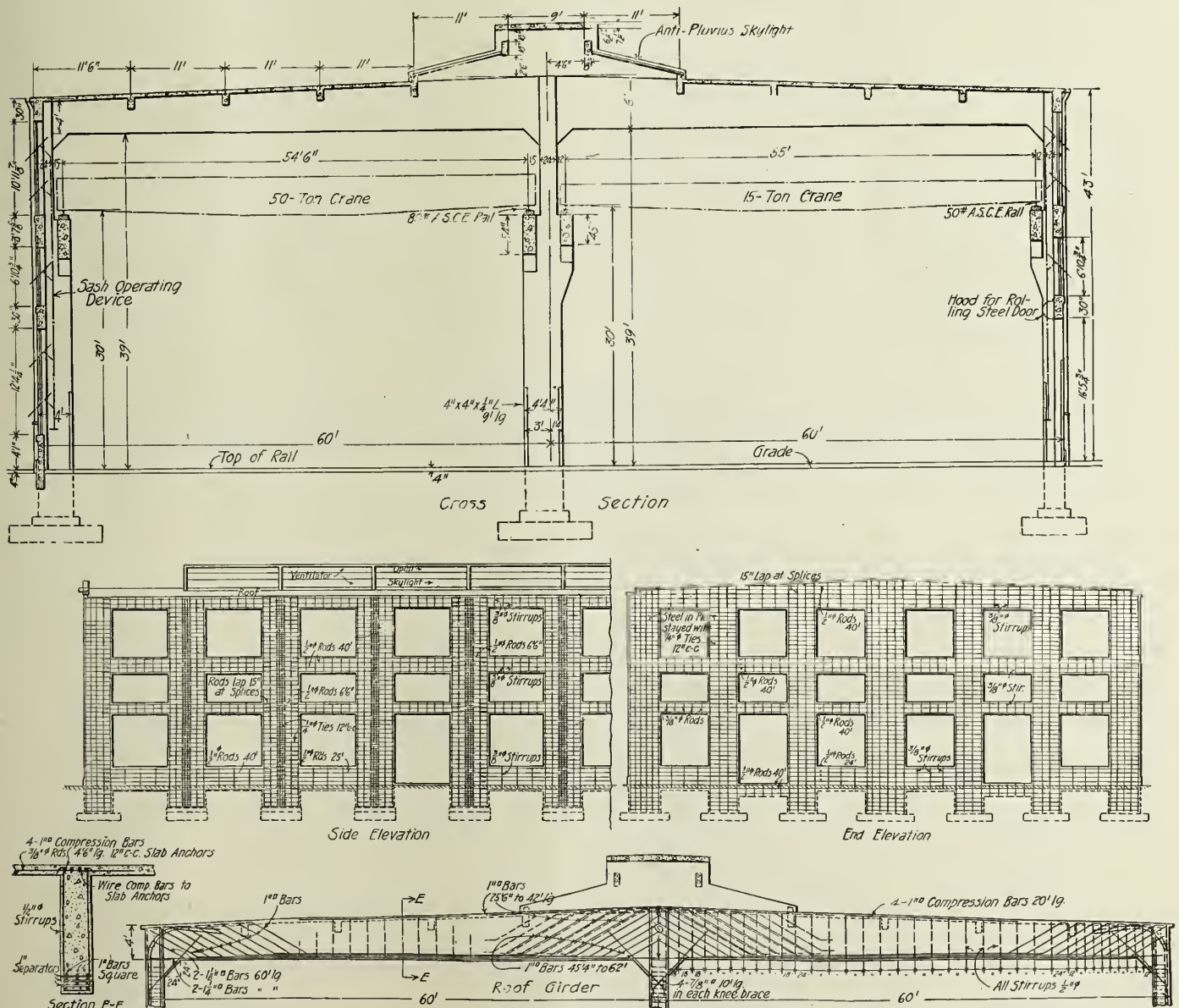
"Another important matter to be considered is the adding of a sufficient percentage to the labor shown on bills for car repairs to fully cover all overhead expense including upkeep of the plant, taxes, insurance, etc. Companies which build and repair cars usually add from 65 per cent to 80 per cent for overhead expenses and there is reason to believe that railroads may be expected in the future to handle such matters on a manufacturing basis.

"The growing importance of the M. C. B. rules of inter-

change has necessitated an extra afternoon session especially for the discussion of the changes which have been recommended.

"In revising the rules of interchange it has been the aim of the arbitration committee to reduce as far as possible the unprofitable movement of cars and material and also to simplify the wording and application of the rules. Some of the members have suggested that the rules ought to be renumbered and rearranged in a more logical order and also that they be continued in force for at least two years without any change. The first suggestion should be followed in revising the rules for the 1915 convention, but the arbitration committee has not thought best to adopt it this year. The large number of suggestions for changes in the rules each year seem to indicate a necessity for their yearly revision, but after the revision proposed for 1915, it may be well to try them for two years without change.

"Some of the members have recommended eliminating all the rules covering combinations of defects which are supposed to indicate unfair usage, viz., rules 37 to 43, inclusive. Some of the arguments for doing this are that the present rules tend to penalize those companies which build strong cars and to unduly favor those having weak cars, also, that no satisfactory basis has been found for combinations in all-steel and steel under-frame cars. While conceding these points the arbitration committee has not thought that the time was ripe for the elimination of all combinations. On account of numerous questions



Transverse Section and Details of Construction, New Reinforced Concrete Boiler Shop, Sunset Central Lines, Houston, Texas.



Reinforced Concrete Powerhouse, Sunset Central Lines, Houston, Texas.

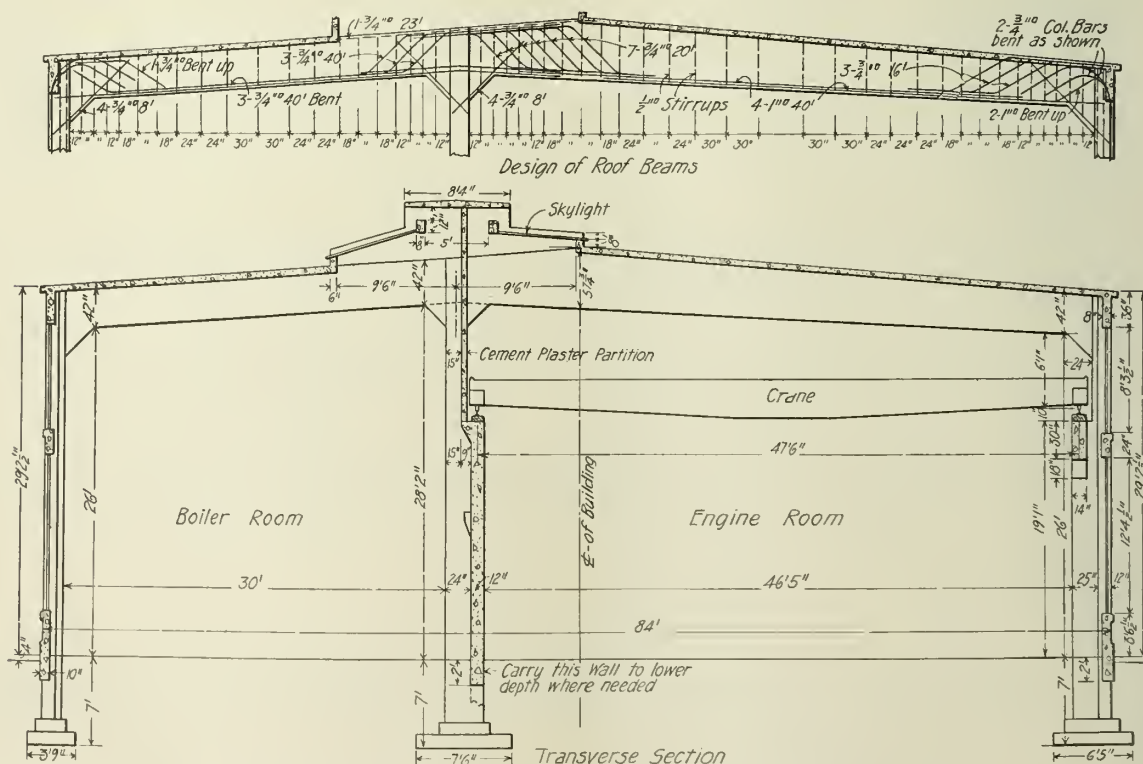
received by the secretary, the arbitration committee has sent out to the members interpretations of those rules which are not clearly understood and it may be well to have a formal expression from the members as to continuing the issuing of such interpretations.

"Many freight cars originally of wood construction are being practically rebuilt and strengthened with steel underframes, friction draft gear, steel ends, new roofs, new siding, etc., so that they are stronger and better than when first built and their ultimate life will be prolonged probably fifteen or twenty years. These improvements usually cost from \$250 to \$400 per car, a part of which is properly chargeable to the capital account,

and it seems only fair that some allowance should be made for them in figuring the depreciation when such cars are destroyed and that those companies which are spending such large amounts to strengthen their cars should not be penalized for so doing, as at present. This subject is of sufficient importance to justify appointing a special committee to study and report upon it at the next convention. While it might be possible to adopt standards for so many items that improvements in design would be discouraged, I believe that the M. C. B. association has not carried standardization as far as it profitably can. The committees on car construction and on car trucks have done something toward standardization and the committee on specifications has done a large amount of valuable work which is submitted in their report for your consideration. Some parts that might be standardized are brake beams, journal boxes for pedestal type freight car trucks and spring planks for steel side-frame trucks.

"The coupler committee has continued its good work and has reduced the number of experimental couplers to two, which they recommend for extensive tests in service, so the prospects of soon having one standard M. C. B. coupler are very good. It would also be a great benefit if standards could be adopted for the principal dimensions of forty-foot and fifty-foot freight cars. Some years ago the American Railway Association decided upon a standard thirty-six-foot box car, but almost immediately the traffic departments began to ask for a variety of different sizes and today very few roads build the standard thirty-six-foot car. The committee on retirement of 40,000 and 50,000 pounds capacity freight cars has presented a definite recommendation which will help to improve the situation if adopted, and it will undoubtedly bring out a full discussion. There should be more standards for passenger car parts, and these need not specify all details but should cover those features which affect interchangeability.

"The building of new wooden passenger cars was practically stopped a year or more ago and most roads are applying steel underframes and ends to the older cars as fast as money can be obtained for the work, with the result that there are now 3,566 less wooden passenger cars in service than there were two years ago, so with the general use of steam heat and electric lights passenger travel on steam railroads is steadily growing



Transverse Section of Powerhouse, Sunset Central Lines, Houston, Texas.

safer. The fact that in 1912 the number of passengers killed in train accidents was only one for each 251,000,000 passenger miles, has enabled insurance companies to pay double and triple indemnities for such accidents, and as stated before the conditions are steadily improving."

MISCELLANEOUS BUSINESS.

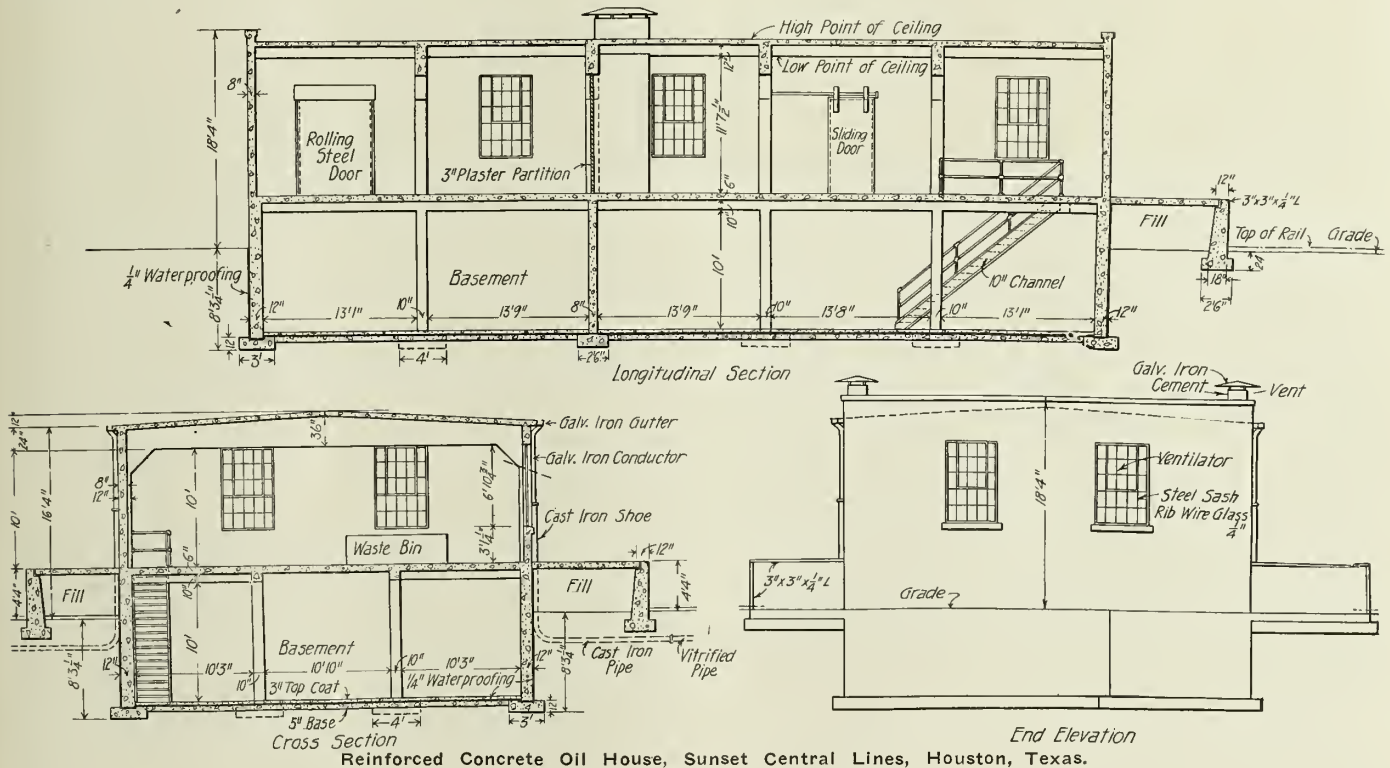
After a brief intermission following the president's address, the convention proceeded to approve the minutes of last year's meeting as printed and distributed. The reports of the secretary and the treasurer were next presented, these showing: Active members, 422; representative members, 436, associate members, 13; life members, 20; total members 891; cars represented, 2,785,894; receipts for the year from all sources, \$24,504.40; and treasurer's balance, \$627.91. These reports were duly referred to the auditing committee. Announcement was made at this juncture of the action of the executive committee in fixing dues for the ensuing year. This action, which was approved by the convention provides that the dues of representa-

sideration at the election to be held during the closing session on Friday, June 12.

REVISION OF STANDARDS AND RECOMMENDED PRACTICE.

T. H. Goodnow, chairman of the committee on revision of standards and recommended practice, presented a lengthy report for that committee involving: Suggestions not approved, 9; instructions to the secretary to make changes or additions, 12; suggestions referred to committee on car wheels, 6; referred to committee on car trucks, one; referred to committee on loading rules, one; referred to committee on car construction, one; referred to committee on specifications for test of materials, one; referred to committee on train brake and signal equipment, one; and referred to letter ballot for change in standard or recommended practice, 11.

One of the suggestions received by the committee and in which it did not concur, was that male and female truck center plates be allowed a clearance of $\frac{1}{4}$ inch instead of the present standard of $\frac{1}{8}$ inch. At the instigation of C. E. Fuller, Union



tive members for the year be \$7.00 the dues of active members remaining at \$5.00 as heretofore. Applications for life membership were received from W. S. Morris and C. A. Schroyer, and for associate membership, from L. W. Wallace, department of railway mechanical engineering, Purdue University, Lafayette, Ind.

REPORT OF THE COMMITTEE ON NOMINATIONS.

F. W. Brazier, chairman of the committee on nominations submitted for that committee the following suggestions for officers for the year 1914-1915: For president, D. F. Crawford, general superintendent of motive power, Pennsylvania Lines West; For first vice-president, D. R. McBain, superintendent of motive power Lake Shore & Michigan Southern Ry.; for second vice-president, R. W. Burnett, general master car builder, Canadian Pacific Ry.; for third vice-president, C. E. Chambers, superintendent of motive power, Central R. R. of New Jersey; for treasurer, J. S. Lentz, master car builder, Lehigh Valley R. R.; and for executive members, J. C. Fritts, master car builders, Delaware, Lackawanna & Western R. R.; R. E. Smith, general superintendent of motive power, Atlantic Coast Line, and H. T. Bentley, superintendent of motive power and machinery, Chicago & North Western Ry. This report was accepted for con-

Pacific R. R., who argued that the present clearance is insufficient to allow for successful foundry practice, this matter was referred to the committee on car trucks for consideration. A second suggestion calling forth extended discussion, was the committees' proposed scheme for the lettering of house cars in which it was planned to have the weight of the car stenciled on the ends of the cars as well as on the sides. Arguments offered in favor of this arrangement were that it made possible the taking of car weights by inspectors passing over the tops of the cars, that it facilitated taking weights at track scales on humps, and that it might prove a convenience at freight platforms where the usual lettering on the sides of the cars is sometimes hidden by the platform. The practice was argued against on the ground that it is a useless expense, a source of confusion through errors in stenciling in a difficult position, and also a source of danger to those mounting ladders to do the stenciling as well as those induced to enter between the cars for the purpose of reading the stenciling. A resolution was finally passed for the consideration of the American Railway Association, declaring it the sense of the convention that end stenciling of weights on freight equipment cars should not be practiced. With these two modifications, the report of the committee was accepted and referred to letter ballot.

TRAIN BRAKE AND SIGNAL EQUIPMENT.

The committee on train brake and signal equipment in its report read by B. P. Flory, New York, Ontario & Western R. R., made the following recommendations which were accepted and referred to letter ballot.

That the B-3-A form of conductor's valve as manufactured by the Westinghouse Air Brake Co. be employed.

That whenever permissible in passenger carrying cars, the conductor's valves be corded the entire length of the cars. Where this can not be done, as is generally the case in dining, buffet, and certain classes of load carrying cars, that two conductor's valves be installed, one at each end of the car, and that each be corded into the car a distance necessary to permit of easy access.

That to prevent delay or confusion in getting hold of the right cord to operate conductor's and signal valves, the conductor's valve cord be of red, and the signal-valve cord be of gray color; also, that the cords be made of metallic material; that is, either of wire or of chain, the preference being chain for the conductor's valve, and hemp or cotton covered wire for the signal valve.

The subjects of non-rigid brake and signal pipe clamps for the ends of passenger cars, clasp brakes for passenger equipment cars, hand brake rigging for passenger cars and improved types of train signal systems, were referred back to the committee for further investigation and report at next year's convention.

That portion of the Master Car Builders' and Master Mechanics' air brake and train air signal instructions under the heading "general instructions" was revised by the committee, the revision being incorporated in the report. Respecting that portion comprising the "General questions and answers," the committee recommended that a committee from the Master Car Builders' and from the Master Mechanics' associations be appointed to confer with the Air Brake Association committee having this matter in hand, for the purpose of revising the questions and answers in such manner as recent practice may seem to require. The opinion was expressed however, that it is hardly within the province of the Master Car Builders' Association to longer concern itself with this matter, and on the motion of W. E. Dunham, Chicago & North Western Ry., not only was the committee's recommendation rejected but the matter of "questions and answers" on train brake and signal equipment with the references thereto was eliminated from the proceedings of the convention.

BRAKE SHOE AND BRAKE BEAM EQUIPMENT.

J. F. DeVoy, Chicago, Milwaukee & St. Paul Ry., a member of the committee on the above subject, read the report of the committee, which has considered individually, the two sets of problems relating to brake shoes and to brake beams respectively.

Brake Shoes.

According to instructions, the committee completed a series of tests on brake shoes, supplementing the work of previous years and closing up the gap which has heretofore existed between the earlier tests and those made at high pressures and speeds. As far as possible, the tests this year employed the same shoes as used in the last series of tests, or duplicates. The report of Prof. L. E. Endsley, who personally conducted the tests was incorporated in the committee's report, extracts of the former conveying the following information concerning the tests.

The shoes tested were of six different kinds and were selected from the seven kinds of shoes reported on in 1911. Two of each of the six kinds were tested. Those of the seventh kind were all broken in the tests carried on in 1911, thus making the report this year cover the test of twelve shoes, two each of six kinds. Three of the shoes tested this year, were the same shoes as tested in 1911. The remaining shoes were two of the six original shoes submitted of each kind.

Schedule of Test.—Each shoe was tested upon a steel-tired wheel under brake-shoe pressures of 12,000, 14,000, 16,000 and

18,000 pounds, the initial speed of the machine being in each case 65 miles per hour. At each of the above pressures nine stops were made.

Method of Testing.—In anticipation of a test, the shoe was given a number of applications until a full bearing surface was obtained, after which it was accurately weighed. The shoes were first tested at a pressure of 12,000 pounds, after which the pressure was increased by increments of 2000 pounds until a pressure of 18,000 pounds was reached, or until the shoe broke or became unserviceable. The loss in weight of the shoe was obtained by weighing the shoe after each three applications, thus giving a check upon the loss for each pressure. Following each application, the shoe was cooled by a blast of air until the temperature was reduced to such an extent that the observer could bear his hand upon the shoe.

Notes Concerning Tests.—It was found that the coefficient of friction of most of the shoes decreased as the pressure increased, the two exceptions to this being the plain cast iron and the "National" shoes. The plain cast-iron shoe gave almost the same coefficient at all pressures, while the National gave almost the same coefficient at the three lower pressures and then made a sudden drop at 18,000 pounds pressure. With four of the different types of shoe tested, the loss in weight, due to wear, increased as the pressure increased up to 16,000 pounds. With two of the kinds of shoes tested, the loss reduced at 18,000 pounds pressure. This seemingly inconsistent result may be accounted for by the fact that two of the shoes, namely, the National and the Spear-Miller, broke during the tests at 16,000 pounds, thereby increasing the wear for a time at least, and possibly decreasing the wear when the broken shoes had again been worn to a new fit before the 18,000 pounds pressure. Two of the types of shoes tested, namely, the Diamond S and the Pittsburgh, showed a tendency to reduce the wear as the pressure was increased up to 16,000 pounds, but increased at 18,000 pounds pressure. This reduction in loss was thought to be due to a change in the per cent of insert in contact or a change in the physical makeup of the shoe.

The coefficients of friction of five of the different types of shoes tested fell somewhat close together, but not nearly so close as they did in the tests conducted at 80 miles per hour and reported in 1911. In 1911 the variation was less than two in the value of the coefficient of friction in per cent at any pressure for all shoes tested, with the exception of the Pittsburgh shoe. From the results reported this year at 65 miles per hour, it was found that this variation is considerably more, being as much as three or over at the different pressures. The coefficient of friction in 1911 was never over 10 per cent nor under 7 per cent, an average for all shoes with the exception of the Pittsburgh, being approximately 8.4, while in the tests this year at 65 miles per hour, the maximum was 13.3 and the minimum 10 per cent for all but the Pittsburgh shoe. The average coefficient of friction at 65 miles per hour was 12.2, thus making it greater by 3.8 than it was at 80 miles an hour.

The Pittsburgh shoe in the tests of 1911 at 80 miles an hour varied in a straight line from 19.75 per cent at 12,000 pounds pressure to 17.1 per cent at 18,000 pounds pressure. It will be seen from the tests made this year that the coefficient of friction of this shoe was less at 65 miles an hour than at 80 miles an hour. It will also be noted that the loss of weight in the Pittsburgh shoe was more at 65 miles an hour than at 80 miles an hour. In 1911 the average loss at 80 miles an hour was 2.8, while this year the results at 65 miles an hour showed a loss of 3.2. This apparent inconsistency in the coefficient of friction and loss in wear of the Pittsburgh shoe may be accounted for by the fact that the shoe is made of a composition filler, and as the shoes had been lying in the laboratory for three years where the temperature was 70 deg. or more, the binder which holds the filler together may have dried out, thus reducing the coefficient of friction and increasing the wear.

The results showed that the approximate distance per stop

was inversely proportional to the coefficient of friction, all of the metallic shoes varying about the same as for coefficient of friction, and this variation was greater at 65 miles per hour than at 80 miles per hour, as reported in 1911. The Pittsburg shoe made stops at approximately half of the distance required by the poorest metallic shoe.

In closing the committee suggested the desirability of having a complete review and digest of tests so far made, with suitable conclusions, to be made a part of the next year's proceedings. The convention voted to accept the report and approved the above recommendation.

BRAKE BEAMS.

Revision of Specifications for Tests on No. 2 Brake Beams.—The committee recommended that the following be substituted for the specifications for No. 2 brake beams, as given in the M. C. B. proceedings for 1913, page 854:

4. Initial Load.—Apply an initial load of 12,000 pounds, then reduce to 500 pounds. Reset the deflection instrument to zero.

5. Test Load.—Apply a test load of 12,000 pounds and under this load measure the deflection, which is desired to be 1/16 in. or 0.0625, but should not exceed 0.07 in.

6. Set Load.—The beam must then be loaded to 24,000 pounds, after which the set shall not exceed 1-100 of an inch.

6½. Total Deflection Test.—The brake beam shall stand a total motion of the head of the machine of not less than two inches without failure at any point.

Weights of Heads and Struts.—The committee considered the desirability of adding to the above specifications a limitation as to the minimum weights of heads and struts allowable and collected considerable information concerning the weights of these parts now in use, finding large variations due to differences in design. Similarly variations in the dimensions and weights of struts were noted. The committee expressed itself as being of the opinion that these factors should be taken into consideration in the specifications and solicited advice from the convention.

Standard No. 2 Brake Beam for Recommended Practice. At the request of the executive committee the matter of a standard No. 2 beam for recommended practice was again brought up with the request that it be again submitted to letter ballot, the committee justifying its request by calling attention to the decided majority in favor of this step and to the further fact that the adoption of a standard of this kind as recommended practice for a few years will give the association and the committee something definite to build upon in forming a standard for brake beams which shall be acceptable to all members of the association.

Attention was called to the results of an investigation on the Pennsylvania R. R. wherein it was shown that about 75 per cent of the defective brake beams found on that road were removed on account of worn brake heads, indicating that if beams were properly hung and the locations for hanger holes and hanger brackets were standardized, a large number of failures could be prevented. Failure of the compression and tension members was further shown to be due largely to poor fits between the heads and struts and the other members.

In the discussion of this subject, considerable argument in favor of standardization of limiting dimensions for beams rather than for the beam itself was brought out, as was also a strong sentiment in favor of improved methods of hanging, the necessity for which has been demonstrated itself on other roads besides the Pennsylvania as noted above. However, the report was finally disposed of by a formal vote of acceptance and was referred to letter ballot.

CAR WHEELS.

The committee on car wheels, report read by W. C. A. Henry, chairman, gave consideration to the request of the American Railway Association for an investigation of con-

tours of chilled iron wheels and throat clearances for frogs, guard rails and crossings, referred jointly to the Master Car Builders' and the Railway Engineering associations, reporting at the present time, insufficient data to warrant recommendations. The hope was expressed that there will be sufficient information available so that definite recommendations can be made at the next convention. Advice was given that the Bureau of Standards of the Department of Commerce, Washington, D. C., is preparing to make an experimental study of chilled car wheels, which will include foundry practice, investigation into the chemistry, metallurgy and mechanics of wheels, etc., and that it is the intention of the bureau to ask the co-operation of the wheel manufacturers and the wheel users in making this investigation.

Errors in the revised wheel specifications as submitted in 1913 were cited and corrected. Attention was called to the fact that the maximum gross weight to be carried by car wheels of 625 pounds weight as shown on M. C. B. sheet H is not in harmony with the specifications. As this sheet in its present form was adopted by letter ballot it was considered necessary to submit to the association for action the recommendation that it be corrected to specify a maximum gross weight not to exceed 95,000 pounds and thereby harmonize with the specifications. The subject of a physical test for rolled and forged steel wheels was reported to be still under investigation, no recommendations relative thereto, as yet being warranted.

The following specific recommendations were submitted:

1. Wheel defect and worn coupler gage to be modified as shown in diagram submitted with report as Exhibit "A."

2. Specifications for cast-iron wheels, paragraph 14, change first sentence to read as follows: "All wheels shall be numbered consecutively in accordance with the instructions from the railroad company purchasing them, and shall have the initials of such railroad company, also the wheel number, the weight of the wheel and month, day and year when made, plainly formed on the inside plate of casting."

3. Specifications for cast-iron wheels, paragraph 4 (b), change last sentence to read: "The time when pouring ceases must be noted and two minutes later an examination of the wheel must be made. If the wheel is found broken in pieces, or if any cracks in the plate extend through or into the tread, all wheels of the same tape size as the wheel broken will be rejected."

4. Specifications for Solid Wrought Steel Wheels, Paragraph IV, Branding, to read: "The name or brand of the manufacturer, date and serial number, shall be legibly stamped on each wheel; also purchaser's name and serial number, if specified. The tape size shall be legibly marked on each wheel. Sheet M. C. B. C-2."

5. Correct M. C. B. sheet "N" to specify maximum gross weight not to exceed 95,000 pounds.

6. Three diameters of steel tired wheels: 33, 36 and 38 in.

7. Three diameters of centers for steel tired wheels: 28, 31 and 33 in.

8. Maximum and minimum flange thickness gages to be as shown in the report as exhibit "B."

At the conclusion of the report, Mr. Henry took occasion to elaborate on the circular recently issued on behalf of his committee requesting detailed information concerning wheel failures from which to determine the nature of the recommendations, if any, to be made in response to the resolution of the American Railway Association referred to above. D. R. MacBain, in order to show that there is little or no occasion for changing the dimensions of flanges on cast iron wheels on his road quoted figures showing the extent to which the various causes are responsible for wheel removals on the Lake Shore & Michigan Southern Ry. These figures are as follows:

On account of tread wear	26.8 per cent
On account of chipped rims	5.5 per cent
On account of being slid flat.....	24.9 per cent
On account of being shelled	8.0 per cent
On account of worn flanges	23.0 per cent
On account of chipped flanges	1.3 per cent
On account of being seamy	5.5 per cent
On account of broken treads.....	3.5 per cent
On account of broken wheels	0.2 per cent
On account of broken flanges	1.3 per cent

Total.....100.00 per cent
The report of the committee on car wheels was accepted and referred to letter ballot.

CASES ARBITRATED DURING THE YEAR.

An afternoon session was held on Wednesday for the consideration of the reports of the arbitration committee and the committee on prices for labor and material. The report of the first of these committees was divided into two parts, the first covering the matter of the cases arbitrated during the year, which was approved, and the second part having to do with the

REVISION OF THE RULES OF INTERCHANGE.

The revised rules of interchange as contained in circular No. 39, 1913-1914, were approved together with two additions decided upon by the committee subsequent to the printing of the report. The first of these additions constitutes paragraph "m" of rule 3 and provides that on and after Oct. 1, 1916, refrigerator cars not equipped with latches to secure the doors in the open position will not be accepted in interchange. The second provision is that in reweighing and restenciling cars, the weights be indicated in multiples of 100 pounds, the nearest even hundred being used except when an even 50 pounds is indicated, in which case the lower hundred will constitute accepted weight of the car.

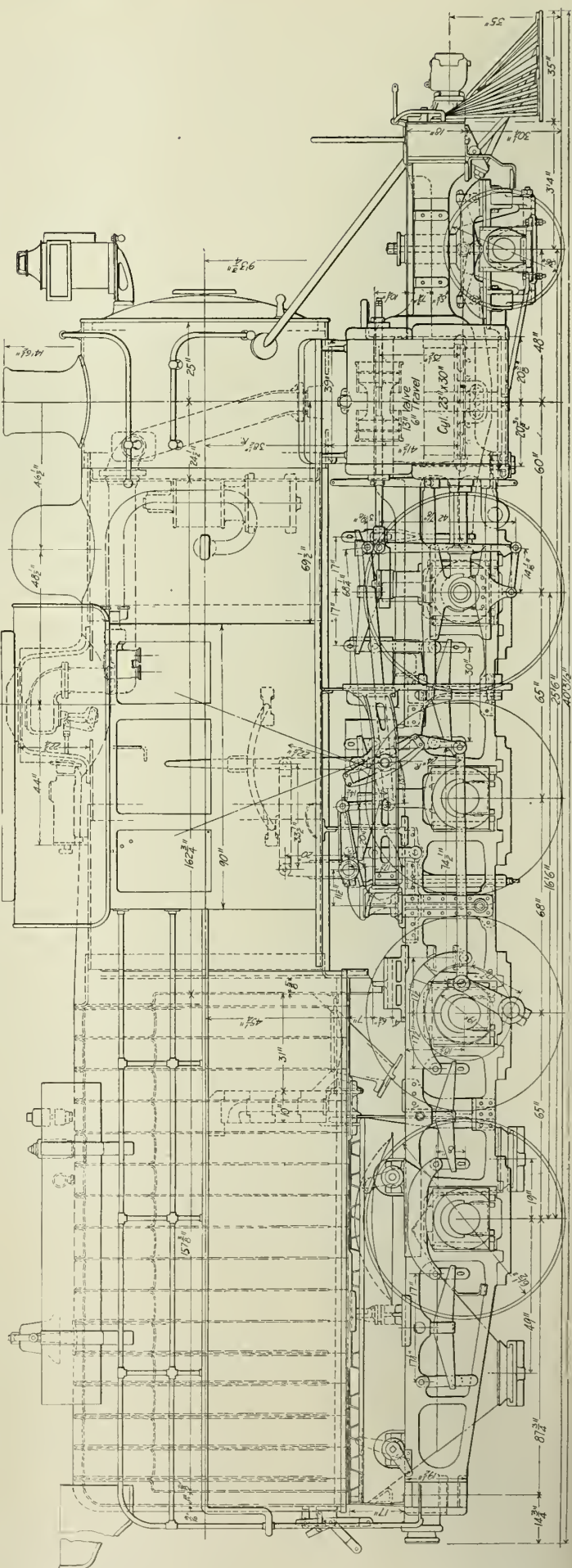
The newly established practice of the arbitration committee in issuing interpretations of rules to be appended to the code was approved and the continuance of the practice was authorized.

PRICES FOR LABOR AND MATERIAL.

The special committee, appointed to suggest prices or modifications of present prices in the rules of interchange, did not prepare a circular of inquiry this year, for the reason that it was thought proper by the committee to review the work already done and make such changes as required to make the rules clearer, as well as such changes in the present prices as would more nearly represent the average cost of labor and material used in making repairs to car equipment, and add such other items as were presented to them by the arbitration committee from time to time for their consideration, and new items which the committee found necessary in connection with its work.

As to price rules governing passenger car repairs, the principal change made was to eliminate the duplications and make clearer the reading of the various items. The committee suggested that for next year special attention be given to the passenger car price rules, in order that they be brought up to the standard of the freight car price rules. Below is given the number of items contained in each price rule and the number recommended to be increased, decreased, new items added, and items eliminated.

Rules.	Number of items in rule.	Number items recommended to be Incr.	Number items recommended to be Decr.	New items added.	Items Eliminated.
Freight car rule No. 101	149	1	2	2	.
Freight car rule No. 107	351	19	29	8	3
Freight car rule No. 116	54	..	1	1	.
Passenger car rules....	73	2	7	1	5



Elevation, Consolidation Locomotive for the Philadelphia & Reading Ry.

The committee's report as a whole was accepted and approved.

SIXTY-FIVE PER CENT ADDITION TO LABOR COST ON FREIGHT CAR REPAIRS BILLS.

The matter of adding 65 per cent to the labor cost on freight car repair bills to cover overhead expense was regarded as being of such importance as to warrant the appointment of a special committee to report at the 1915 convention. By formal motion and vote, this course of action was adopted by the convention.

(To be continued.)

The Broken Rail Record.

Commenting on the broken rail as a factor of railway accidents, in connection with his report on the New York, New Haven & Hartford R. R. wreck near Westerly, R. I., October 25, 1913, caused by a broken rail, Chief Inspector H. W. Belnap, of the Interstate Commerce Commission points out that, since 1902, the number of derailments caused by broken rails in this country has been 2762 and the number of persons killed 175, number of injured 6004. He then has this to say: "This enumeration of casualties refers to a period the greater part of which elapsed before rail failures by transverse fissures were known or had become so prevalent as they now appear. The results, however, em-

phasize the importance which the subject of safety in rails has assumed. To those elements of danger existing in the past is now added this type of failure shown in the development of interior fissures. On account of the insidious character of these fissures and the fact that they are progressive in their development, and so far as is known no system of inspection has been found that will detect them until they have reached the surface of the rail, it becomes extremely difficult to suggest any preventive against future accidents of this character. Although, as noted in previous reports dealing with rails failing on account of transverse fissures, it seems apparent that a remedy lies in the diminishing of wheel pressures and the lowering of direct compressive bending and shearing stresses. From the constant increase in rail breakage occurring from this new type of failure it would appear that the danger zone in the use of steel rails as at present manufactured has been reached, since the study of the rails here under discussion appears to indicate that transverse fissures are the direct result of high-wheel pressures acting upon hard steel. A complete investigation of rail, track, and wheel load conditions for the purpose of determining the effect thereon of the recent types of locomotives and cars, with their greatly increased wheel loads, should be undertaken for the purpose of scientifically determining this matter and ascertaining a remedy."

Consolidation Locomotives for the Philadelphia & Reading Ry.

The Philadelphia & Reading Ry. is developing a number of successive designs of consolidation locomotives in which several of the late innovations in locomotive construction are being adapted in a manner that is both interesting and of such nature as should, after greater or less periods of service, serve to demonstrate the merits of each of these departures independently of the others. The striking features of the engine referred to in this description are the Jacobs-Shupert firebox (Wooten type) and the Gaines combustion chamber.

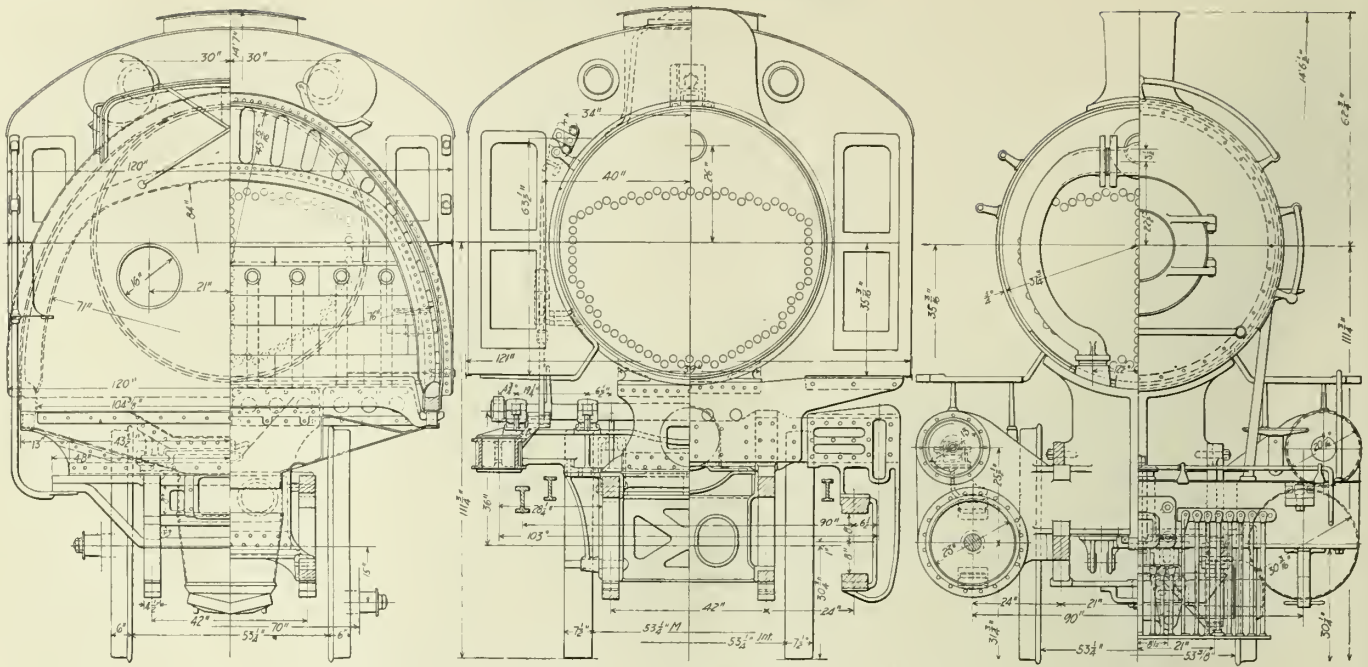
The design of Consolidation locomotive adopted as standard some years ago on the Philadelphia & Reading Ry. has undergone a series of modifications until at the present, some very interesting developments have resulted and are now undergoing experiment. The first of the several designs included in this series and known as I-8-a type, was fitted with slide valves and Stephenson gears; the second or I-8-b type was characterized by the application of piston valves and Walschaert gears; in the third or the I-8-c type, there has been incorporated the Jacobs-Shupert design of firebox in combination with the Gaines

combustion chamber; and the fourth, which is now undergoing construction, involves the same features as the I-8-c in addition to which it will be fitted with the Schmidt superheater. The illustrations accompanying this text pertain to the third design of the series, or the I-8-c type.

In common with other engines in use on the lines of the Philadelphia & Reading system, these engines are fitted with wide fireboxes of the Wooten type to permit of the use of anthracite coal as fuel. A characteristic accompaniment of this feature is the placing of the cab well forward on the boiler. In the design under question, the engine is provided with cylinders 23 by 30 inches in size, which with the 62½-inch drivers and a weight of 221,837 pounds on the drivers, enables it to develop an initial tractive effort of 46,060 pounds, the factor of adhesion thus being 4.81. This high starting capacity coupled with the generous factor of adhesion and the large driving wheels, serves to constitute an engine well adapted for heavy local service or for the hauling of through preference freight on fast schedules as circumstances may require.



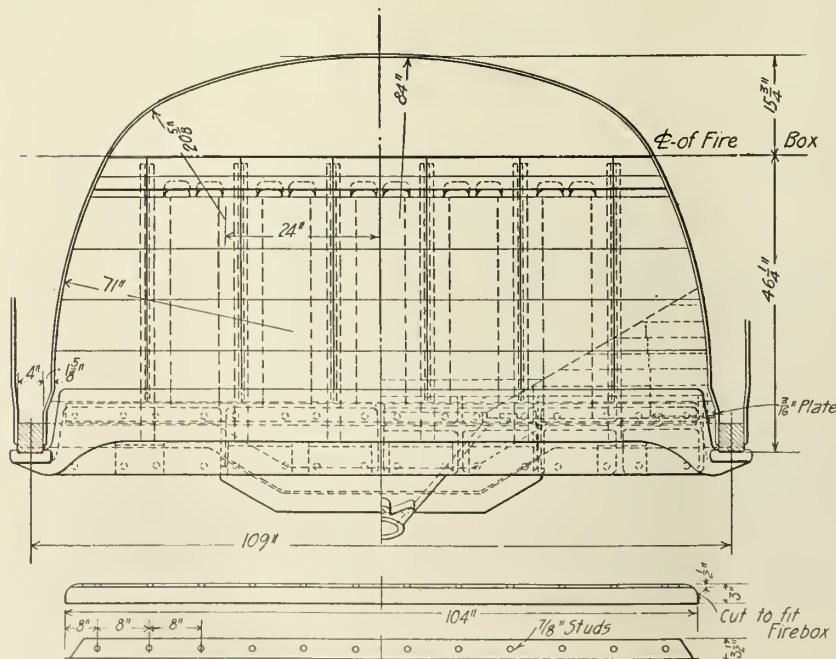
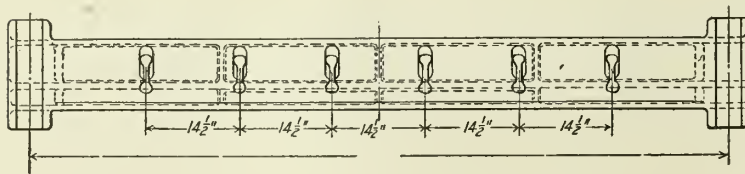
Consolidation Locomotive, Philadelphia & Reading Ry.



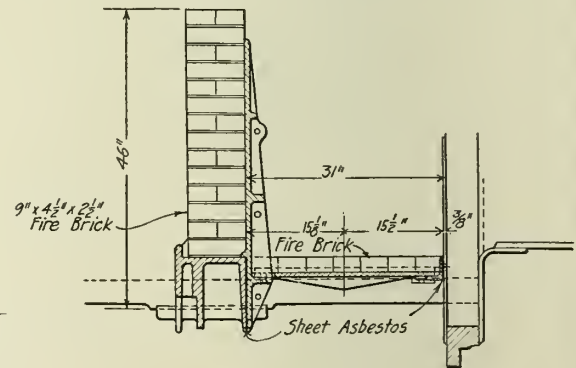
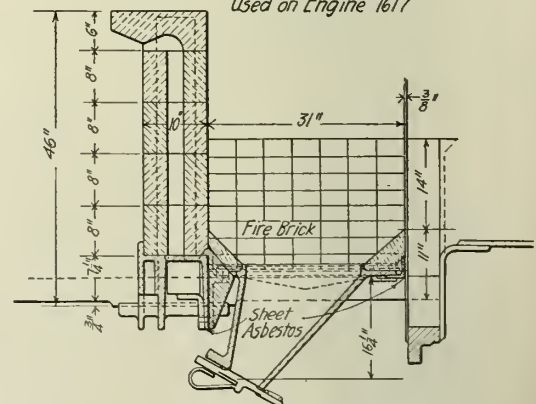
Cross Sections, Consolidation Locomotive, Philadelphia & Reading Ry.

The boilers used on these engines are of the straight top variety having three main courses of $\frac{3}{4}$ -inch steel between the smoke-box and the firebox. The distance over the flue sheets is 13 feet $6\frac{3}{4}$ inches, being relatively short on account of the application of the combustion chamber principle. The same general principle obtained in the preceding design, the boiler barrel in that case being one course longer and the chamber of the cylindrical type extending forward from the firebox a corresponding distance into the barrel. The firebox, which is

the striking feature of this design, is 13 feet $1\frac{3}{8}$ inches in length, inside, being made up of 15 courses according to the well known Jacobs-Shupert principle. While the inside dimension of the firebox is as stated, the grates occupy but 9 feet 8 inches of this length, the remainder of the distance constituting the combustion chamber. This volume is separated from the grates by a 10-inch straight bridge wall 46 inches high above the bottom of the mud ring, and through which is a series of vents for the admission of air to support combus-

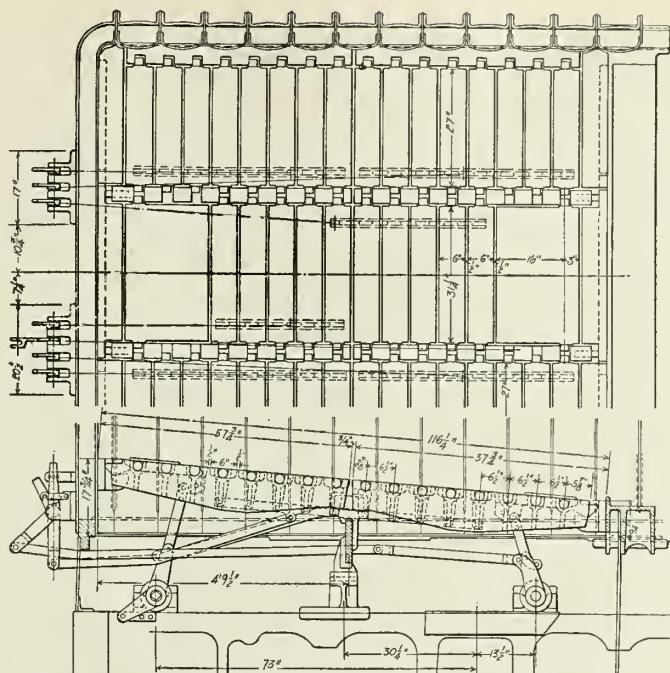


Gaines Combustion Chamber, Consolidation Locomotive, Philadelphia & Reading Ry.

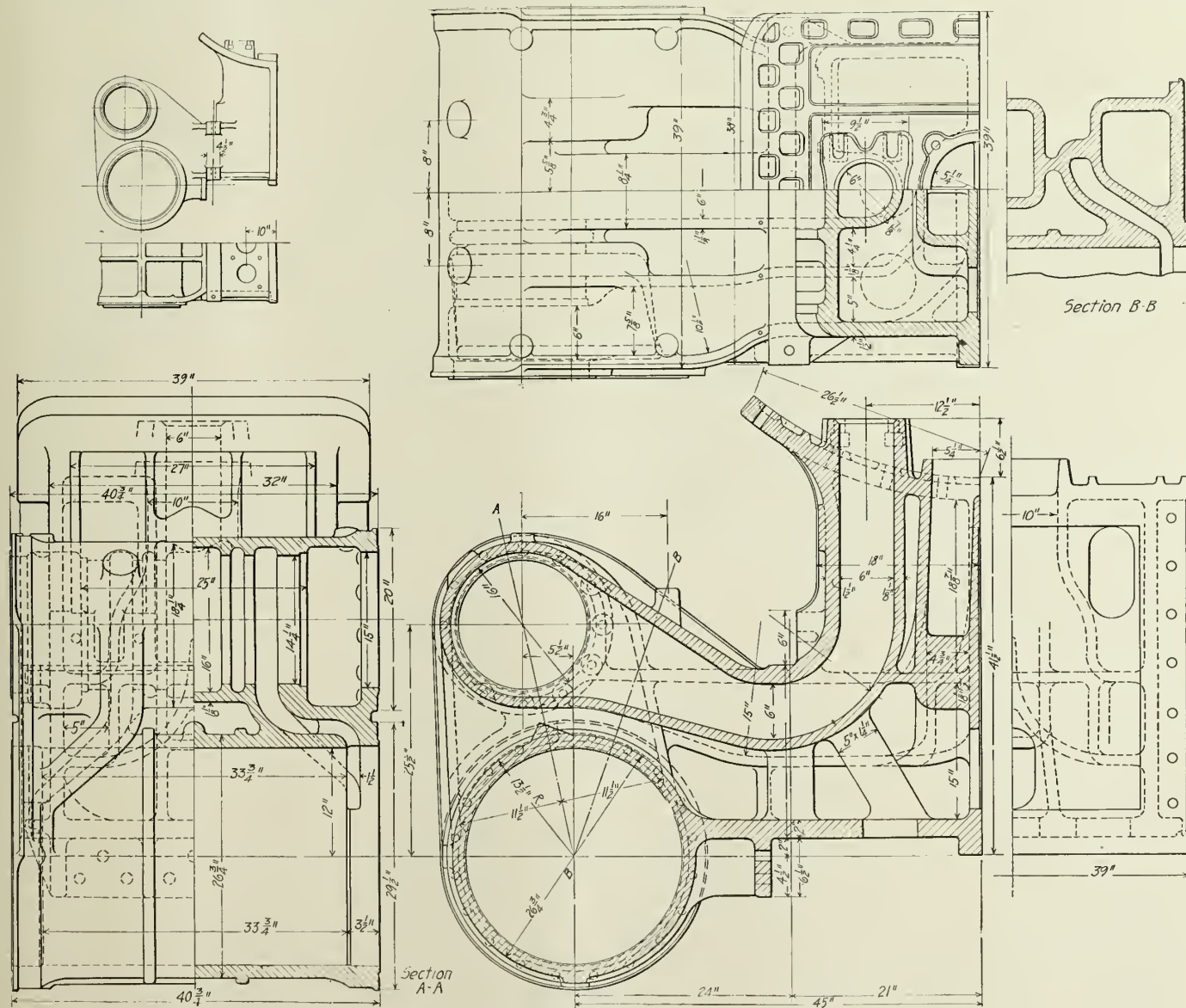
P. & R. Combustion Chamber
Used on Engine 1617Gaines Combustion Chamber
Used on Engine 1616

tion. In the case of the engine to which these details apply, the combustion chamber is provided with a cinder pocket. In a sister engine, and as shown in the combustion chamber details herewith, a solid wall built up of 9 by 4½ by 2½ inch firebrick is to be tried, this engine differing also in the fact the cinder pocket construction is omitted. This arrangement has been designated the "P & R" combustion chamber and in comparison with the one previously referred to, should in service, be productive of valuable information as to the value of admitting air over the top of the fire through the heated arch or bridge wall.

While the mud ring is horizontally disposed, the grates are given a slope of $8\frac{1}{2}$ inches in a length of $116\frac{1}{4}$ inches. The grates are made to rock in six sections. The grate area is 82 square feet and fuel is fired by hand through two 16-inch circular doors, placed 21 inches either side of the vertical center of the back head. Fuel used is a mixture of "buckwheat" and soft coal. The grate area of the present engine is 8 square feet less than that of the preceding design, the firebox heating surface is some 37 square feet less, and the total heating surface is 34 square feet greater, the compensation arising from the fact that eight more tubes are used in the new design, resulting in some 70 square feet more tube heating surface than in the preceding design. This leaves the engines about equal on the heating surface basis. As for grate area, however, should the lesser area of the new engines prove



Grate Arrangement, Consolidation Locomotive, Philadelphia & Reading Ry.



Cylinder Casting, Consolidation Locomotive, Philadelphia & Reading Ry.

sarily an added service. The Interstate Commerce Commission held in this case that the carriers could charge for any added service, although it held in this case that here was merely a substitute service amounting to a substitution for switching and terminal charges. This was a question of fact plainly within the province of the Interstate Commerce Commission and the finding of the commission is conclusive of the facts."

Another decision of the Supreme court will allow the Florida East Coast Ry. to charge higher rates on citrus fruits and vegetables. The Interstate Commerce Commission had issued an order lowering the rates on certain commodities shipped over the Florida road. The chief justice laid down the principle that while the commission was charged with the sole authority to ascertain facts and enter an order in accordance therewith, the court was not precluded from looking into the record to ascertain whether the facts disclosed sufficient warrants for higher rates. In this case the court decided there was nothing in the facts disclosed by the record to sustain the order lowering the rates and the order would operate as confiscation of the carrier's property and was therefore void.

By another decision Missouri's anti-trust laws, attacked as unconstitutional because they exempt labor combinations,

were upheld. At the same time the Kentucky anti-trust statutes were annulled because of the endeavor of the commonwealth to exempt tobacco pools from their operation. As a result of these decisions the judgment of the Missouri Supreme court ousting from the state and fining the International Harvester Co. of America \$25,000 for being a member of a "trust" was affirmed, while the action of the Kentucky Court of Appeals in affirming judgment in favor of various Kentucky counties for penalties against the same company for being a member of a "trust" was reversed.

Still another decision upheld the constitutionality of a Virginia law requiring companies mining coal or manufacturing iron or steel to pay employees at least monthly in money, and making it unlawful to issue scrip unless redeemable in money at its face value.

The power of the state of New Jersey through the chosen freeholders of Hudson county to fix tolls over the Bergen Point ferry between Bergen Point, N. J., and Staten Island was upheld in a decision by the Supreme court June 8. The ordinance fixing the tolls was attacked by the Bergen Point Ferry Co. as a burden upon interstate commerce, but the Supreme court held that the states may exercise jurisdiction and regulate ferries, even though they be engaged in interstate traffic if they have terminals within the state.

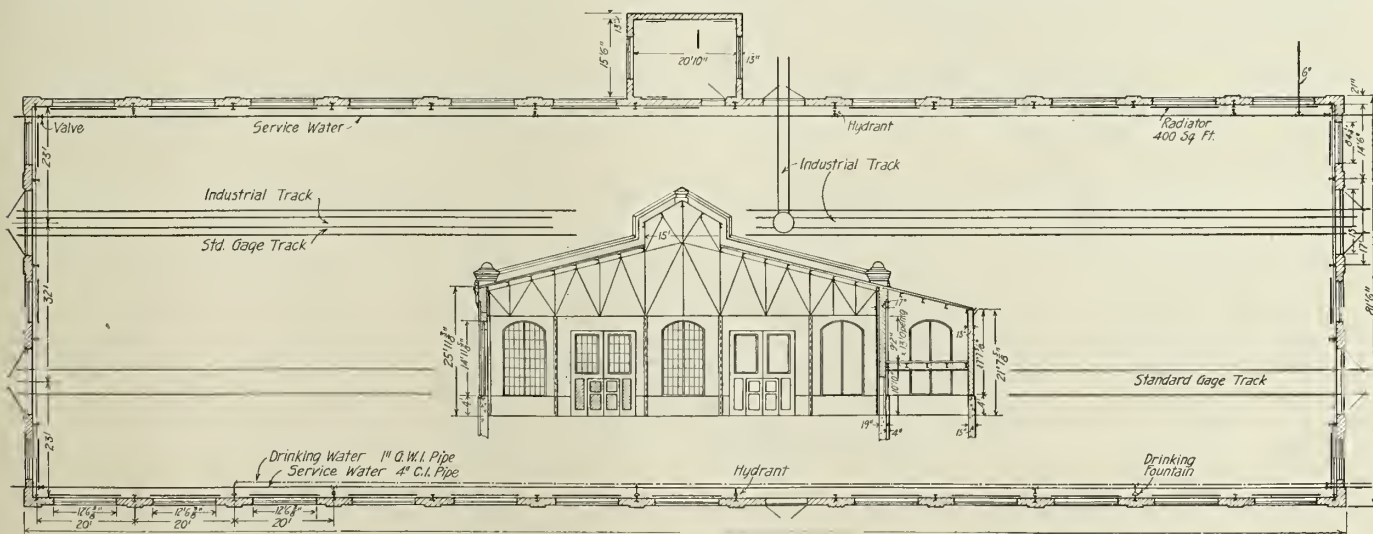
Leonard Shops of the National Transcontinental Ry.

The National Transcontinental Ry. is establishing repair shop facilities in its eastern territory at St. Malo, near Quebec. These shops involve a new method of disposing the buildings with respect to the "midway," along which they are to be built. The arrangement of the pits in the erecting shop is such as to require a minimum amount of door opening and closing which is a point worthy of particular consideration in cold climates.

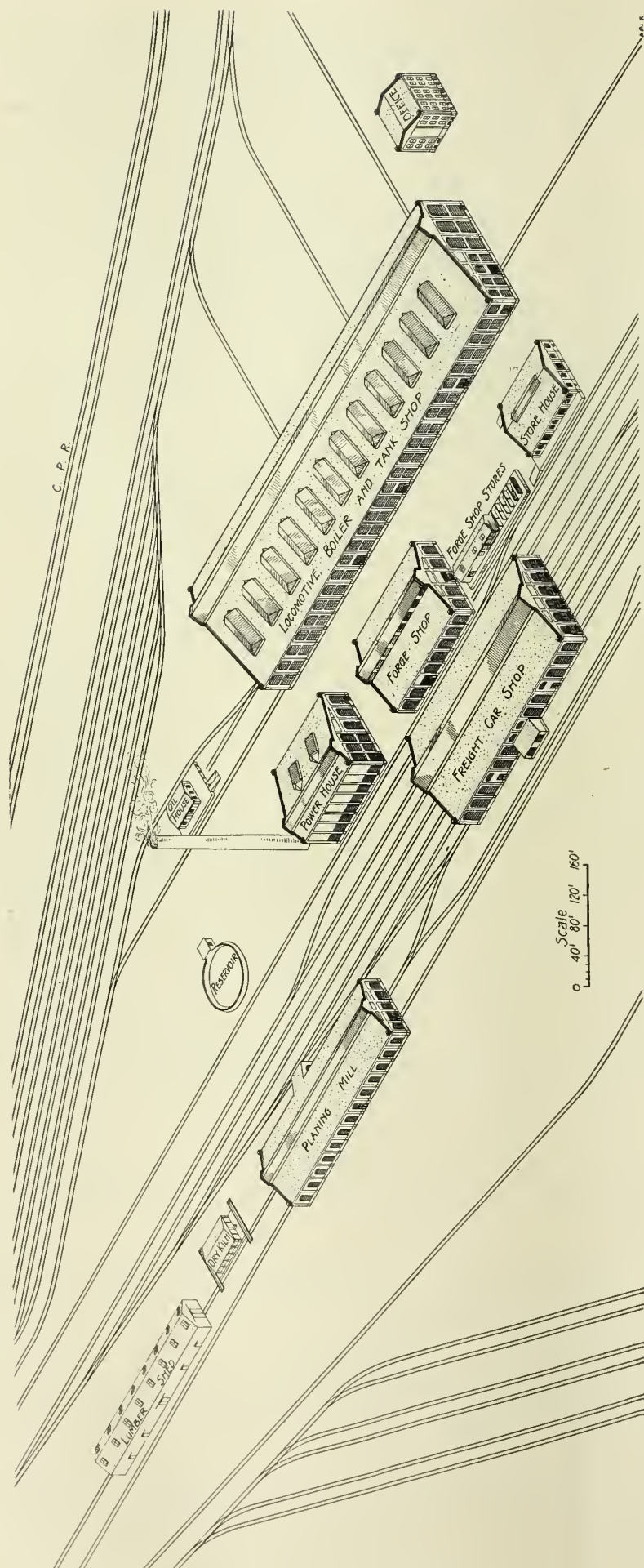
The commissioners of the National Transcontinental Ry. have prepared plans for a general car and locomotive repair plant to supplement, on the eastern end of the system at St. Malo, near Quebec, the work done at the Transcontinental shops near Winnipeg, in the western territory. The very elaborate plant at Transcona was made the subject of an article appearing in the Railway Review for Nov. 19, 1910. The initial layout of the Leonard shops, as the new plant will be known, in honor of Major R. W. Leonard, chairman of the National Transcontinental Railway Commission, while not so elaborate as that of the Transcona plant, is such as to show that not only has convenience of operation been the guiding principle governing the design, but that future needs have also been provided for. Each

shop is capable of extension without interfering with any other and any department can be increased separately as occasion may require. There are eleven buildings in all, of various dimensions, each suitable for the special work to be done therein. These buildings consist of a locomotive, erecting, machine and boiler shop; a forge shop; a freight car shop; a power house; planing mill; dry kiln; lumber shed; forge stores and scrap bins; oil house; stores building; and an office building for the executive staff. The total area covered is about five and one-half acres.

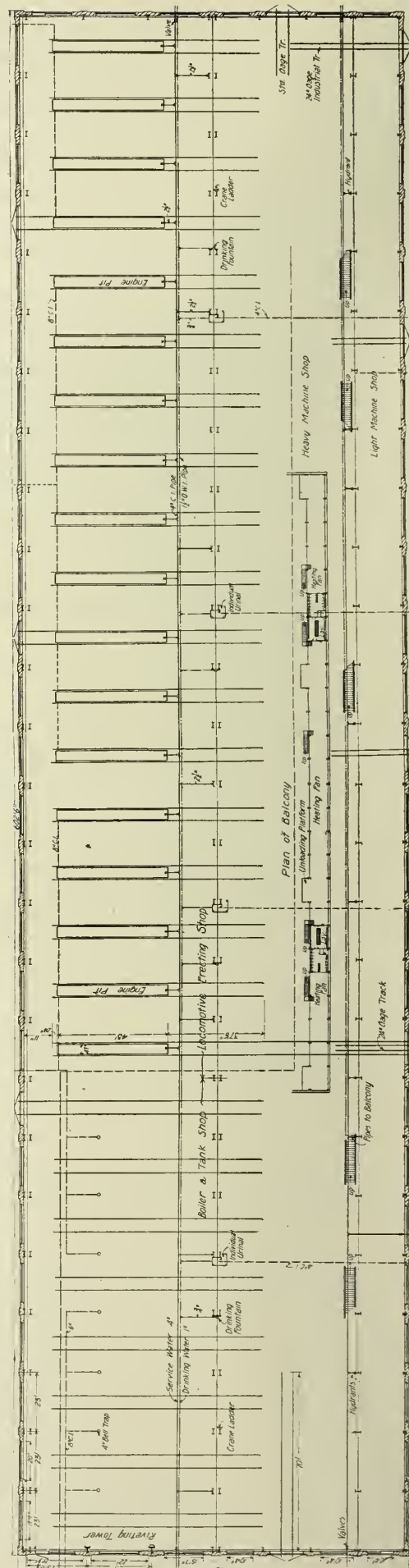
In the erecting shop there are eighteen pits, placed transversely, over which a 120-ton crane lifts locomotives into, and removes them from, their respective positions. A 20-ton crane, operates over the same area at a few feet lower level, and carries small material and makes many light and rapid lifts. The transverse-pit layout" has the advantage of doing away with many side doors in the building for the "in-and-out" movements of locomotives. There are two doors, conveniently placed, through which engines and material enter and leave. This arrangement is economical in the matter of heating and does away with the necessity of a transfer-table with all its inconvenience from snow



Plan and Transverse Section of Planing Mill, Leonard Shops of the National Transcontinental Ry.



Isometric Layout of Leonard Car and Locomotive Shops of the National Transcontinental Ry., near Quebec.



and ice. The practically unbroken sidewall permits the use of jib cranes, one serving the fronts of two locomotives, and each crane is capable of lifting smoke stacks, main valves, smoke box doors and rings, etc. The use of these very handy cranes would be inconvenient if the wall of the shop had been cut up into a series of doors.

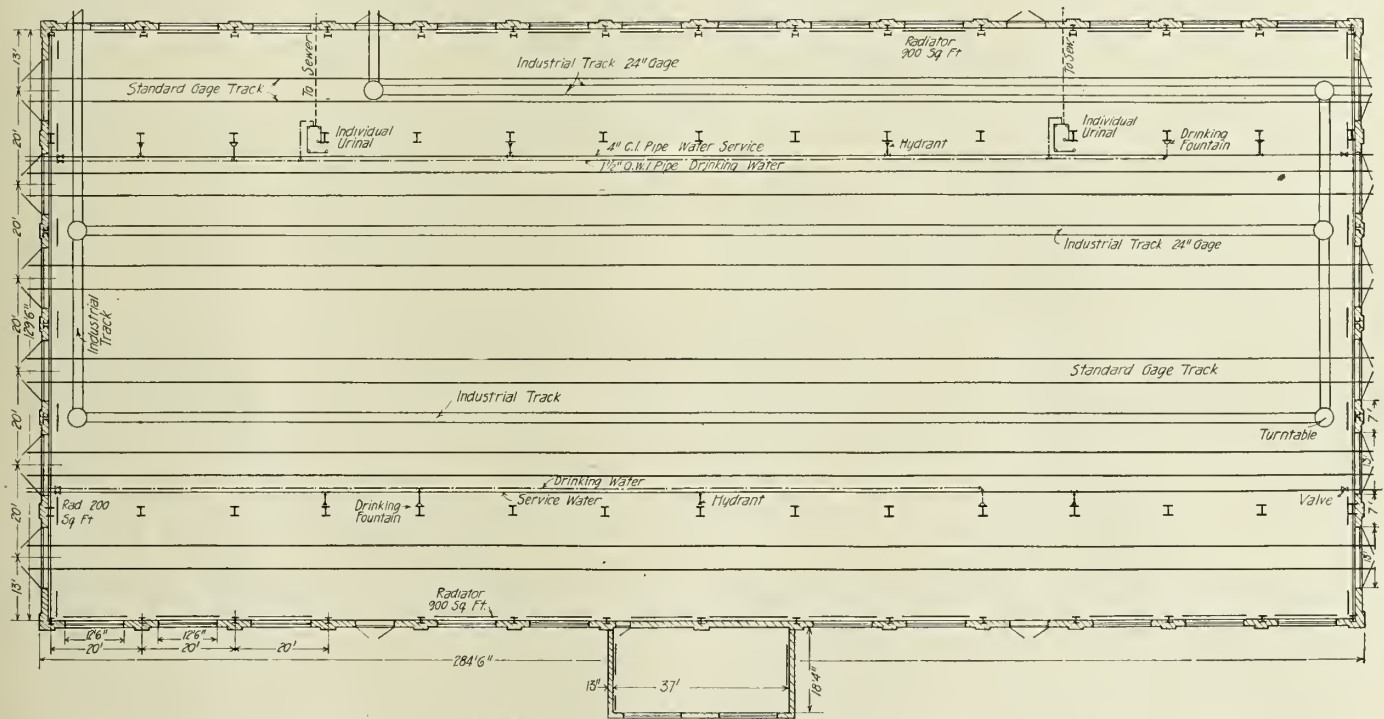
The cross-section of the shop shows that the large crane is carried on a series of built-up columns, so that the heavy load is central over the line of foundations. As one crane does the work of lifting and placing each locomotive, there is no chance of confusion such as might occur when two cranes are used, and where two men do the work. The single powerful crane has also the advantage over the usual twin crane arrangement in economy of first cost and maintenance. All the overhead cranes are provided with effective safety appliances. One of the most important, prevents the load from being "over-wound" by the lifting drum, either by accident or otherwise.

The direction in which the midway crane operates is a new departure in railway shop construction, which has been brought

The forge and the boiler shops are placed as near as possible to the power house. This is important, for in the case of the forge shop, where hammers are operated by live steam, the short distance between boiler and hammer reduces condensation and delivers steam where it is required with small loss. A similar condition holds good in a sense, for the delivery of compressed air to the boiler shop machinery. The nearer the source of supply, the less the pipe friction there is and the smaller the losses due to the forcing of air through the pipes.

Industrial tracks form convenient means of communication between the various shops. The buildings, cars, engines and supplies are protected by a water-system arranged to be readily put in use in case of fire. A further protection is afforded by the use of concrete and steel in the various structures.

The freight car shop is to be divided into two departments, one for the repairs of steel cars, and the other for repairs to wooden freight cars of all kinds, the equipment to be such that either kind can be repaired or built. The shop itself is to be 129 feet 6 inches wide, by 284 feet 6 inches long. It will be



Plan of Freight Car Shop, Leonard Shops of the National Trans continental Ry.

out by W. J. Press, mechanical engineer of the commission, and which secures substantial advantages. The midway is laid out so that the shops are parallel thereto and not at right angles as is usually the case. The object of this arrangement is that when material is brought by the midway crane from the storehouse, forge shop, or foundry to the machine, erecting or boiler shop, it is placed at the door nearest to the machine on which the material will be handled, or to the engine upon which it will be used. In this way the delivery of material is not concentrated at one spot at the extreme end of the building. It avoids distribution from a congested area, and it obviates the "long haul" through the shop. The system of placing machines is such that the movement of material will be in one direction and the distance over which any locomotive "part" is carried, will not be unnecessarily lengthened by journeys forward from one machine and back to another. The continuous one-way movement of material saves time and labor and prevents interference.

The pits in the locomotive shops are supplied with steam, compressed air, hot and cold water, the pipes being carried in depressions in the pit walls. By this arrangement the working space in the pits is not restricted and the pipes are not where they can be easily damaged by workmen dropping material on them, and thus they are quite safe, as well as out of the way.

composed of a self-supporting steel frame resting on concrete foundations. The walls are of brick and the roof of wood covered with prepared roofing. The floor is of grease-resisting Mastic asphalt composition, one and one-half inches thick, laid on six inches of concrete. Ribbed factory glass is used in the side walls and that in the skylight is heavy thick ribbed wire glass which prevents the falling of fragments in case of breakage.

The shop is divided longitudinally into three bays, two of which, next the walls are about 22 feet wide each. One of these, in which there is a standard-gage track, is served by a 10-ton overhead electric crane. The center bay, about 80 feet wide, is served by a 25-ton overhead electric crane, below which are four standard tracks. The remaining bay, 22 feet wide, has one standard track with an industrial track in the center. The equipment of this shop, according to the plans under way, will be equal to any of its kind in the country. The shop will be well lighted and ventilated and will be heated by a direct heating system.

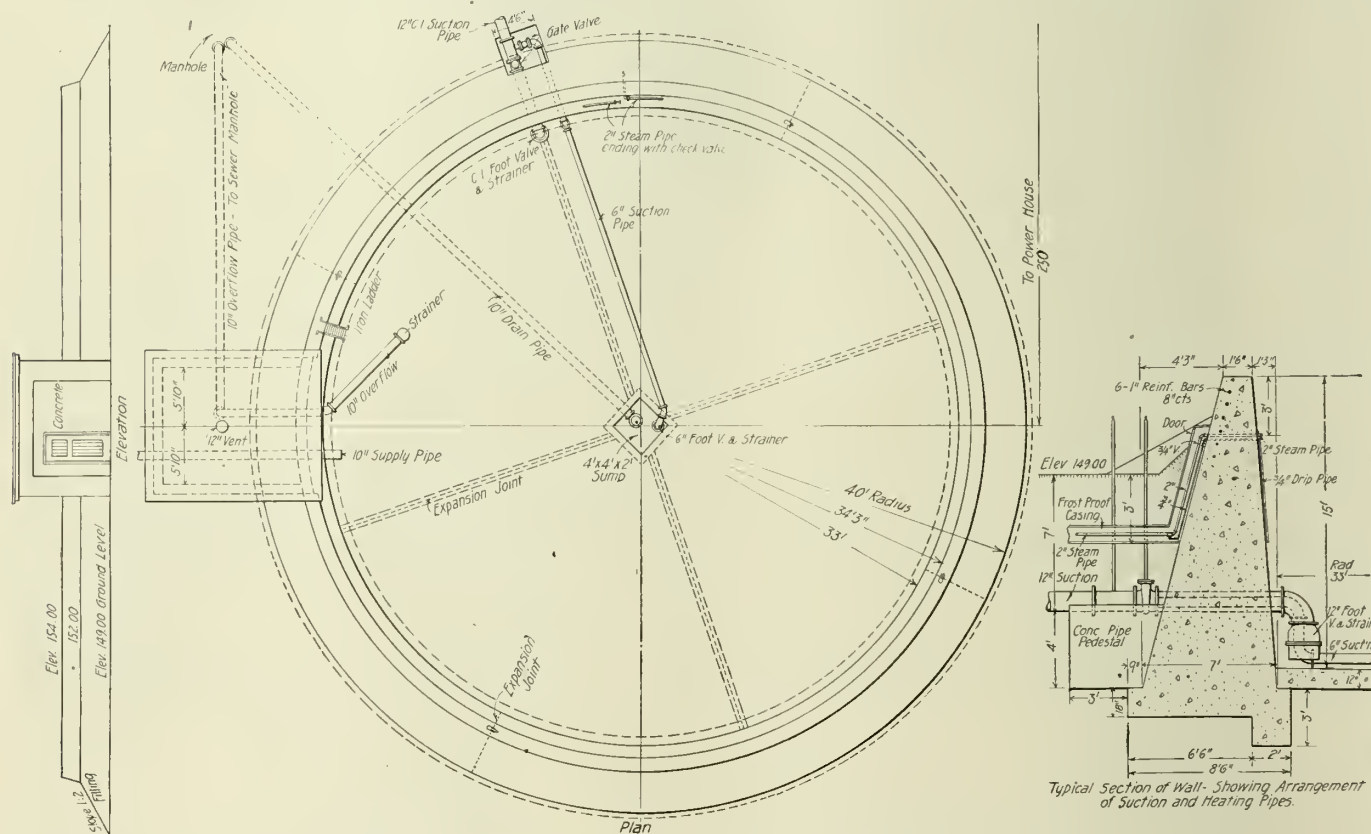
The planing mill building is to be 81 feet 6 inches wide, and 264 feet 6 inches long. It is, like the freight car shop, built with self-supporting steel frame and brick walls. There are two standard-gage tracks entering this building, and industrial tracks

are provided for the transportation of material. In the center of this building there is a lean-to used as a lavatory, with a floor 10 feet above, on which is placed the fan for the direct heating system, the steam for which is supplied at about 2 pounds pressure. A separate drinking water system has been provided in this and other shops of the Leonard plant. The woodworking machinery has not yet been fully decided on, but the various tools and appliances will be of the latest and most modern design. This building is conveniently located near the powerhouse so that shavings, etc., can be forced by a fan system to the boilers of the powerhouse.

The drying of lumber is recognized as an important feature in shop operation and in this instance a dry kiln 71 feet 6 inches long, by 38 feet 4 inches wide has been provided. It contains two standard gage tracks, the outer rails in each case doing duty in connection with four industrial tracks, each 2-foot gage.

concrete foundations and sills, having drop siding walls and wood sheathing roof, with ventilators and skylights. The floor is of 2-inch spruce on joists of hemlock or red pine sleepers, bedded in 2 inches of gravel. The building is 225 feet 6 inches long, and 40 feet 6 inches wide. There are sixteen skylights glazed with $\frac{3}{8}$ -inch ribbed wire glass. There is one standard track in the center of the building and the ends are fitted up with sliding doors.

The plant as a whole has been laid out under the supervision of Gordon Grant, chief engineer; the design, details of the relative size, arrangement and position of the buildings and the selection of the machinery and appliances has been entrusted to Captain W. J. Press, mechanical engineer of the commission, who has had charge of similar work at the Transcona shops of the National Transcontinental Railway, near Winnipeg. The Leonard shops, the contract for which was awarded some time ago



Details of Reservoir, Leonard Shops of the National Transcontinental Ry.

The building will have brick superstructure walls, concrete roof and sides. The concrete floor is 6 inches thick and is suitably drained. The heating apparatus is arranged for the use of exhaust steam supplied at atmospheric pressure. The approximate total heating surface is 1860 square feet or about 3000 lineal feet of 2-inch pipe. The heating coils are of course, placed in concrete pits below the level of the floor. There are ten coils in all, one being below the central gangway, in each half of the kiln, the other eight are below the industrial tracks. The floor is composed of expanded metal in sections 4 ft. long set on 2 by 2 by $\frac{3}{8}$ -inch angle frames.

The control cabinet containing valves, thermometer, vacuum gage, etc., is outside the building, so that the condition of the kiln can be ascertained and alteration of heat arranged for without opening the main doors. Each half of this building is a separate unit. A central partition and ceilings permit one side to be used without the other. Outside the building at each end, there is a concrete platform and at the ends there are small transverse pits with short transfer tables for moving the lorries upon which the green and the dry lumber is taken to, and removed from, the dry kiln.

The lumber shed is an ordinary wooden frame building on

to Joseph Gosselin of Pt. Levis, Que., will form a most valuable addition to the repair shop facilities of this great Canadian "cross-continent" highway.

The Traveling Engineers' Association.

The twenty-second annual convention of the Traveling Engineers' Association will be held at the Hotel Sherman, Chicago, Ill., commencing Tuesday, September 15, 1914, and continuing four days.

The subjects to be discussed at this convention are as follows:

"Difficulties accompanying prevention of dense black smoke and its relation to cost of fuel and locomotive repairs;" Martin Whalen, chairman.

"Operation of all locomotives with a view of obtaining maximum efficiency at lowest cost;" J. R. Scott, chairman.

"Advantages to be derived from the use of mechanical stokers, considering (first) increased efficiency of the locomotive; (second) to increase the possibility of securing a higher type of candidates for the position of firemen; (third) the

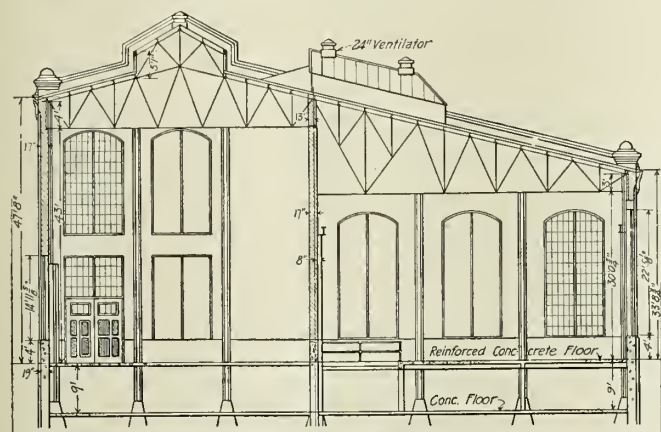
utilization of cheaper grades of fuel;" J. H. DeSalis, chairman.

"The care of locomotive brake equipment on line of road and at terminals; also, method of locating and reporting defects;" Geo. H. Wood, chairman.

"Advantages derived from the use of speed records and the influence of same on operating expense;" Fred Kerby, chairman.

"Practical chemistry of combustion;" A. G. Kinyon.

"Scientific train loading; Tonnage rating. The best method to obtain maximum tonnage haul for the engine over



Cross Section of Powerhouse, Leonard Shops of the National Transcontinental Ry.

the entire division, taking into consideration the grades at different points on the Division;" O. S. Beyer, Jr.

Requests for further information should be addressed to W. O. Thompson, secretary, care of N. Y. C. car shops, East Buffalo, N. Y.

Inspection of Government Coal Purchases.*

The inspection of coal purchased for the government is conducted from the headquarters of the bureau of mines in Washington, D. C., where the engineer in charge of the inspection service is stationed and the laboratory for analyzing samples of deliveries is situated.

The work done includes the collecting, analyzing, and testing of samples representing deliveries of coal purchased under government contracts providing for purchase on a specification basis, in order to ascertain whether the coal represented by the samples conforms to the stipulations of the contracts. On such contracts the bidders guarantee the quality of the coal they offer, and the quality guaranteed by the successful bidder becomes the standard of his contract. A large part of the coal used by the government for its power plant, public buildings and naval stations is purchased under contracts that specify the ash and the moisture content, the heating value, the limits of the content of volatile matter, and the sulphur content. The analysis of samples of deliveries determines whether the quality of the coal is up to the standards guaranteed by the contractor. If it is not, the price to be paid is decreased in proportion to the lower value of the coal; if the coal is of higher quality, the price is proportionately increased.

In the collection of samples a definite scheme of procedure is observed. By following the instructions of the bureau of mines and by observing every practicable precaution, the collection of samples fairly representing the coal delivered is insured. The gross samples taken are reduced by successive crushings, mixings, and partings to samples that weigh about three pounds each. These are sent by mail to the laboratory in Washington. The larger part of the coal now bought by the government is

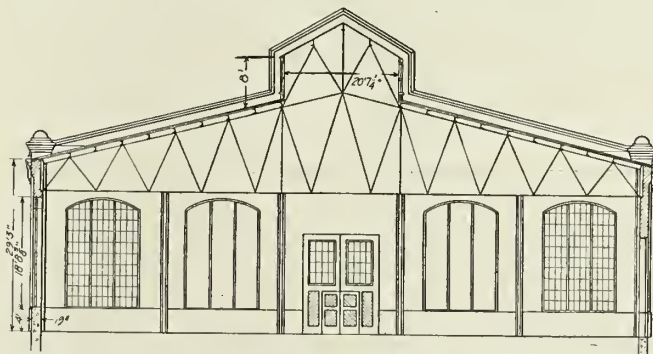
*From the forthcoming third annual report of the national bureau of mines, Joseph A. Holmes, Director.

purchased under the general technical supervision of the bureau of mines. The cost of purchases under specifications prepared by the bureau for the use of the government now aggregates approximately \$4,500,000 per annum, and the additional fuel bought under the general advice of the bureau now aggregates in purchase cost some \$3,000,000 per annum more, making a total value not less than \$7,500,000.

The benefits to the government from this work of the bureau have been both general and special. In the case of the purchase of coal by the Isthmian Canal Commission for the Panama R. R. during the fiscal year 1910 and 1911, the money actually saved by the government was nearly \$75,000 and the real saving was probably several times these figures, because the method of purchase insured deliveries of coal of a higher grade than would otherwise have been obtained. Other examples might be mentioned, among them the saving effected by the quartermaster corps, war department, which amounted to \$27,500 during the fiscal year 1912.

Some benefits to the general public resulting from this work for the government may be indicated by the fact that more than fifty of the larger cities, a number of states, and a large number of private corporations and business concerns in different parts of the country have followed the general plans adopted by the government for the purchase of its coal. The analyses of coals from the different coal fields of the country, analyses that have been made in testing these coals for the use of the government, have been of great service to engineers in charge of power plants and to manufacturing industries throughout the country, enabling users of fuel to determine in advance the character of the coals available for local or special use.

The specification method of purchase protects the government against the delivery of poorer coal than that guaranteed by the contractor and incites dealers to prepare the coal more carefully. In the case of coal for use on naval vessels, at the request of the navy department the mining and shipping facilities



Cross Section of Forge Shop, Leonard Shops of the National Transcontinental Ry.

of mines from which purchase is proposed are carefully examined by the engineers of the bureau of mines, and the samples collected from each mine are analyzed at the Pittsburgh laboratory; in this way a standard of high-grade coal, low in ash and volatile matter, is fixed, and must be maintained in subsequent shipments. Occasionally samples are collected as the coal is being loaded on ships, and if the results show that the coal as loaded is not up to the standard, the contractor is promptly notified that the quality of his shipment must comply strictly with the contract specifications, and on his failure to ship coal of specified quality his contract is annulled. Coal purchased under such specifications and used on naval vessels amounts in round numbers to 700,000 tons a year.

The steaming tests that have been conducted and the advice given by the bureau's engineers are resulting in further economies to the government. For instance, by a change in the kind of coal used one government boiler plant is spending between \$4,000 and \$5,000 a year less than formerly for fuel, and still another plant has reduced its annual expense for fuel by about \$15,000.

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SATURDAY, JUNE 13, 1914.

Perhaps the best wisdom currently contributed upon the administration's "anti-trust" program is from Senator Frank B. Brandegee, of Connecticut, a republican member of the committee on interstate commerce, who said: "I do not think that a worn and exasperated congress, which has been in continuous session for more than a year, should be forced to enter upon the discussion of all these intricate and controverted questions in midsummer on the eve of a nation-wide political campaign. I do not think the agitation and debate will tend to restore confidence to the distracted and drooping business of the country. I think the best service congress can render is to pass the appropriation bills and adjourn and let the country have a rest, and, if possible, recover its own wits."

The lower house of congress came to substantial agreement upon the three bills sooner than was expected. A part of the congressmen's sudden unity of purpose, it may be assumed, is accounted for by their willingness to pass on to the senate some of the vexatious details of the legislation. That the senate will not dispose of the responsibilities thus saddled upon it without some difficulty, is fairly indicated by

subsequent events and the opinions expressed, of which that above quoted is one. The three measures, which are summarized at some length in another column of this issue, were received by the senate, June 6, and sent to the appropriate committees. On the same day the senate committee on interstate commerce reported out a measure as a substitute for the Covington bill. It is said to be, by the way, notably more radical in its terms than the measure passed by the house, and it was freely denounced by the more conservative members of both parties. There was a strong sentiment that this bill should be the only one considered for the present session. The senate committee on judiciary made a preliminary survey, on Monday, of the Clayton bill, with the immediate disclosure that agreement on such subjects is far in the future. The prevailing opinion is that congress must remain in session through the entire summer if the President insists upon holding the measure before it.

Firemen and Firing.

Probably none but those having actually had experiences in firing present day heavy passenger or freight locomotives under adverse conditions, can appreciate the demands made on the intelligence and physical endurance of the fireman. True, the propaganda for "scientific" firing, if productive of results at all, should bring about lessened physical exertion for the fireman, and doubtless would, except for the fact that the demand for increased drawbar output is so insistent as to absorb to large extent, whatever advantage the fireman may gain through applying intelligence to his work. Besides, where do the niceties of firing practice come in for consideration when, as often happens, a train is compelled to work against a combination of odds that threatens to all but lay the locomotive out as a failure for the run? Under such conditions, it behooves the fireman to shovel coal, and while it does not necessarily follow that his salvation lies wholly in vigorous application to that pursuit, he generally conceives it to be his chief function and under usual conditions he may be pardoned in a large measure, for forgetting the ethics of his vocation. Firing has come to be looked upon as an almost herculean task, as indeed it is when conditions are such that other functions demand a share of the fireman's time and effort.

One of the worst of the interferences with the fireman's work lies in the matter of his being compelled, as his coal supply becomes low, to climb back on the tender for the purpose of raking fuel down to a point where it can be reached from the firing platform. When this extra work is forced upon him, he frequently and with ample reason, becomes less a fireman and more a coal heaver, with the result that coal is wasted, the fire suffers from lack of constant attention and the possibility of train delay or engine failure looms immi-

nent. To avoid these conditions, it behooves the roads to have coal spaces so designed as to bring as much of the fuel as possible to the fireman, by gravity or otherwise, or to continue with the widely prevalent practice of maintaining coaling stations at unnecessarily frequent intervals and of permitting trains to lose valuable time in stopping for coal at these stations, when, as a matter of fact, there still remains a third or more of the coal on the tender, and with which the terminal could easily be reached provided the coal were so placed as to enable the fireman to use it without a second handling. It is really surprising what far reaching effects studies of the different phases of locomotive operation may be found to have. As respects the matter cited for example, the employment of means for lessening the strain on the fireman by placing all of the coal in a locomotive tender within his easy reach, has demonstrated both a saving in the fireman and in fuel, has permitted the abandonment of coaling station facilities for certain trains, the nonuse of which facilities has spared the trains loss of time, besides making train operation more certain through the ability of the fireman to pay more constant attention to his work. Much complaint is being heard of the difficulty of securing satisfactory combinations of brain and brawn for firing service. The fact is to be appreciated that better material for promotion to the right-hand side of the cab is to be attracted by providing for more tolerable conditions on the left. Where the potentialities of the fireman's position are given the consideration they deserve, there should be no lack of suitable material from which to choose the future locomotive engineer.

The Decision in the Shreveport Rate Case.

The decision of the United States Supreme Court in the Shreveport rate case, announced on Monday of this week, probably will become historic. It is momentous, as we observe in another column in connection with extended quotations from the decision, in that it upholds the unrestricted supremacy of federal authority in rate regulation. The language of Justice Hughes is unequivocal: "Wherever the interstate and intrastate transactions of carriers are so related that the government of the one involves the control of the other it is congress that is entitled to prescribe the final and dominant rule, for otherwise congress would be denied the exercise of its constitutional authority and the state and not the nation would be supreme within the national field."

The decision clarifies the situation because it passes upon the points which the court did not pass upon in the Minnesota rate case, which as a matter of coincidence was decided just a year previously, as nearly as the calendar would allow. That decision clearly held that federal authority was paramount and was "not to be denied or thwarted by the commingling of

intrastate and interstate operations." But because the Interstate Commerce Commission had not declared the rates specifically at issue to be discriminatory in interstate commerce, it had not taken jurisdiction; and until jurisdiction was exercised by this federal authority it rested with the state. Justice Hughes, who wrote both opinions, points out that the present decision does not conflict with that rendered a year ago.

The decision is viewed with the greatest satisfaction by the railroads because it will eliminate the points of conflict between state and federal regulation. It will relieve the railroads of conforming to regulatory measures which, heretofore passed by various states, have too often been prompted by shallow business judgment, petty politics, or plain foolishness. In these respects the jurisdiction of the Interstate Commerce Commission is admittedly preferable, but in addition it will give certainty and directness to railway administration, in being responsible to but one master instead of many. Railroad men, in expressing their views, said it was a "great" decision.

Regarding the adjustment of the rates immediately at issue in the case, the decision affirms the original order of the Interstate Commerce Commission, which in itself was sufficiently clear regarding what should be done to end what it characterized as discrimination. It is apparent that the railways are now free to make the adjustment either by lowering the Louisiana rates or by raising the Texas rates, even though the latter course be in direct contravention to the orders of the Texas commission. As the Texas rates were adopted against the volition of the railways, it is reasonable to suppose that these will be the ones to be canceled. Regarding this aspect of the matter the concluding language of the decision is as follows:

"Reading the order in the light of the report of the commission, it does not appear that the commission attempted to require the carriers to reduce their interstate rates out of Shreveport below what was found to be a reasonable charge for that service. So far as those interstate rates conformed to what was found to be reasonable by the commission, the carriers are entitled to maintain them, and they are free to comply with the orders by so adjusting the other rates, to which the order relates, as to remove the forbidden discrimination. But this result they are required to accomplish."

Forestry and Wood Preserving.

The economics of the production and consumption of lumber are so closely identified with nearly all lines of engineering construction that the subject of forestry, which is one means for conserving the lumber supply, and that of timber preservation, which is another method of conservation, have a peculiarly wide application. At the May meeting of the Central Railway Club the mem-

bers of that organization were afforded an exceptional opportunity to listen to some of the principle phases of these two industries. Mr. W. F. Goltra, prominently known in connection with timber preservation, read a paper on that subject, telling in a general way of the practices of the railroads in treating ties and timbers in this country. The other paper, on "Forestry and Forest Fire Fighting," was by Mr. Wm. G. Howard, assistant superintendent of the New York State Forests, and his paper dealt with the forestry of that state alone.

It was shown that there are sixteen counties in New York where there are forest preserves, of which an area of upwards of ten million acres is in the Adirondack region, extending over twelve counties, and four other of these counties, containing nearly three million acres, are in the Catskills; and of these thirteen and one-half million acres, over a million and a half acres of forest lands are owned by the state. As is well known, New York State has been engaged in forestry for a good many years, and an organization for policing or keeping these forests under surveillance, for the double purpose of preventing theft of timber and destruction by fire, has been maintained. The state employs a number of men known as forest rangers, who are paid \$60 per month, and devote all of their time to the work. The forest preserves are divided into five districts, each being under an official known as district forest ranger, who is paid a salary of \$1500 a year, with allowance for necessary traveling expenses. During the season when fires are most likely to occur, from about May 1 to November 1, about seventy rangers are employed. Some fifty mountain lookout stations are equipped for observation, and last year 366 fires were discovered by observation from these stations, or an average of about one a day for the whole year. These lookout stations are connected by a telephone system, and the organization is such that when a fire is discovered by a station observer the ranger nearest the fire is called, and he at once proceeds to gather a fire-fighting crew. Any one called upon to fight fire is obliged to assist or submit to a fine of \$20. Last year the record of service was 100,000 acres of forest protected by each man, at a total expense for all salaries and other charges of one-tenth of one cent per acre; and destruction by fire was kept down to lands burned over amounting to one-half of one per cent of the total forest area.

The railroads being a frequent source of forest fires, the state has regulations regarding locomotive spark arresters, the use of oil-burning locomotives in some sections; and what is perhaps the most frequent cause of forest fires in all parts of the country, namely the clearing of land, is under strict control by law. This law provides that no clearing of land by burning shall be done at any time of the year without a permit. The laws, of course, regulate the building and quenching of fires by campers, hunters, fishermen, etc. But forest fires do get started occasionally without human agency, as is shown by the record of the forest fires reported in

this department last year to the effect that 65 of the fires were caused by lightning.

This state has also a peculiar law regarding the slashing of timber where lumbering is being done in forests of private ownership. This law requires that all lateral branches be lopped from coniferous trees that are cut for general lumbering purposes. The law has found favor with the lumbermen who, while noting that it has cost them from fifteen to twenty-five cents per thousand feet of lumber cut, have realized enough from the extra lumber taken out of the tree tops to more than offset the expense of lopping. Careful observation has shown that this lopping of branches reduces fire danger but little, if any, during the first two or three years after the trees are felled, but the lopped branches, lying close to the ground, decay much more rapidly than they would in open tops, and therefore reduce the period of fire hazard. The lopped branches also render fire-fighting easier than is the case where the tree tops have been left untouched.

The state forest preserves consists of upwards of 6700 separate parcels of land, some of large area and many of small acreage. A good deal of this land has been acquired at tax sales. A peculiar provision of the state law regarding these forests is the constitutional prohibition of doing any lumbering in state forests whatever. Of course, the growing of timber for sentimental effect or for recreation grounds is not true forestry, and it is recognized that there will at some time in the not distant future be the necessity of amending the constitution to permit lumbering of matured trees on these lands.

The state is also doing something in reforestation of lands, and from a source independent of Mr. Howard's paper it is officially reported that the New York state forest nurseries have a capacity of 28,000,000 young trees per year. These nurseries supply trees at cost to private individuals who wish to reforest land within the state, and the demand for young trees for this purpose has been so great that but few trees have been available for planting of state land.

The substance of Mr. Goltra's paper was in regard to the ordinary practice of railways in treating ties, and the methods to which he referred, being familiar to maintenance of way engineers, need not be dwelt upon here in detail. He gave, however, some statistics of the progress of tie-treating which may not be so well known. At the date of the latest available statistics, namely the year 1913, about 25 per cent of the entire number of ties purchased by steam and electric railways in this country were chemically treated, and of the ties used in Canada about 8½ per cent were so treated. Last year there were 94 tie and timber treating plants in the United States, of which 30 plants were owned and operated by railroads and 64 plants by independent commercial companies. In Canada there were five tie-treating plants in operation. Of creosote used for timber-treating purposes in this country about 70 per cent was imported

from European countries, principally from Germany.

The agencies now at work for the conservation of the timber supply in this country, while not yet, according to the statisticians, sufficiently extensive to render the annual growth of timber equal to the consumption thereof, are nevertheless accomplishing a good deal. The story of the vanishing timber supply has now become an old one, but the claims of conservative authorities on this question are nevertheless recognized as approximations to the actual conditions. Yet it is not many years since there were but few forest preserves in this country, and apparently no effort was being made anywhere to protect forest areas from the annual devastation by fires during the dry season. Now, however, we have the large forest preserves of the national government in the Rocky Mountain country and further west, and a good start under the same supervision in the eastern or Atlantic states. What the state of New York has done in this direction has been referred to above. The practical necessity of vigilant watchfulness over the starting of forest fires is everywhere recognized in the northern states, particularly in those along the Great Lakes and the northern boundary, where the coniferous timbers abound.

Good progress, indeed, has been made in the prolongation of the life of structural timbers, particularly bridge timber and railroad ties. Most gratifying progress has also been made in substitutes for timber in engineering construction, greatly to the advantage of permanency and reduced fire risk, and affecting very considerably the demand for timber. In fact the pinch which these substitutions have brought upon the lumber industry has for some time been reflected in editorials in the lumber periodicals, which have taken every occasion to try to show the superiority of wood construction over concrete or brick where the use of such substitutes were making headway at the expense of timber; and very rapid substitution of steel for timber in car construction has met with the fruitless opposition of some of the interests so largely identified with the manufacture of lumber. The probability is that the substitution of more permanent materials for lumber, especially in building construction, will increase right along, and the day when timber will be growing as fast in this country as it is being consumed does not now seem as far off as it did at one time.

While reservations of the national and state governments can do much toward conserving the forests, a great deal more can be accomplished by encouraging the care and maintenance of forests by private ownership; and in this direction very little has as yet been done. Trees of the commercially valuable kinds are slow growing, and the annual income from forest lands that have once been cut over and burned off is exceedingly small, whereas the rate of taxation on timber land in almost all sections of the country is generally regarded as too high compared with the rate on tillable land. A general and large reduction of taxation on forest lands, if not

the entire remission of taxes on such lands, would undoubtedly encourage private forestry, making it advisable for landowners to forego clearing much of the poorer lands or periodically burning over brush lots to create pasturage.

"Anti-Trust" Bills Pass the House.

The house passed, June 5, the three bills comprising the administration's "anti-trust" program, which have been the subject of debate in congress for two weeks past. The three bills are the Covington bill establishing an interstate trade commission; the Clayton bill prohibiting interlocking directorates, holding companies and price discrimination, with a clause excluding labor unions from its provisions; and the Adamson-Rayburn bill, giving the Interstate Commerce Commission jurisdiction over the issuance of railway stocks and bonds, and prohibiting interlocking directorates among common carriers after two years without the express consent of the commission. There was no roll call on the Covington bill. The Clayton bill passed by a vote of 275 to 54, and the Adamson-Rayburn carried by a majority of 325 to 12.

COVINGTON TRADE COMMISSION BILL.

The Covington trade commission bill would turn over to a commission of three members the power now held by the bureau of corporations in the Department of Commerce, and confer on the commission additional powers. The bill provides for the appointment of three commissioners. The commissioners would serve six years at \$10,000, and employ a secretary at \$5000. After abolishing the bureau of corporations and the offices of commissioner and assistant commissioner of corporations the bill would turn over the organization and powers of the bureau to the new commission. It then provides that all corporations, with a capital of not less than \$5,000,000, except those now subject to the Interstate Commerce Commission, shall submit annual reports, "records of its organization, bondholders and stockholders and financial condition" to the commission.

The commission may also designate corporations having a capitalization of less than \$5,000,000 from which it desires reports. It may call for special reports in addition to the regular annual statements required by the bill, and would provide a penalty of \$100 a day for delay in filing reports.

Upon the direction of the President, the Attorney General or either house of Congress, the commission would be authorized to investigate and report the facts relating to any alleged violations of the anti-trust laws. The commission would also recommend possible readjustments of the business of corporations so investigated in order that they might conduct their business in accordance with the law.

CLAYTON BILL.

The Clayton bill carries provisions designed to strengthen and support the Sherman law and other acts against monopolies and restraints of trade. As framed by administration leaders and considered by the house the bill contained: Prohibition against price discrimination, or arbitrary refusal to sell natural mineral products and against the enforcement of conditional leases, or contracts of sale under which lessees or purchasers agree not to deal in the products of competitors of the seller or lessor; a provision that decrees in suits brought by the government under the anti-trust law shall be final evidence in suits brought against the defendant by others, involving the anti-trust law; provisions against holding companies and interlocking directorates in concerns under the jurisdiction of the federal government; and provisions guaranteeing labor and farmers' organizations their legal existence under the Sherman law,

limiting the use of the injunction in labor disputes and providing for jury trials in cases of indirect contempt of court.

In addition the bill clears up various jurisdictional questions and questions of procedure which have arisen in the administration of the anti-trust laws.

The provisions obtained by representatives of organized labor are the culmination of a long fight by labor to secure exemption under the Sherman law. They provide that nothing in the anti-trust laws shall be construed to "forbid the existence and operation" of labor and farmers' unions, and that such organizations and their members shall not be construed or held to be "illegal combinations or conspiracies under the anti-trust laws." The restrictions placed about the issuance of injunctions in the bill are close. It would provide that no "preliminary injunction shall be issued without notice to the opposing party," and that no temporary restraining order shall be issued unless it shall appear from specific facts shown by affidavit that immediate and irreparable injury will result to property or a property right of the applicant before notice could be served or hearing had thereon. The bill provides that every injunction or restraining order must be specific in terms, thus outlawing the so-called "blanket injunction."

In labor disputes injunctions would be forbidden by the bill "unless necessary to prevent irreparable injury to property or a 'property right,' for which injury there is no adequate remedy at law. It would also forbid injunctions against striking, peaceful picketing, primary boycotts, the payment of strike benefits, or the peaceful assemblage of strikers and contains a provision legalizing such acts.

The holding companies provision of the act would prevent one company from acquiring any stock in another corporation "where the effect of such acquisition is to eliminate or substantially lessen competition between the corporations, or to create a monopoly."

The interlocking directorates prohibition in the bill is an effort to reach all corporations, railroads, and banks over which the federal government has jurisdiction. Among other things, it makes ineligible as national bank directors the directors of private and state banks in the same city or town.

ADAMSON-RAYBURN RAILWAY SECURITIES BILL.

The committee divided the Adamson-Rayburn measure into two sections in order that one might stand if the constitutionality of the other failed in the courts. The bill makes it unlawful for any common carrier to issue stocks, bonds, notes or other evidences of indebtedness without the approval of the commission. It broadens the powers of the commission to require information from railroads and other common carriers and prescribes an elaborate system of reports. The commission would be authorized by the bill to require periodical or special reports on the financial condition of railroads, balanced statements of receipts and expenditures in relations to capital accounts and all other financial transactions.

Before issuing stocks or bonds, the bill would require railroads to file with the commission a certificate of notification showing in detail the character of the securities, the purposes for which they are to be issued, and the disposition to be made of them. Such certificates the bill makes public record and open to inspection. The bill would give the commission wide authority for the examination of the books of railroads and would provide penalties for the concealing of information from the commission. Giving the commission authority to supervise issues of securities the bill says:

"It shall be unlawful for any common carrier subject to the act to regulate commerce, to issue any capital stock or certificate of stock or any bond or other evidence of indebtedness or to assure any obligation as lessor, guarantor, or surety for the securities of any person, natural or artificial, even though permitted by the authority

creating the carrier corporation, except for some purpose within its corporate powers necessary to the proper performance of its service for the public and not tending to impair the financial ability of the carrier to discharge its duty to the public.

"It shall likewise be unlawful to issue any such stocks or bonds for the purposes hereinbefore mentioned or for any other purpose unless and until upon application and after investigation in the premises by the interstate commerce commission of the purposes and use of the issue and the proceeds thereof, such issue is approved by said commission as necessary and appropriate for the purpose stated; provided, that nothing herein shall be construed to imply any guaranty or obligation as to such issues on the part of the United States."

The bill exempts from this provision notes maturing not more than two years after their issue, when they do not aggregate more than 5 per cent of the outstanding obligations of the issuing roads.

The measure provides that the commission, in investigating proposed stock issues shall hear the authorities of the states through which the railroad desiring to issue securities passes.

The bill carries a prohibition, effective two years after the bill becomes law, against one director acting on more than one railroad under the jurisdiction of the commission, without the commission's approval. It also would make it unlawful for any director or officer of a railroad to profit by the sale or disposition of stocks or bonds.

Decision of the U. S. Supreme Court in the Shreveport Rate Case.

The United States Supreme court handed down its decision, June 8, in the Shreveport rate case, the last and in certain ways the most important of the great cases involving railway regulation which have been engaging its consideration for some years past. The decision is momentous in that it upholds the unrestricted supremacy of the federal authority in rate regulation; that rates fixed by a state for traffic wholly within the state must give way to orders of the Interstate Commerce Commission when the commission finds that the state regulations effect a discrimination in interstate commerce. The decision is a victory for the Interstate Commerce Commission as opposed to the Texas state commission, and is regarded with the greatest satisfaction by the railroads, in that it relieves them in the immediate instance of conforming to the extremely low rates ordered by the Texas commission, and in general opens a way of escape from the multiplicity of conflicting and oppressive regulatory measures imposed by the various states.

The Shreveport rate case, it will be recalled, was first brought before the federal powers by the Louisiana state commission, which in March, 1911, initiated a contest before the Interstate Commerce Commission in behalf of the jobbers along the Louisiana-Texas border. The Louisiana commission complained that the class rates charged by the railroads for transportation in a westerly direction from Shreveport to points in Texas were unjustly discriminatory in that they were much greater than the rates contemporaneously charged for the transportation of like traffic from Dallas and Houston, in Texas, to the same points. They complained, in substance, that a trade wall had been erected around Texas, and that outside jobbers were not permitted to enter into the enclosed field.

The Houston East & West Texas, the Houston & Shreveport and the Texas & Pacific railways did not deny the discrimination, but answered that the Shreveport rates were reasonable in themselves, and that the Texas rates were not voluntary, but were prescribed by the Texas railroad commission. The Interstate Commerce Commission issued an

order, holding that an unjust discrimination existed, and directed the railways either to lower the interstate rate from Shreveport to Texas points or to increase the Texas rates from Dallas and Houston to other Texas points so as to remove this discrimination. The railways vainly endeavored to induce the Commerce court to enjoin the enforcement of this order.

It is upon the order of the Interstate Commerce Commission, above referred to, which declared that discriminations arose from the observance of state rules even for intrastate rates that the present decision rests. That order is sustained, and while the particular point at issue was the reduction of interstate rates to the level of the intrastate rates fixed by the state of Texas, the inference is plain that the roads would be at liberty to obviate the discrimination not only by reducing their interstate rates, but also by raising their intrastate rates, regardless of state authority.

The following extract from the Supreme court's decision defines the issues:

"In their petition in the Commerce court the appellants assailed the order in its entirety, but subsequently they withdrew their opposition to the fixing of maximum-class rates, and these rates were put in force by the carriers in May, 1912. The attack was continued upon that portion of the order which prohibited the charge of higher rates for carrying articles from Shreveport into Texas than those charged for eastward traffic from Dallas and Houston, respectively. The holding of the Commerce court was that the order relieved the appellants from further obligation to observe the interstate rates, and that they were at liberty to comply with the commission's requirements by increasing these rates sufficiently to remove the forbidden discrimination. The invalidity of the order in this aspect is challenged upon two grounds:

"1. That congress is impotent to control the intrastate charges of an intrastate carrier even to the extent necessary to prevent injudicious discrimination against interstate traffic; and

"2. That it be assumed that congress has this power, still it has not been exercised, and hence the action of the commission exceeded the limits of the authority which has been conferred upon it."

Justice Hughes, who delivered the opinion, then discussed these two objections to the validity of the order. Respecting the first he said:

"It is unnecessary to repeat what has been said by this court with respect to the complete and paramount character of the power confided to congress to regulate commerce among the states. It is of the essence of this power that where it exists it dominates. * * * By virtue of the comprehensive terms of the grant, the authority of congress is at all times adequate to meet the varying exigencies that arise and to protect the national interest by securing the freedom of interstate commerce from local control.

"Congress is empowered to regulate—that is, to provide the law for the government of interstate commerce. * * * As it is competent for congress to legislate to these ends, unquestionably it may seek their attainment by requiring that the agencies of interstate commerce shall not be used in such a manner as to cripple, retard or destroy it. The fact that carriers are instruments of intrastate commerce, as well as interstate commerce, does not derogate from the complete and paramount authority of congress over the latter or preclude the federal power from being exerted to prevent the intrastate operations of such carriers from being made a means of injury to that which has been confided to federal care.

"Wherever the interstate and intrastate transactions of carriers are so related that the government of the one involves

the control of the other, it is congress, and not the state, that is entitled to prescribe the final and dominant rule, for otherwise congress would be denied the exercise of the constitutional authority, and the state, and not the nation, would be supreme within the national field."

Justice Hughes quoted the decisions of the court sustaining the employers' liability act and various other decisions upholding the national authority, including the federal hours of service law. Referring to the latter case, Justice Hughes said:

"Employees, dealing with the movement of trains, were employed in both sorts of commerce, but the court held that this fact did not preclude the exercise of federal power. As congress could limit the hours of labor of those engaged in interstate transportation, it necessarily follows that it could not be frustrated by prolonging the period of service through other requirements of the carriers or by the commingling of duties relating to interstate and intrastate operations.

"That an unjust discrimination in the rates of a common carrier, by which one person or locality is unduly favored as against another, under substantially similar conditions of traffic, constitutes an evil is undeniable; and where this evil consists in the action of an interstate carrier in unreasonably discriminating against interstate traffic over its line, the authority of congress to prevent is equally clear.

"This is not to say that congress possesses the authority to regulate the internal commerce of a state as such, but that it does possess the power to foster and protect interstate commerce and to take all measures necessary or appropriate to that end, although intrastate transactions of interstate carriers would thereby be controlled. We find no reason to doubt that congress is entitled to keep the highways of interstate communication open to interstate traffic upon fair conditions.

"It is immaterial, so far as the protecting power of congress is concerned, that the discrimination arises from intrastate rates, as compared with interstate rates. The use of the instrument of interstate commerce in a discriminatory manner so as to inflict injury upon that commerce, or some part thereof, furnishes abundant ground for federal intervention. Nor can the attempted exercise of state authority alter the matter where congress has acted, for a state may not authorize a carrier to do that which congress is entitled to forbid and has forbidden.

"It is also to be noted, as the government has well said in its argument in favor of the commission's order, that the power to deal with the relation between the two kinds of rates, as a relation, lies exclusively with congress. It is manifest that the state cannot fix the relation of the carrier's interstate and intrastate charges without directly interfering with the former unless it simply follows the standard set by federal authority.

"It is also clear that, in removing the injurious discriminations against interstate traffic arising from the relation of intrastate to interstate rates, congress is not bound to reduce the latter below what it may deem to be a proper standard fair to the carrier and to the public. Otherwise, it could prevent the injury to interstate commerce only by the sacrifice of its judgment as to interstate rates.

"Having this power, congress could provide for its execution through the aid of a subordinate body, and we conclude that the order of the commission now in question cannot be held invalid upon the ground that it exceeded the authority which congress could lawfully confer."

Justice Hughes then took up for discussion the second objection against the commission's order, and said:

"It is apparent from the legislative history of the (interstate commerce) act that the evil of discrimination was the principal thing aimed at, and there is no basis for the contention that congress intended to exempt any discriminatory

action or practice of interstate carriers affecting the interests of commerce which it had authority to reach. The opposing argument rests upon the proviso in the first section of the act, which in its original form was as follows:

"When the act was amended so as to confer upon the commission the authority to prescribe maximum interstate rates, this proviso was re-enacted, and when the act was extended to include telegraph, telephone and cable companies engaged in interstate commerce, an additional clause was inserted so as to exclude intrastate messages. Congress thus defined the scope of its regulation and provided that it was not to extend to purely intrastate traffic. It did not undertake to authorize the commission to prescribe intrastate rates and thus establish a unified control by the exercise of the rate-making power over both descriptions of traffic. Undoubtedly—in the absence of a finding by the commission of unjust discrimination—intrastate rates were left to be fixed by the carrier and subject to the authority of the states or of the agencies created by the states.

"This was the question recently decided by this court in the Minnesota rate cases. There, the state of Minnesota had established reasonable rates for intrastate transportation throughout the state, and it was contended that, by reason of the passage of the act to regulate commerce, the state could no longer exercise the statewide authority for this purpose which it had formerly enjoyed, and the court was

asked to hold that an entire scheme of intrastate rates, otherwise validly established, was null and void because of its effect upon interstate rates. There had been no finding by the Interstate Commerce Commission of any unjust discrimination.

"Here, the commission expressly found that unjust discrimination existed under substantially similar conditions of transportation, and the inquiry is whether the commission had power to correct it. We are of the opinion that the limitation of the proviso in section 1 does not apply to a case of this sort. The commission was dealing with the relation of rates injuriously affecting, through an unreasonable discrimination, traffic that was interstate. The question was thus not simply one of transportation that was 'wholly within one state.'"

The court said in conclusion:

"Reading the order in the light of the report of the commission, it does not appear that the commission attempted to require the carriers to reduce their interstate rates out of Shreveport below what was found to be a reasonable charge for that service. So far as those interstate rates conformed to what was found to be reasonable by the commission, the carriers are entitled to maintain them, and they are free to comply with the orders by so adjusting the other rates, to which the order relates, as to remove the forbidden discrimination. But this result they are required to accomplish."

Performance of Electric Switching Locomotives on the N. Y., N. H. & H. R. R.

Description of the service which electric switching locomotives of the New York, New Haven & Hartford R. R. have been performing in heavy freight yard movement for a year and a half. Data concerning the latest designs embodied in these machines. An interesting feature is an ammeter and a temperature indicator located within view of the motorman, by which he is informed what load each motor is taking and what heating effect is taking place therein.

The New York, New Haven & Hartford R. R. has been performing all freight switching service between Stamford, Conn., and the Harlem river, New York city, by electricity, for ap-

proximately 18 months past. The New Haven road carries 75 per cent of the freight which goes into and comes out of all New England by rail; and the greater part of this freight is handled by way of the Harlem River division and the Harlem River and the Westchester freight and transfer yards. The magnitude of the switching service thus involved is enormous; and it is stated now after the extended trial to date, that the economies obtained by the use of the electric switcher locomotives have exceeded all the expectations of those who are responsible for their application to this field. The reliability of the equipment has proven to be far superior to the steam loco-



View in Oak Point Yard of New York, New Haven & Hartford R. R., Showing Electric Switching Locomotives in Service.

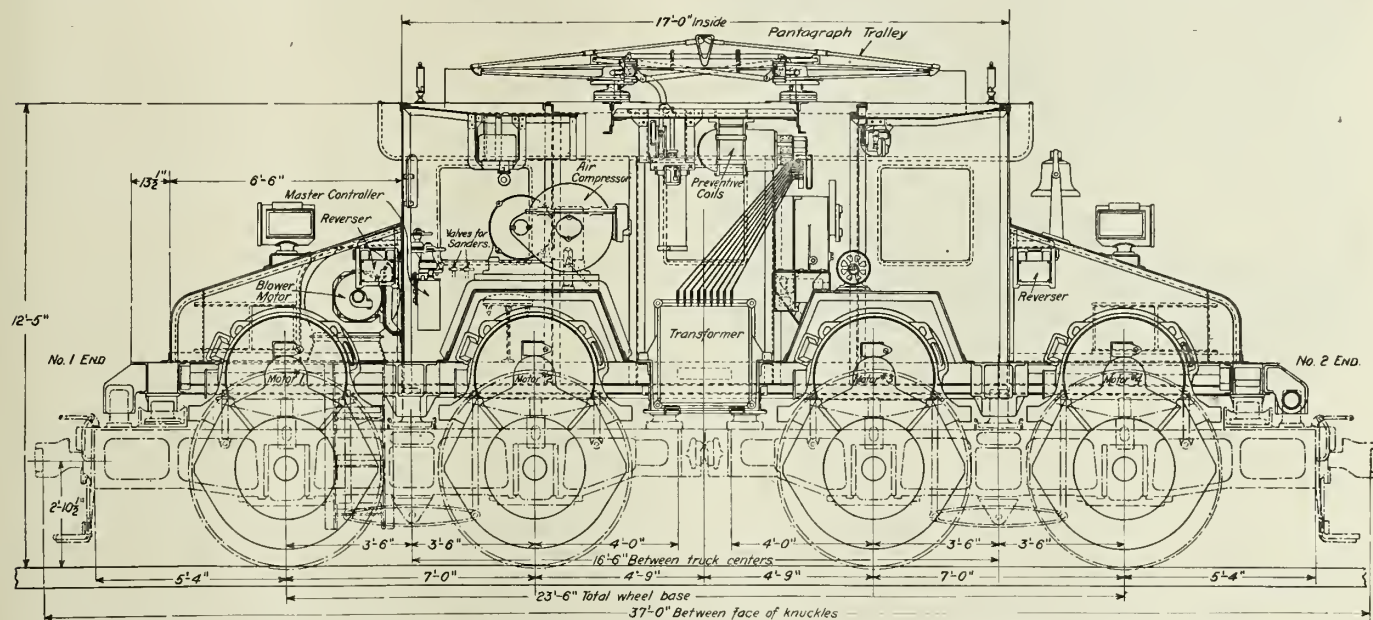
motive in switching service, and the operation of the electric locomotives, it is stated, is a source of satisfaction to the operating department and trainmen who have this work in charge.

The three main switching yards on the New Haven system are: the Harlem River yard, 23.3 miles in length; the Oak Point yard, 37.16 miles long, and the Westchester yard, with a length of 22.29 miles. Also the Van Nest yards which are used for storage only. In March, 1911, the first electric switching en-

a feature that appeals strongly to those who operate them.

All of the heavy freight tonnage mentioned above is handled within the corporate limits of New York City, and the elimination of smoke by the use of the electric locomotive is another advantage which has appealed to all parties.

There are sixteen switching locomotives included in this installation. Each locomotive is equipped with four Westinghouse No. 410, 125-h. p., 25-cycle, single-phase motors and unit switch control. These locomotives each weigh 80 tons and are



Sectional Elevation of New York, New Haven & Hartford Electric Switching Locomotive, Showing Location of Apparatus.

gine was placed in operation at Stamford, Conn. In August, 1912, the first electric switcher started to work in the Westchester yards; in September, 1912, the first in the Oak Point yards in float service; and in August, 1913, the first began its operation in the Harlem River yards proper.

The Oak Point yard is the place where all the cars arriving and departing on floats are loaded and unloaded. The service of the electric locomotives here includes pushing the cars onto or pulling them off, the floats. When either loading or unloading floats, there are always two flat cars coupled between the electric switcher locomotive and the cars; and the two flat cars act as an arm for reaching the train. In this way the locomotive always remains on land.

To date, it is stated, not a single feature has developed in which the electric locomotive is not superior to steam locomotive in switching service. The ease with which electric locomotives are controlled the elimination of stand-by losses and those that are necessary where coal and water are used, elimination of liability of freezing in cold weather, are all features which are to be credited to the electric locomotive.

Six single-phase electric locomotives do the work of approximately twice the number of steam locomotives formerly used. A total of eight of these electric locomotives are sufficient for practically all of the switching work between Stamford and Harlem River station. These are kept in service 24 hours a day, each making on the average approximately 140 miles in 24 hours, with three eight-hour crew shifts. The electric locomotives handling the work between Westchester Yard and Harlem River for a given month made 38,000 locomotive miles and consumed approximately 896,000 kilowatt-hours of electrical energy at the locomotive.

During this same period, the six locomotives handled approximately 65,000 cars which had a total weight of approximately one million tons. Practically all of these cars were transferred from floats, and since the control of the electric locomotive is more sensitive than the control of the steam locomotive, this is

able to exert a maximum tractive effort of 40,000 pounds with a clean dry rail. Several items given below such as hauling capacity, weights and mechanical data may be of interest.

Rated Hauling Capacity.*

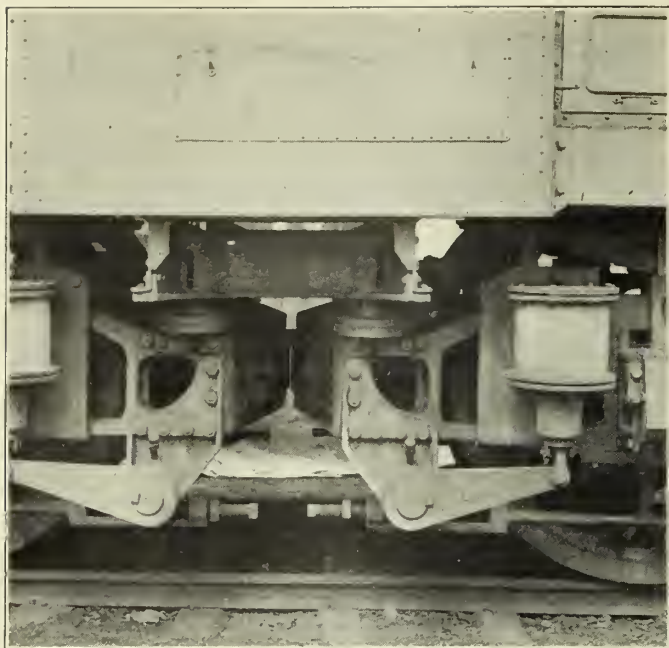
Track Profile.	Number of Cars	
	Each Weighing 45 Tons With Load.	Max. Speed. M. P. H.
Straight Level Track	67	8.5
½ per cent Grade	28	8.1
1 per cent Grade	17	8.1
2 per cent Grade	9	8.1

The figures given for "straight level track" show the load which may be handled in infrequent switching service. The switching locomotives are guaranteed to exert a maximum tractive effort of 36,000 pounds for about three minutes at speeds up to 6 miles per hour and a continuous tractive effort of 14,800 pounds at a speed of 11½ miles per hour. In practice it has been found that an electric switching locomotive can do the work of two steam locomotives because it can be operated both day and night. In fact, the first switching locomotive furnished has been in use for about 20 hours a day in the yards at Stamford. It is not expected that the maximum voltage on the motors will be reached in ordinary switching service, but it is available when climbing grades or on longer runs in the yard. The average operating potential is estimated to be 190 volts. The hour rating corresponding to this voltage and current of 900 amperes is approximately 125 h. p. per motor.

Arrangements have been made for a large bridge, known as the interconnecting railroad bridge, between Harlem River and Long Island city, which will physically connect the Pennsylvania and New Haven systems. Electricity as a motive power will be used entirely for handling all traffic over this bridge.

A detailed description of the original switching locomotive

*On the average road, the load that can be handled is determined by the maximum grade.



View Showing Articulation Between the Trucks, New York, New Haven & Hartford Electric Switching Locomotives.

of this installation was given in the Railway Review, July 6, 1912, but there have been some minor changes in the design since that date, as will be noted by a comparison of the accompanying illustrations with those published on the previous occasion. The sixteen switching locomotives as at present operating, are of the eight-wheeled 0-4-4-0 articulated truck type with central cab and sloping ends. The pulling and buffing strains are taken by the truck frames, which are joined at the center of the locomotive by a draw bar. The frames are placed outside the wheels, and are steel castings of the usual bar type, having straight pedestal and removable gibs. The semi-elliptic springs are placed directly over the journal boxes, and the springs of each truck are connected by equalizing beams. There is no cross equalization with this arrangement; that is, the equalizer system of one side of the locomotive is not connected with that of the other side.

As these locomotives operate on the New Haven tracks only,

no provision has been made for collecting current from a third rail. The locomotives have been designed to transverse 20-degree curves.

These locomotives are controlled by means of a master controller located in each side of the cab. A sixteenth locomotive has been built in which a single controller in the center of the cab is provided for operation in either direction. An ammeter is provided near each master controller to enable the engineer to know just what load each pair of motors is taking at any time, so that he can handle the locomotive to the best advantage. In the case of a switching locomotive it is especially desirable to know the temperature condition of the motors. For this reason, there has been installed a temperature indicator which is built on the principle of the Wheatstone bridge. The connection of this instrument is made through a coil in the motor fields. Its indications are obtained only when the motorman presses a button which is in the circuit of the control battery. This indicator has been in satisfactory operation since May, 1911.

A novel feature in the main circuit connections is that the motors are operated from a two coil transformer instead of an auto-transformer; thereby reducing the insulation strain on the windings to a minimum. A number of interesting features regarding these locomotives are given below:

Weights.

Per driver axle.....	39,780 lbs.
Mechanical parts	83,390 lbs.
Transformer	6,000 lbs.
Motor complete with gear and gear case and quill drive.....	13,585 lbs.
Control equipment and details.....	10,675 lbs.
Forced ventilating equipment.....	770 lbs.
Air-brake equipment	3,950 lbs.
Total weight	159,120 lbs.

Mechanical Data.

Type of trucks.....	4-wheel, articulated and swiveled
Truck wheel base, rigid.....	7 ft. 0 in.
Total wheel base.....	23 ft. 6 in.
Length between coupler knuckles.....	37 ft. 0 in.
Type of cab.....	Steeple.
Length of cab inside.....	17 ft. 0 in.
Length of hoods.....	6 ft. 6 in.
Width of hoods.....	5 ft. 0 in.
Width over all.....	10 ft. 3 in.



Eighty-Ton Baldwin-Westinghouse Electric Switch Locomotive in Service in Freight Yard of New York, New Haven & Hartford R. R.

Diameter driving wheel.....	63 in.
Total height over cab roof.....	12 ft. 6 in.
Gage	4 ft. 8½ in.

Business Lively at Panama.

An ocean steamship was passed successfully through the locks of the Panama canal for the first time, on June 8. It was the Panama Railroad steamship *Allianca*, a vessel of 4000 tons. The trip was made a test of the working of the electric towing locomotives in handling a large vessel. The operation passed off without any incident, the time required being about an hour and a half each way. A large crowd of spectators witnessed the vessel's passage. Governor Goethals was present. The project of lightering the cargo of the steamship *Alaskan* through the canal, begun with the departure of barges in tow of the *La Boca* from Balboa on May 18, has developed into a regular traffic operation. Twelve barges have been diverted to the service, and the tug *Mariner* was transferred to the division of operation on May 21, and is now continuously engaged in handling the barges back and forth. This unprecedented volume of freight offered for transit across the isthmus was occasioned by the closing of the Tehautepec Railway route across Mexico. The Panama railroad is almost unable to cope with the situation. Practically every car the railroad owns is in service, and still mountains of freight at the terminals show no diminution. Several large freighters are seen daily at anchor in the Pacific roadstead off Balboa waiting for a chance to get to the wharf to unload their cargoes that are destined finally to reach New York and other eastern United States ports. At the time the route across Mexico was interrupted there were several ships unloading in the harbor at Salina Cruz. Every effort was made to unload the ships and get away before the port was closed, but several of the vessels were unable to get their cargoes on the wharf in time. In consequence they sailed for Panama with parts of their cargoes.

A New Low-Grade Fuel Oil Engine.

The Chicago Pneumatic Tool Co. has recently developed a low-grade fuel oil engine known as the class A-O "Giant," one of which, a 12x12 in. engine of 25 h. p. capacity may be seen in operation at the exhibit of the mechanical convention, in space 618, at Atlantic City, this week. It operates a "Chicago Pneumatic" class "N" power driven compressor which furnishes the compressed air for the convention.

The class A-O "Giant" engine will operate successfully on any of the following grades of fuel: crude oil, fuel oil, residuum, stove oil, star oil, tops, tar oil, solar oil, gas oil, engine distillate, holder oil, coal oil, kerosene, alcohol, motor spirits, naphtha, benzol, gasoline. It has no valves, gears, carburetors, mixers, oil or air heaters, magnetos, batteries, timers, switches, coils, wires or spark plugs.

The employment of a single cylinder minimizes working parts and their consequent friction. It is the valveless, two-cycle low compression type. Water jackets are cast integral with the cylinders but cover only that portion in which the combustion takes place. This construction simplifies the cylinder casting and facilitates the equalization of temperatures at all points.

The crosshead construction is extremely important, providing features of advantage over the trunk piston type. The crosshead removes from the piston head the angular thrust of the connecting rod with its tendency to wear the top and bottom of the cylinders more than the sides, with a result that oils of a heavy or asphaltum base work back and under the piston rings, hardening there and causing excessive cylinder wear. With the cross head type all bearings are accessible and by compressing in the front end of the cylinder instead of in the crank case, satisfactory compression is

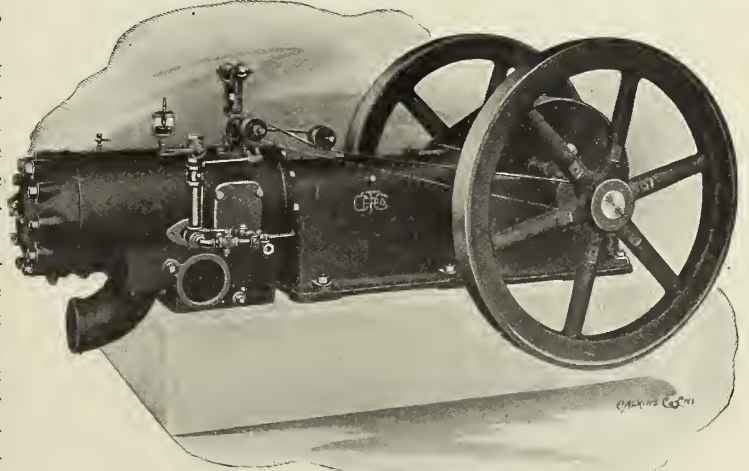
assured, there being no joints to offer opportunity for leakage and the compression space is greatly reduced. Lubricating oil from the crank case cannot possibly enter the combustion chamber and disturb regulation.

The relatively high compression employed is a chief factor in securing the efficiency of these engines, and four self-adjusting, eccentric spring piston rings are provided to effect that end. These are wider than the admission and exhaust ports and cannot catch or break. The deflector is a form that has been adopted after exhaustive experimental research and tests. It insures perfect scavenging of the cylinder at each stroke, a result also due to the relatively high compression obtained in the crank end of the cylinders.

The method of igniting the fuel charge is positive and extremely simple with no delicate parts involved and no sensitive adjustments necessary. A thin circular plate is rigidly secured to the piston, and after the engine is started fuel injected against this hot plate is instantly gasified and ignited. By this system air only is compressed in the cylinders, the fuel is injected at the proper time and high sustained operating economies are possible. A fuel pump of simple construction is used. The method of regulating the stroke of the pump plunger is extremely efficient and meets all conditions imposed by widely varying loads. A cam under the control of the governor rests against the collar on the plunger rod, the position of the cam determining and regulating the stroke of the pump and consequently the quantity of fuel injected. A hand-operated lever, also acting upon the plunger, is provided for stopping the engine. The fuel nozzle is a combination ball check valve and nozzle, is made of bronze and screwed into the center of the cylinder head. It can be quickly replaced and can be cleaned without removing from the cylinder.

The value of a proper quantity of water mixed with the fuel in the combustion space has long been recognized, but the attempts to utilize it and to efficiently regulate the quantity to suit varying fuels and loads have not invariably been satisfactory. The water regulator of the Giant A-O engine is nothing more than a needle valve which is at all times under the control of the governor and automatically varies the admission of water to meet load requirements. By this proportioning of water supply to the quantity of fuel injected it is possible to obtain an appreciable increase in power and economy to prevent overheating of cylinder head and burning of the lubricating oil, to eliminate shocks in the engine and to ensure freedom from carbon deposits.

All of the smaller engines may be readily started by hand but for the largest size and for the smaller when desired a small vertical single-acting air compressor is provided, which is driven from a pulley bolted to the flywheel. This compressor delivers air to a storage receiver, suitable for 150 pounds working pressure, and a lever-operated air starting



Class A-O "Giant" Engine, Chicago Pneumatic Tool Co., for Operation on Low-Grade Fuel Oil.

valve permits running the engine on air until firing of the fuel charge begins.

Class A-O engines are built in four standard strokes, 8, 10, 12 and 14 inches of 12, 18, 25 and 45 brake horse power respectively.

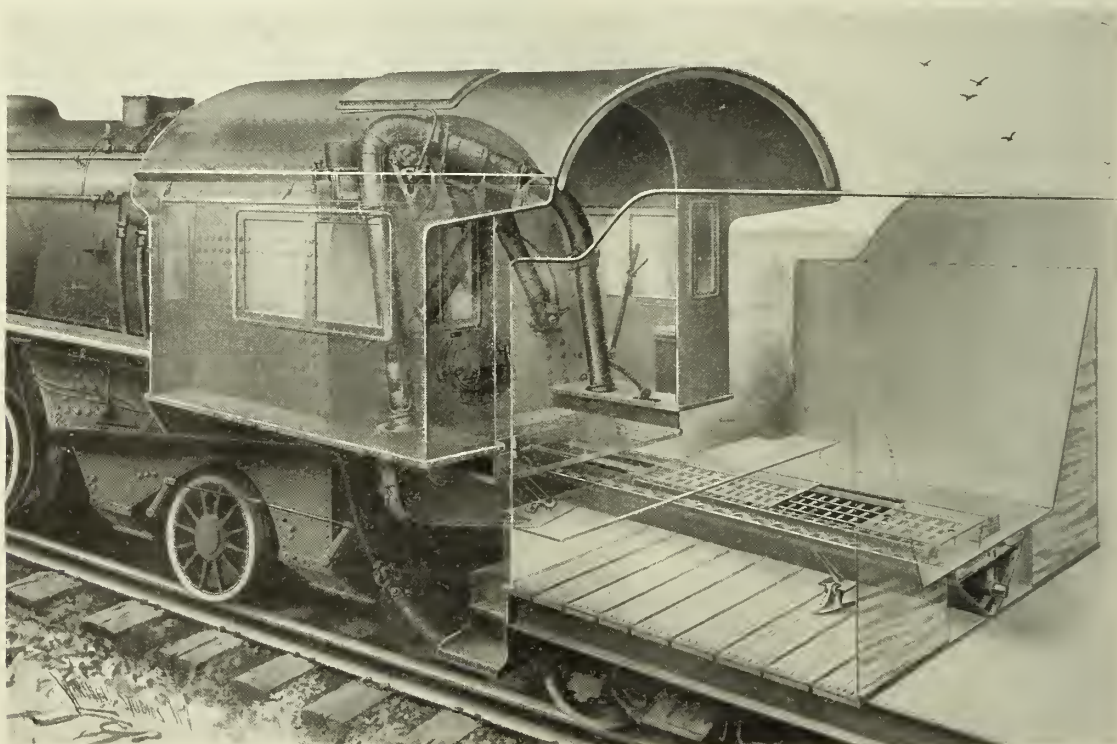
Street Type C Locomotive Stoker.

The latest form of the Street locomotive stoker is designated as type C. The accompanying illustration shows the apparatus as applied to a locomotive. This stoker retains the general features of the type B machine, which consists of a screen in the floor of the tank, through which the coal passes to a screw conveyor, which carries it from the tender to the locomotive. On the locomotive, it is deposited in a hopper from which, by means of an endless chain elevator, it is carried to a discharge pipe above the fire door. The discharge pipe embodies a screen which

purpose of giving the fireman an absolute control over the quantity of coal to be conveyed to the fire box. This engine has seven different speeds and is controlled by a small lever on the front of the crank case. By setting this lever in a given notch, a fixed feed of coal is obtained, and is maintained regardless of the load on the engine. This enables the fireman to duplicate results in his firing on different locomotives and at different times on the same locomotive.

The friction clutch enables the fireman to start and stop the feed of coal instantly at any time. The elevator engine is allowed to run continuously, and by throwing in the clutch lever, the elevator can be started and the feed of coal to the fire-box begins instantly, as under normal conditions, the elevator buckets are full of coal. Throwing the clutch lever out stops the feed of coal instantly.

These two improvements in the Street stoker have been in the course of development for the past two or three years, and



Phantom View of Locomotive Cab, Showing Street Type C Locomotive Stoker as Applied.

removes the dust and small particles, and deposits them through a center distribution, across the back end of the grate under the fire door. The larger particles pass over the screen, and are divided between two side distributors which distribute them over the remaining section of the grate.

The new machine, type C, differs from the type B in having a variable speed engine for driving the elevator, and a friction clutch for making connection between the engine and the elevator. The variable speed engine was introduced for the

all the machines now being built embody them. It is believed by the manufacturers that they give the fireman absolute and accurate control of the fire, and the results of service show that they enable him to make a considerable saving in the coal consumed.

Over one hundred of these new type machines are now on order, or being applied to locomotives by the Locomotive Stoker Co., of Schenectady, N. Y., which company controls the Street stoker.

The Railway Supply Man's Point of View

Once More.

Some of them have been coming, well since the beginning—at least we know some that have. Others are here on their first trip. Still others we saw for the first time last year. Once more—where? The June conventions. They are an institution for good. Yes, undoubtedly.

Each year, of course, brings changes, sometimes improvements, sometimes not. But when all is said and done June's for many years back have been the milestones of progress in things mechanical in the railway field. Saratoga, Old Point Comfort, Niagara Falls and other places come to mind, and then come to mind old familiar faces known only to memory now, but whose influence is still felt in the railway supply field.

A railway supply man always feels proud that he is what he is, but more than ever each year when the coming of summer is heralded by the advent of the June conventions.

For these June conventions are more than railway conventions—they are railway plus railway supply conventions and at them co-operation is always in evidence.

Is it a good convention, good attendance, how are things going, who got in on the ——— Ry.? All these and similar questions. Then for the pier and the exhibitions. And what a wonderful setting for exhibits, wonderful because natural. The big expanse of the ocean blue means more than any artificial decorations. Even we in the railway supply business are affected by surroundings, and especially so this year. Business is—rather say, isn't! Perhaps it is coming, but when?

We take comfort in the statement of a railroad man on the train that there are bad order cars by the thousands and how the crops are to be moved he doesn't know. Perhaps we won't move all the crops. We are economizing to such an extent these days that perhaps the economy will lessen the demand for crops.

Perhaps we had better not exhibit next year is the talk on the pier. Skip a year and be noticed when we come back two years hence.

Salt Air.

Salt air does give one an appetite; that is, when one lives inland the year around. Would that it would have that same effect on railroads, but perhaps they need less salt and less air of the variety that's heated. At any rate, forget general conditions for the moment and be thankful for the appetite for something and the credit at least to supply it.

Presidents of the American Railway Master Mechanics' Association for the past two years have recommended the plan of holding the two conventions in one calendar week, and it is understood that the president agrees with this suggestion. The idea is for one convention to meet Tuesday and Wednesday and the other Friday and Saturday, using Thursday for joint sessions. Most members and supply men would thus need to be away from home only one business week. As it is now, two weeks are practically used up by those attending both conventions.

Superintendents of motive power attending the convention have interesting stories to tell of the amount of equipment in bad order and out of commission. The activity in repair shops will be enormous when things really take a start. Car repairing can be hastened under pressure, although at greatly increased cost for labor and materials. Locomotive repairs require more time, and while there are a good many locomotives ready for service at once, they will not go far toward supplying the demand for power. As prices for materials and repair parts must necessarily go up with increasing demand, the railways which, knowing what is inevitably ahead of them, begin placing orders at once will have reason to congratulate themselves later.

There is an unwonted atmosphere of psychology at Atlantic City this week.

Owing doubtless to the general business depression, there are some vacant exhibit spaces on the pier at Atlantic City this year. Late comers found they could be accommodated, which is not usually the case. The exhibit is of the usual high order of merit, and there are many beautiful installations. The tendency is spreading to some extent not to exhibit machinery and appliances unless one has something really new to show. There are a number of spaces fitted up only as reception rooms. On the other hand, there are

many new exhibits in Machinery Hall and elsewhere and the railway man who really wants to know what is going on has great opportunity for investigation.

On the Pier.

There is a "River of Doubt" on the mechanical map, which the M. C. B. Association still hesitates to explore. It still continues to spell "draft" with an i instead of an a. It needs to be geared up to a higher speed.

"Sickological," said a board walk philosopher, "is all right; business is sick and it's the logical result of too much washing at Washington."

"What are the wild waves saying"? at Atlantic City. They are sobbing for orders, orders, orders! The railway men want orders from their superiors to get equipment into shape; and the supply men are waiting watchfully for the dams to break.

Probably no department of the railway has been neglected of late more than shops and shop equipment. This is telling severely on costs of maintenance and the effects will be very evident when the orders come to get everything ready "yes-terday." More than one superintendent of motive power is wondering how he is to "make bricks without straw."

Inspectors to right of them, inspectors to left of them, inspectors in front and inspectors behind. Even the sea-side offers no retreat from I. C. C. inspectors. And some think they should be called suspects instead.

There is an occasional spot of light in the general business gloom. The Parkesburg Iron Co. are running at 110 per cent of capacity and have been doing so right along, with orders ahead for some time.

Generally speaking, business is about as thin as some of the dresses on the board walk, looking toward the sun.

The exhibit of the American Steel Foundries includes some interesting photographs of some large castings, and illuminated transparencies of the Davis steel wheel. One showing the casting of the wheel is both artistic and realistic to an extraordinary degree.

The record of Bettendorf cast steel truck frames on some 24,000 cars of the Chicago, Milwaukee & St. Paul, shows failures in wrecks and from all causes of one one-hundredth of one per cent. This is official from the road. Failures of underframing from all causes were one-tenth of one per cent—largely due to an early form of draft arm.

Iron and Steel Industry.

The exceptional activity in car ordering for the past ten days typifies possibilities in other branches of the steel industry under influences likely to develop at any time. The spurt in pig and a rush of steel plate orders raise hopes of a change pointing to normal demand. The momentum of business is lost. Anticipation is restricted to actual business secured. Despite a 50 to 60 per cent of capacity output, the undertone is strong and all conditions indicate possible surprises.

Passengers on the Convention Special.

The following persons were among those making up the party arriving at Atlantic City for the M. C. B. and the

M. M. conventions Tuesday afternoon on the Pennsylvania R. R. convention special from Chicago:

Hugh S. Adam, Edward G. Budd Mfg. Co., Chicago; T. W. Aishton, National Malleable Castings Co., Chicago; George F. Allen, Railway Materials Co., Chicago; William Anderson, Pantasote Co., Chicago.

Claude M. Baker, Murphy Varnish Co., Chicago; A. E. Barron, Templeton-Kenley Co., Chicago; W. T. Bauer, Edison Storage Battery Co., Chicago; R. W. Bell, G. S. M. P., Illinois Central R. R., and Mrs. Bell, Chicago; W. A. Bennett, Griffin Wheel Co., Chicago; P. A. Bevan, American Vanadium Co., Chicago; B. F. Bilsland, General Electric Co., Chicago; F. J. Blum, Armstrong-Blum Mfg. Co., Chicago; George M. Boyce, A. M. Castle & Co., Chicago; R. F. Brydon, Wadsworth-Howland Paint Co., Chicago; R. J. Buckman, Jr., Chicago Varnish Co., Chicago; T. H. Burns, William Sellers & Co., Chicago; J. J. Byers, National Malleable Castings Co., Chicago.

W. F. Caspers, Monarch Steel Castings Co., Detroit, Mich.; W. A. Clark, general car foreman, D. M. & N. Ry., Proctor, Minn.; C. W. Floyd Coffin, Franklin Railway Supply Co., Chicago; R. P. Cooley, Chicago Car Heating Co., Chicago; M. F. Covert, Swift Refrigerator Car Co., Chicago; E. H. Crown, superintendent, Pacific Fruit Express Co.; Roseville, Cal.; Bruce V. Crandall, editor Car Insurance Magazine, Chicago; C. W. Cyr, S.M.P., C.B. & Q.R.R., Chicago; H. B. Cole, Supt. transportation, Indian Refining Co., Lawrenceville, Ill.

J. J. Dale, Alfo Tool Co., and Mrs. Dale, Chicago; E. Dawson, M. M., Arizona & New Mexico Ry., Clifton, Ariz.; J. F. DeVoy, assistant superintendent motive power, C. M. & St. P. Ry., Milwaukee, Wis.; L. S. Domgold, Illinois Central R. R., Chicago.

F. W. Edwards, Ohio Injector Co., Chicago; F. M. Egolf, Curtain Supply Co., Chicago; P. M. Elliott, Camel Co., Chicago.

H. H. Finney, Independent Pneumatic Tool Co., Chicago; B. H. Forsythe, Hale & Kilburn Co., Chicago; C. B. Friday, Carnegie Steel Co., Chicago; C. E. Fuller, assistant general manager, Union Pacific R. R.; Omaha, Neb.; Miss Mary E. Fuller, Omaha, Neb.; Harry C. Fuller, Omaha, Neb.; F. W. Furry, Ohio Injector Co., Chicago; William S. Furry, Ohio Injector Co., Chicago.

W. H. Gardner, Jr., Consolidated Car Heating Co., Chicago; H. H. Gilbert, Pressed Steel Car Co., Chicago; Egbert H. Gold, Chicago Car Heating Co., Chicago; T. H. Goodnow, superintendent car department, C. & N. W. Ry., Chicago; G. P. Gowing, Pratt & Lambert Co., Chicago; F. N. Gundrum, Chicago Varnish Co., Chicago.

W. B. Hall, Railway Equipment Co., and Mrs. Hall, Chicago; G. L. Harvey, Frost Railway Supply Co., Chicago; H. H. Harvey, general car foreman, C. B. & Q. R. R., Chicago; O. C. Hayward, Touzey Varnish Co., Chicago; E. T. Hendee, Joseph T. Ryerson & Son, Chicago; J. J. Hennessey, M. C. B., C. M. & St. P. Ry., Milwaukee, Wis.; H. H. Henricks, Independent Pneumatic Tool Co., Chicago; Howard Hibbard, Grip Nut Co., Chicago; Howard H. Hibbard, Grip Nut Co., Chicago; E. R. Hibbard, Grip Nut Co., Chicago; John L. Hodgson, M. C. B., Grand Trunk Pacific Ry., Transcona, Man.; William Hagarth, M. C. B., Canadian Pacific Ry., East Chicago, Ind.; J. R. Howe, Remy Electric Co., Anderson, Ind.; Ira C. Hubbell, K. C. M. & O. Ry., and Mrs. Hubbell, Kansas City, Mo.; J. W. Hathaway, Union Draft Gear Co., Chicago.

P. C. Jacobs, H. W. Johns-Manville Co., Chicago; E. E. Jetter, M. C. B., Morris & Co., Chicago; George Johnson and Mrs. Johnson, W. H. Miner, Chicago; F. B. Jordan, Vulcan Process Co., Chicago.

A. La Mar, M. M., Pennsylvania Lines, Chicago; John M. Lammadec, Railway Review, Chicago; J. P. Landreth, Garlock Packing Co., Chicago; George F. Laughlin, Armour Car Lines, and Mrs. Laughlin, Chicago; T. G. Laverty, general car

foreman, Florence & Cripple Creek Ry., Colorado Springs, Colo.; G. H. Lickert, Brown & Co., Inc., Chicago.

Thos. Madill, Sherwin-Williams Paint Co., Chicago; W. E. Magraw, Railway List Co., and Mrs. Magraw, Chicago; A. D. McAdam, Ralston Steel Car Co., Chicago; C. J. Miles, Doud Stock Car Co., Chicago; G. H. Milton, superintendent car department, C., R. I. & P. Ry., and Mrs. Milton, Chicago; A. C. Moore, Safety Car Heating & Lighting Co., Chicago; Morgan M. Moore, U. S. Metal & Mfg. Co., Chicago.

C. J. Nash, railway supplies, and Mrs. Nash, Chicago; John J. Nicholson, Murphy Varnish Co., Chicago.

Thomas O'Leary, Jr., New York Air Brake Co., Chicago; Edward O'Malley, O'Malley-Bear Valve Co., Chicago; Thomas O'Malley, O'Malley-Bear Valve Co., Chicago.

H. M. Peroy, side bearings, Chicago; George H. Porter, Western Electric Co., Chicago; E. W. Pratt, C. & N. W. Ry., and Mrs. Pratt, Chicago; B. Pratt, New York Air Brake Co., Chicago; George E. Pratt, Railway Utilities Co., Chicago.

Robert Quayle, general superintendent motive power and car departments, C. & N. W. Ry., Chicago.

F. J. Reichmann, president Street's Western Stock Car Line, Chicago; George W. Ristine, Pressed Steel Car Co., Chicago; J. H. Rodger, Safety Car Heating & Lighting Co., Chicago; E. J. Robertson, superintendent car department, Soo Line, Minneapolis, Minn.; H. R. Rochester, Hale & Kilburn Co., Chicago; J. W. Robb, Cudahy Packing Co., and Mrs. Robb, Chicago; E. U. Roland, electrical supplies, Anderson, Ind.; W. H. Rosing, special agent, St. L. & S. F. R. R., Springfield, Mo.; W. H. Rosevear, Canadian manager Independent Pneumatic Tool Co., Montreal, Quebec; E. B. Ross, Buchanan Electric Steel Co., Buchanan, Mich.

R. W. Schulze, superintendent car department, Frisco Lines, Springfield, Mo.; W. J. Schlacks, McCord & Co., Chicago; F. C. Schultz, chief interchange car inspector, Grand Central Station, Chicago; C. A. Seley, American Flexible Bolt Co., and Mrs. Seley, Pittsburgh, Pa.; W. E. Sharp, Grip Nut Co., and Mrs. Sharp, Chicago; C. S. Shearman, general foreman, Chicago Junction Ry., Chicago; W. T. Simpson, S. F. Bowser & Co., Inc., Chicago; P. Simpson, superintendent equipment, Indian Refining Co., Lawrenceville, Ill.; W. A. Smith, Railway Review, Chicago; G. H. Snyder, chief clerk mechanical department, Soo Line, Minneapolis, Minn.; Geo. Spengler, Locomotive Superheater Co., Chicago; C. N. Swanson, superintendent car shops, A., T. & S. F. Ry., Topeka, Kan.; John A. Swanson, A., T. & S. F. Ry., Topeka, Kan.

George Thomson, M. C. B., L., S. & M. S. Ry., Englewood, Ill.; C. J. Thulien, Duff Mfg. Co., Chicago; W. J. Tollerton, C., R. I. & P. Ry., and Mrs. Tollerton, Chicago; F. W. Trappnell, chief interchange inspector, Kansas City, Mo.

W. T. Van Dorn and Mrs. Van Dorn, Chicago; E. B. Van Patten, Murphy Varnish Co., Chicago; H. H. Varney, National Boiler Washing Co., Chicago; Harry Vissering, railway specialties, Chicago.

W. M. Wilson, Flannery Bolt Co., Pittsburgh, Pa.; G. C. Wilson, Chicago; H. H. Warner, Maher Mfg. Co., Minneapolis, Minn.; A. B. Wegener, Camel Co., Chicago; H. Weitzel, Arizona Eastern Ry., Phoenix, Ariz.; Edward P. Welles, president Charles H. Besley & Co., Chicago; E. B. White, National Boiler Washing Co., Chicago; Charles J. Wymer, general car foreman, Belt Railway of Chicago, Chicago.

Supply Trade Notes.

—The Bettendorf Company has purchased a site at Bethlehem, Pa., for a steel underframe plant.

—J. A. Bodkin has resigned his position as engineer for the Q. & C. Company to become associated with his brother in the Track Specialties Co., 29 Broadway, New York City.

—A number of the employees of the Westinghouse Electric

& Manufacturing Co., and the Westinghouse Machine Co., went on a strike last week, because the management refused to recognize the demands made by the newly formed labor union, the Allegheny Congenial Industrial Union, and as a result the works of these companies at East Pittsburgh are partly shut down. The management of the companies does not believe that the trouble will be of long duration.

—Fred A. Poor, Chicago, representative of the Rail Joint Company, resigned on June 1 to become president of the P. & M. Company, whose general offices are in the Railway Exchange building, Chicago.

—L. R. Pomeroy, a railway and electrical engineer of prominence, has been appointed manager of the New York sales office, 16-24 West Sixty-first street, U. S. Lighting & Heating Co., the general offices of which are now at Niagara Falls, N. Y. Mr. Pomeroy has long been engaged in work in the railway and electrical fields, and enjoys the reputation of being an authority along several lines in each industry. He was born at Port Byron, N. Y., in 1867, and attended high school at Milwaukee, Wis., and the Irving institute at Tarrytown, N. Y. From 1874 to 1880 he was engaged in commercial business, bookkeeping, special auditing, drafting and designing of cars and locomotives. From 1880 to 1886 he was secretary and treasurer of the Suburban Rapid Transit Co., of New York. For four years following this he was a special representative of the Carnegie Steel Co., introducing basic boiler steel for locomotives and



L. R. Pomeroy, Manager of the New York Sales Office of the U. S. Light & Heating Co.

special forging for railways. For nine years he was engaged in the same work with the Cambria Steel Co., and the Latrobe Steel Co., jointly; this assignment involved metallurgical engineering and experimental research to adapt special steels for railway axles, crank pins and piston rods. From 1899 to 1902 he was assistant general manager of the Schenectady Locomotive works. For six years following this he was a special representative in the railway field for the General Electric Co., this work covering the electrification of steam roads, railway shops, and the general application of electricity for railway purposes. Following this he was for two years assistant to the president of the Safety Car Heating & Lighting Co., during which period he devoted a portion of his time to consulting work in the special field of railway shops and machine tool operation.

From the Safety company he went with J. G. White & Co., New York, as chief engineer of the railway and industrial division. Before becoming associated with The U. S. Light & Heating Co. he had an office at 50 Church street, New York, and served a large clientele as consulting engineer.

—The "Christy" roof, manufactured by the American Car Roof Co., of Chicago, will be used on a few of the new box cars just ordered by the Illinois Central, they giving it a test in service compared with other roofs.

—The Hatfield Rail Joint Manufacturing Co., Macon, Ga., has entered into arrangements with T. B. Bowman, formerly assistant to president of The Q. & C. Company, New York, and now of the Efficiency Company, to assume general charge of the sales of the Hatfield rail joint with offices at No. 2 Rector street, New York, and 700 Railway Exchange, Chicago.

RAILWAY NEWS.

Atchison, Topeka & Santa Fe.—See Railway News under Oklahoma Central Ry.

Atlanta, Birmingham & Atlantic.—The Atlanta, Birmingham & Atlantic R. R. has been formally sold at auction to attorneys representing the bondholders. The terminal properties of the road in Atlanta, Ga., were bought for \$123,500, Birmingham terminals for \$715,500, and the road itself was bought for \$3,641,000. In each case the purchasers assumed all liabilities. The reorganized road will be known as the Georgia, Alabama & Western R. R. See Railway Review of April 4.

Boston & Maine.—The directors of the New York, New Haven & Hartford R. R. have acquiesced to the plan proposed by Gov. Walsh, of Massachusetts, for the separation of the Boston & Maine R. R. from the New Haven system, Chairman Howard Elliott, of the New Haven company, has told of the legislative committee on railroads. Mr. Elliott recommended the enactment of legislation necessary to permit the sale to a board of trustees of the Boston & Maine stock now held for the New Haven company by the Boston Railroad Holding company. He said, although the New Haven directors did not consider the proposed action entirely just or necessary, they had consented to the agreement proposed by the department of justice, and to Gov. Walsh's plan of disposing of the Boston & Maine stock in order to avoid an extended controversy with the department, and also in the interests of the stockholders, and 90,000 employees, as well as of the general welfare of New England.

Two bills, designed to bring about a separation of the Boston & Maine and the New Haven system, were outlined at a hearing before the Massachusetts legislative Committee on Railroads on June 9. One carries a referendum clause and gives the state the option of purchasing the Boston & Maine stock now held for the New Haven by the Boston Railroad Holding company, at a price approved by the governor and the executive council. The other bill, which has no referendum provision, authorizes the transfer to the state of the Boston & Maine stock under such regulations as the public service commission may deem proper to protect the interests of both commonwealth and stockholders.

Canadian Northern.—The Canadian government's bill to guarantee interest on \$45,000,000 bonds of the Canadian Northern Ry. has been passed in the final stage by the Canadian parliament. This measure was fought by the liberal opposition in the commons and criticised by the liberal senators in the upper house. The act is designed to enable the Canadian Northern to be completed as a transcontinental railway.

Chicago & North Western.—The Chicago & North Western Ry., it is said, has awarded the contract to the Walsh Construction Co., Davenport, Iowa, for the reduction of grades between Radnor, Ill., and Nelson, Ill.

Erie Railroad.—Announcement has been made that the Erie Railroad will begin the work of double tracking its branch line from Pymatuning, Pa., to New Castle, Pa., between Feron to West Middlesex, a distance of about six miles, within the next two weeks. If this is finished in time the remainder of the line between West Middlesex and New Castle will be double tracked this year.

Florida Central.—A court decree orders the sale of the Florida Central R. R. on October 6, 1914. The Florida Central was constructed as a lumber railroad, and runs from Thomasville, Fla., via Miecouskee, Wadesboro and Capitola,

in Leon county, to Fanley, in the southern portion of Jefferson county, 47 miles. The road has been in the hands of a receiver since June 1, 1912. It was the original intention of the promoters to extend the line to the Gulf at St. Marks or Panacea, and reports say this will be done soon after the sale.

Greenville & Knoxville.—The Greenville & Knoxville R. R. 23 miles long, from Greenville to River Falls, S. C., has been sold at receivership sale to W. T. Thompson of Atlanta, Ga., and associates.

Kansas Southwestern.—A report says that the Kansas Southwestern Ry. plans to rebuild its entire line from Arkansas City, Kan., to Anthony, Kan., a distance of 60 miles.

London & Port Stanley.—The Ontario provincial government is reported to have passed the London & Port Stanley railway bill, whereby the city of London, Ont., is authorized to expend \$700,000 upon electrification of the London & Port Stanley R. R. Adam Beck, chairman of the commission has been quoted as saying that the work would begin immediately and the electrified line will be in operation early next year.

New York, New Haven & Hartford.—See Railway News under Boston & Maine R. R.

Northern Pacific.—Stockholders of the Northern Pacific Ry. have approved the recommendation of the directors that a blanket mortgage be placed on the property. It is reported that the mortgage may total from \$500,000,000 to \$600,000,000, and that a \$20,000,000 stock issue will shortly be announced in connection with contemplated improvements.

Oklahoma Central.—The committee of which F. J. Lisman is chairman announces to the holders of first mortgage 5 per cent bonds of the Oklahoma Central Ry., and to the holders of certificates of deposit for bonds already lodged with the Columbia Trust Company that a plan of agreement and reorganization under date of May 6, has been adopted and filed with the depository. The announcement contains a confirmation of the recent reports that the property will probably be leased by the Atchison, Topeka & Santa Fe Ry. for five years with an option to buy.

Union Pacific.—Reports state that double-tracking the Union Pacific, between Omaha, Neb., and Ogden, Utah, 250 miles, has been deferred until 1917, and plans for electrifying the Idaho division of the Oregon Short Line R. R., between Pocatello, Idaho, and Huntington, Ore., have been temporarily abandoned. In respect to the latter undertaking the report says that the executive committee decided, after receiving the report of engineers who figured the expense, that the business of the road would have to be four times what it is now to warrant the change from steam to electricity.

PERSONALS.

E. H. Beckley, with the title of trainmaster, has assumed the duties heretofore performed by F. C. Tucker, deceased, late superintendent of transportation of the Macon, Dublin & Savannah R. R. Mr. Beckley's headquarters are at Macon, Ga. A. L. Williams has been appointed car accountant of this company, with office at Macon, effective June 1.

L. B. Maytag has been elected vice-president of the South Dakota Central Ry., with office at Sioux Falls, S. D.

Mott Sawyer, superintendent of the Columbia division of the Chicago, Milwaukee & St. Paul Ry., at Malden, Wash., has been appointed superintendent of the Idaho division, with headquarters at Spokane, Wash. A. E. Campbell, trainmaster at Tacoma, Wash., succeeds Mr. Sawyer at Malden. W. C. Ennis, trainmaster at Moberg, S. D., is transferred to St. Maries, Idaho, in a similar capacity. W. J. Jordan is appointed trainmaster at Tacoma vice Mr. Campbell.

F. G. Bullock has been appointed trainmaster of the Florida East Coast Ry., with headquarters at New Smyrna, Fla.

T. Garland Tinsley has been appointed treasurer of the Georgia & Florida Ry. with office at Augusta, Ga.

C. G. Johnson, agent of the Missouri Pacific Ry. at Jefferson City, Mo., has been appointed supervisor of efficiency of the Minneapolis, St. Paul & Sault Ste. Marie Ry., with office at Minneapolis, Minn.

James M. Barrett has been appointed superintendent, district No. 2, of the Canadian Pacific Ry., Eastern division, with office at Windsor Station, Montreal, Que., succeeding J. K. McNeillie, who has been appointed superintendent, district No. 3, with office at Montreal, succeeding R. W. McCormick, appointed superintendent of district No. 1, with

office at Farnham, Que., succeeding W. B. Wray, transferred.

J. T. Loree, trainmaster of the Delaware & Hudson Co. at Oneonta, N. Y., has been appointed superintendent of the Susquehanna division, with office at Oneonta, succeeding J. H. Rosenstock, resigned.

H. O. Halsted, whose appointment as superintendent transportation of the Pere Marquette R. R. has been announced in these columns was born at Milwaukee, Wis., February 5, 1863. He attended public schools in Kansas and in 1884 entered the service of the Union Pacific R. R. He remained with that road until 1893, serving as clerk, operator, trainmaster and assistant superintendent. For two years he was with the Flint & Pere Marquette R. R. as operator and dispatcher. From July, 1895, to June, 1896, Mr. Halsted was superintendent of the Duluth Mississippi River railroad, now a part of the Great Northern Ry. He began his service with the Pere Marquette in 1896, holding the following positions: agent at Toledo for five years; chief despatcher and trainmaster, Grand Rapids, Mich., one year; November, 1903, to June, 1904, superintendent of the Detroit division at Plymouth; for five years superintendent of Chicago terminals; November, 1910, to November, 1912, superintendent transportation; November, 1912, to June, 1913, on special work in general manager's office; September, 1913, to April 1, 1914, superintendent of the Petoskey division. Mr. Halsted has been assistant to general manager since April 1.

W. G. Phelps whose appointment as purchasing agent of the Pennsylvania Lines West of Pittsburgh was announced in a previous issue, has been in the service of the system since November, 1888. On that date he resigned the position of chief clerk to the general western passenger agent of the Cleveland, Cincinnati, Chicago & St. Louis Ry. to accept a position in the general freight office of Vandalia Railroad at St. Louis, Mo., and he has been subsequently; 1888 to November 13, 1896, rate and division clerk, Vandalia Railroad; November, 1896, to June, 1901, chief clerk to general manager of the Vandalia; June 9, 1901, to 1902, chief clerk to fourth vice-president of the Pennsylvania Lines, at Pittsburgh, Pa., and until January 1, 1913, he was chief clerk to third vice-president and then to second vice-president. Mr. Phelps was appointed assistant purchasing agent of the Pennsylvania Lines, January 1, 1913. His appointment as purchasing agent was effective June 1, 1914.

TRAFFIC.

B. S. Merritt has been appointed general agent of the Great Northern Ry., at Great Falls, Mont., in place of H. R. Mitchell, who has been transferred to Kansas City, Mo., as commercial agent.

T. J. Keen, traveling freight agent of the Texas & Pacific Ry. at Shreveport, La., has been appointed commercial agent of the International & Great Northern Ry. with headquarters at Texarkana, Tex.

B. S. Fay has been appointed commercial agent of the Winston-Salem Southbound Ry. at Jacksonville, Fla., succeeding Willis Callaway.

H. B. Sperry, assistant general freight agent of the Missouri Kansas & Texas lines at Dallas, Tex., effective July 1, will be transferred to Kansas City, Mo., to succeed J. C. Finch, resigned to engage in other business. F. G. Abbey, chief clerk of the general freight office at Dallas, will succeed Mr. Sperry there. C. L. Lyons, commercial agent at St. Louis, Mo., has been appointed assistant general freight agent, with headquarters at St. Louis. L. W. Mosher, commercial agent at Oklahoma City, will succeed Mr. Lyons and O. C. Thomas, now commercial agent of the Wichita Falls & Northwestern Ry., Wichita Falls, Tex., will take the place of Mr. Mosher at Oklahoma City.

A. S. Collins has been appointed general dairy agent of the Rock Island Lines, with headquarters at Cedar Rapids, Iowa, in place of Irving Mitchell, deceased. P. L. McGue has been appointed commercial agent at Buffalo, N. Y., succeeding Mr. Collins.

F. K. Crosby, chief clerk to the freight traffic manager of the Chicago, Rock Island & Pacific Ry., has been appointed chief of tariff bureau, with headquarters at Chicago, succeeding J. C. LaCoste, who has been appointed assistant general freight agent at Kansas City, Mo., in place of Fred Smith, resigned; effective June 1.

T. J. Wall, general agent of the Canadian Pacific Ry. at Spokane, Wash., has been appointed general agent at Minneapolis, Minn., in place of H. M. Tait, who has been transferred to Calgary, Alta.

ENGINEERING.

W. H. Finley, assistant chief engineer of the Chicago &

North Western Ry., has been appointed chief engineer, with office at Chicago, succeeding E. C. Carter, resigned.

H. B. Shoemaker, effective June 10, has been appointed engineer maintenance of way of the Chicago, Indiana & Southern R. R., with headquarters at Gibson, Ind., succeeding M. C. Cleveland, resigned to accept service with another company.

H. E. Waters, supervisor of the Philadelphia, Baltimore & Washington R. R., at Bowie, Md., has been appointed supervisor of division No. 6 of the Pennsylvania Railroad, with office at Mifflin, Pa., succeeding J. A. Burchenal, transferred.

Walter Walker has been appointed foreman of the bridge and building department of the South Dakota Central Ry., at Sioux Falls, S. D., in place of R. T. Walker, deceased.

J. S. Browne, whose appointment as assistant engineer maintenance of way of the New York, New Haven & Hartford R. R., was noted in the Railway Review of June 6, was born at Willet, Pa., in 1861. From June to December, 1880, he was chainman on the Yellowstone division of the Northern Pacific Ry.; March, 1881, to April, 1884, inspector of dredging filling and force accounts, New York, West Shore & Buffalo R. R., Weehawken, N. J.; June, 1884, to October, 1886, rodman, leveler and transitman on location and construction of the Brooklyn Elevated & New Jersey Junction railroads; April, 1887, to June, 1888, assistant engineer for contractor on construction of masonry, Harlem river (Washington Bridge), New York; August, 1889, to October, 1893, transitman and assistant engineer, New York, Providence & Boston and New York, New Haven & Hartford railroads, engaged on surveys and plans for four-track widening through the cities of Providence and Pawtucket, R. I., the design and construction of bridge masonry and on surveys, plans and estimates for abolishing grade crossings, etc.; October, 1893, to June, 1903, assistant engineer of the latter road, engaged on the preparation of plans and estimates for improving the alignment and grade of tracks, the design and construction of freight and passenger yards, abolishing grade crossings, and renewals of bridges, buildings and miscellaneous structures; June, 1903, to June, 1914, division engineer, same railroad, in charge of maintenance of way and structures; also some extensive new construction work on the Providence division, including about 330 miles of road. Mr. Browne is a member of the American Railway Society of Civil Engineers, and also of the American Railway Bridge and Building association.

MECHANICAL.

C. O. Destiche has been appointed superintendent of motive power of the South Dakota Central Ry., with office at Sioux Falls, S. D., succeeding H. J. Osborne, resigned.

W. H. Davis has been appointed master mechanic of the Marshall & East Texas Ry., with office at Marshall, Tex., succeeding C. E. Langton, resigned.

W. T. Kuhn, master mechanic of the Toronto, Hamilton & Buffalo Ry., at Hamilton, Ont., has been promoted to superintendent of motive power, with office at Hamilton.

Harvey Shoemaker, whose appointment as mechanical superintendent of the Bangor & Aroostook R. R., has been announced in these columns, began his railway career as an apprentice in the old Lehigh Valley shops at Wilkes-Barre, Pa., in March, 1886. He received his first promotions from machinist to gang foreman and from gang foreman to general foreran in this same shop. In 1901, he was made general foreman of the Delaware, Lackawanna & Western R. R., at Scranton, Pa., and he continued in that position until August, 1903, when he was appointed master mechanic of the Scranton division of the Lackawanna. In May, 1911, Mr. Shoemaker resigned to take charge of shop construction at Middletown, N. Y., for the New York, Ontario & Western Ry. Upon completion of the shops he was appointed shop superintendent and he continued in this capacity until June, 1914, when as has been announced, he accepted appointment as mechanical superintendent of the Bangor & Aroostook, with office at Derby, Me.

OBITUARY.

Edwin T. Plowman, of Kansas City, Mo., for twenty years superintendent of the dining car and eating-house system of the Atchison, Topeka & Santa Fe Ry., died at Deming, N. M., June 9.

NEW ROADS AND PROJECTS.

Alabama.—A press report says that the Illinois Central R. R. is about to begin construction of a line from Jackson, Miss., to Birmingham, Ala.

Alaska.—Press reports state that actual work on surveys of possible routes for the government's railroad in Alaska was begun June 2, when the first stake was driven at Chitina by the reconnaissance party, under Henry Deyo, who will survey the route from Chitina, where the Fairbanks trail leaves the Copper River & Northwestern Ry., to Matanuska coal fields. Thomas Riggs, Jr., member of the Alaska Railway commission, sailed for Skagway June 3. He will go down the Yukon river from White Horse to the Tanana by steamer, and will direct surveys from Fairbanks to the sea. Lieutenant Mears and W. C. Edes, the other two members of the commission, will follow in a few days. The commission hopes to have a route selected by the time of the meeting of Congress in December.

The Taku Railway & Navigation Co., has filed in the Juneau land office right of way and terminal plats for the proposed railway line up the Taku river from a point on Taku inlet to the Canadian-Alaska boundary. About two miles of side cut rock work on the lower end is encountered. The line for the most part is tangent and free of sharp curves. The grade is said to be considerably less than 1 per cent. The terminal is located on the south side of Taku inlet just opposite Windom glacier, which has been dead for some time. The Inlet is narrow at this point and not over forty feet in depth, and the feasibility of bridging the canal at this point and continuing the line to Juneau has been discussed and is believed by engineers to be practicable. F. J. Wetrick who make the survey for the American line of the railway is now making a preliminary survey on the Canadian side to Atlin, B. C., to be known as the Atlin Railway.

Alberta.—The Western Dominion Ry., it is said, will begin construction of its proposed line immediately. The road will extend south from Calgary, Alta., through the oil fields to the international boundary. Canadian press reports say that the Chicago, Milwaukee & St. Paul Ry. will build a line north from Great Falls, Mont., to a connection with the Western Dominion.

British Columbia.—See reference to the Atlin Railway under Alaska.

California.—The Modoc Northern Ry. plans to start work soon on the line to be built from Westwood Junction to Midland, Cal., via Lookout. This is a project of the Southern Pacific Co. The Utah Construction Co. has a contract for a portion of the work.

The San Francisco Northern Ry. was recently incorporated, capital stock \$2,500,000, to construct a railroad from Point San Quentin to Santa Rosa, Cal. Frank A. Brush, Santa Rosa, is said to be interested.

Florida.—The East & West Coast R. R. has laid 2½ miles of track to the Braden river on its line from Bradenton to Arcadia, Fla., 54 miles. All grading is nearly completed. Allen W. Jones of Augusta, Ga., and others are interested.

Georgia.—Surveys are being made for a railroad from Hartsville to Society Hill, Ga., 18 miles. C. D. O'Neal and J. L. Byrd are reported interested.

Indiana.—See New Roads and Projects under Ohio.

Kentucky.—The Commercial Club of Columbia, Ky., has presented a proposition to officials of the Louisville & Nashville R. R., asking that the railroad build a line from Greensburg, Ky., to Columbia, a distance of about 15 miles. Columbia is the county seat of Adair county which has no railroads.

Louisiana.—See Gulfport & Northwestern R. R., under Mississippi.

Mississippi.—It is reported that the Gulfport & Northwestern R. R., which proposes to build a line of railroad from Covington, La., to Gulfport, Miss., has secured the right of way and will shortly begin construction.

Missouri.—A report says that the Kansas City, Ozark & Southern Ry., which is making improvements, will ultimately extend its line about 30 miles south of Ava, Mo. A line from Alwanda to Lead Hill, about three miles from Mansfield, will also be built.

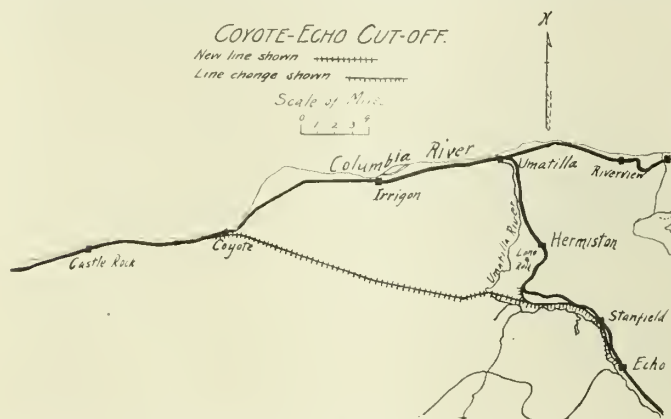
Montana.—See reference to Chicago, Milwaukee & St. Paul Ry. under Alberta.

Nebraska.—The Chicago, Burlington & Quincy R. R. has awarded contract to Edward Peterson, Omaha, Neb., for construction of the proposed cutoff from Yutan to Chalco, Neb.

North Carolina.—The Virginia & Carolina Southern R. R. is reported as letting contract to J. R. Adams & Co., of Richmond, Va., to build a two-mile extension from Elizabethtown, N. C., to Browns Landing, including 350-ft. trestle.

Ohio.—The Cincinnati, Indiana & Ohio River Ry. is reported incorporated. The company proposes to build a railroad from Cincinnati to Louisville on the north side of the Ohio river. The capital stock is \$25,000. Marion Griffith, Vevay, Ind., and L. S. Cook, Cincinnati, Ohio, are interested.

Oregon.—The Oregon-Washington R. R. & Navigation Co. has awarded contract for grading to Twohy Bros. Co., Portland, Ore. The work consists of approximately nine miles of change of line between Hermiston and Echo, Ore.,



Oregon-Washington R. R. & Navigation Co., Proposed Cut-off and Change of Line in Northern Oregon.

which will eliminate 727 degrees of curvature and reduce maximum curves from 10 to 4 degrees; also the construction of a cutoff from the main line near Coyote to a point on the change of line. This will reduce the distance between Hunt-ington and Portland ten miles.

Pennsylvania.—A charter has been granted to Gleason-ton & Paddy Run Ry. to construct a railroad from Gleason-ton, Pa., on the Pennsylvania Railroad, to a point north of Ren-ovo, a distance of 10 miles, via Paddy Run. Among the in-corporators are: I. W. Gleason, Gleason-ton; Wm. Schleicher, Troy, N. Y.; Geo. H. Daick, Lock Haven.

Tennessee.—A. G. Betts, president of the Madison County, Ry., Stackhouse, N. C., and others are reported interested in a plan to build a railroad from Erwin, Tenn., to connect with the existing line, about 45 miles. Preliminary surveys are being made and some rights of way have been secured.

The Alabama Great Southern R. R. has awarded contract to Thrasher & Gunter, Knoxville, Tenn., for building the proposed double-track extension from Chattanooga, Tenn., to Wauhatchie, five miles.

Texas.—The Texas Midland R. R. has not definitely decid-ed when the proposed line between Greenville and Commerce, Tex., will be built. This refers to the report that the road would abandon the use of the tracks of the St. Louis South Western Ry. and build its own line between the points named.

An officer of the Missouri, Kansas & Texas Ry. states that construction of the reported extension from Colmesneil, Tex., to Beaumont, and Waco probably will not be undertaken for some time.

The Central Ry. of Texas, which proposes to build a rail-road from Harbor Island to Seymour, Quanah and Belton, via Lockhart, Tex., will soon begin construction work at Harbor Island. Rights of way are being secured. It is re-ported that financing has been arranged. The project was originally known as the Quanah, Seymour & Gulf R. R. See Railway Review of March 14.

Virginia.—The Tye River Timber Co., of Lynchburg, Va., has applied for charter for the Virginia-Blue Ridge Ry., a proposed line from Tye river, near Arrington, Va., to Massies Mills, about 10 miles. According to the charter 25 miles of road may be built. The capital stock is \$150,000 to \$300,000. John W. Dwight, Ithaca, N. Y., is president and J. W. Powell, Canisteo, N. Y., is secretary of the railway company. Actual construction, it is said will not be begun for several months.

Washington.—The Newaukum Railroad, capital \$200,000, has filed articles of incorporation and seven miles of rail-road is being built from or near Napavine, Wash., into tim-ber holdings of the Carlisle-Pennell Lumber Co. J. P. Guerrier and George Dysart are named as incorporators. The company plans eventually to extend its line eastward to bisect Lewis county east and west, but the immediate purpose is to provide transportation for the output of the Onalaska Lumber Co., which is building a mill 16 miles southeast of Chehalis.

Electric Railways.

The Dayton, Middletown & Cincinnati Ry. is making sur-veys for the construction of an electric railway from Middle-town to Cincinnati, Ohio, about 29 miles. This is part of a proposed line to connect Dayton, Germantown, Middletown, Monroe, West Chester, Sharonville, Reading and Cincinnati. James G. Miller, West Chester, is president.

Work now under way by the Loban Valley Railway, a sub-sidiary of the American Railways Co., will practically com-plete double tracking between Altoona, Pa., and Tyrone.

Construction work on the Washington & Maryland Ry., formerly known as the Baltimore & Ocean City Ry., has been about completed from Washington to Takoma Park, D.C.

The New York public service commission, of the First district, opened bids June 9 for the construction of that part of the Seventh Avenue subway which will connect with the existing subway at Battery Park. This section runs from the north line of Battery Place, under Battery Park, to the old subway. It will be a two-tracked route and have a sta-tion opposite the present South Ferry station. The bidders were the Rapid Transit Construction Co., \$474,244; Oscar Daniels Co., \$498,000; Patrick McGovern & Co., \$556,000, and Smith, Hauser & McIsaac, Inc., \$804,000.

The city council of Detroit, Mich., has approved plans laid before it by the utilities committee for subways in Wood-ward, Michigan and Gratiot avenues, and the committee will now proceed with a further study for which \$50,000 is avail-able.

The Fort Worth Southern Traction Co. has filed an amend-ment to its charter with the state department at Austin, Tex., changing its name to the Tarran County Traction Co. and increasing its capital stock from \$1,500,000 to \$2,500,000. The company has taken over the Fort Worth-Denton line and under its amended charter is authorized to extend the present line between Cleburne and Fort Worth on north to Denton.

Plans for a merger of the Boston Elevated Ry., the Bay State Street Ry., the West End Street Ry. and the Bos-ton, Revere Beach & Lynn R. R. into a corporation to be known as the Commonwealth Electric Ry. has been an-nounced. The new corporation would be authorized to in-crease fares to an extent "necessary to properly provide for maintenance and depreciation and a reasonable return on the capital actually invested."

Engineers are surveying between McKinney and Paris, Tex., for the McKinney, Bonham & Paris interurban railway. R. L. Waddill, chairman of the executive board of the com-pany, says that sixty days will be required to complete the survey.

The Wilmington & Westchester Ry., Wilmington, Del., is being organized for the purpose of constructing an electric railway to connect Concord Heights and the Washington Heights line of the Wilmington & Philadelphia Traction Co. Thomas W. Wilson is interested.

The Rock Falls & Southern Traction Co., Rock Falls, Ill., has been incorporated to construct and operate an electric railway to connect Rock Falls, Sterling, Deer Grove, New Bedford and Kewanee. The incorporators are: B. G. Neville, George F. Young, William Usburne and William L. Batteau.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Chicago, Milwaukee & St. Paul Ry. is in the market for 5 mikado (2-8-2) locomotives.

—The Central Vermont Ry. is in the market for 5 ten-wheel (4-6-0) locomotives.

—The Alexandria & Western Ry. has ordered one mogul (2-6-0) locomotive from the Baldwin Locomotive Works.

—The Alabama Central R. R. has ordered one prairie (2-6-2) locomotive from the Baldwin Locomotive Works.

—The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Co. is reported in the market for 3 locomotives.

—The Chicago, St. Paul, Minneapolis & Omaha Ry. is in the market for 4 switching locomotives.

—The Chicago, Indianapolis & Louisville Ry. has ordered 5 Santa Fe (2-10-2) locomotives from the American Loco-motive Co.

—The Bingham & Garfield Ry. has ordered one superheater consolidation (2-8-0-S) freight locomotive from the Amer-ican Locomotive Co. This engine will have cylinders 21x30

ins., driving wheels, 51 ins., and total weight in working order 199,000 lbs.

Freight Cars.

—The Chicago, Milwaukee & St. Paul Ry. is in the market for 300 tank cars.

—The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Co. is in the market for 24 30-ton and 10 40-ton steel underframe box cars, 20 30-ton flat cars and 6 30-ton refrigerator cars.

—The Illinois Central R. R. is contemplating the purchase of 2000 cars in addition to orders recently placed.

—The Chicago, Rock Island & Pacific Ry. is in the market for 100 underframes.

Passenger Cars.

—The Chicago, Milwaukee & St. Paul Ry. has ordered 10 steel coaches from the Standard Steel Car Co. and the following from the Barney & Smith Car Co.: Two mail, baggage and express, 2 passenger and baggage, 3 observation, 1 dining, 4 sleeping and 7 compartment cars.

—The Minneapolis, St. Paul, Rochester & Dubuque Electric Traction Co. is in the market for 15 70-ft. all-steel passenger cars.

—The New Orleans Great Northern R. R. is in the market for one combination mail and passenger car.

—The Minneapolis & St. Louis Ry. is inquiring for 2 postal cars.

Machinery and Tools.

—The Seaboard Air Line Ry. is planning to install additional machinery and tools and renew and modernize the present equipment of its shops at Portsmouth, Va. A report says \$200,000 will be expended for this purpose.

Bridges.

—The Carolina, Atlantic & Western Ry., Hamlet N. C., is reported as preparing to construct a bridge across the Cooper river.

—The Boston & Maine R. R. has ordered 200 tons of bridge material from the Boston Bridge Works.

—The Illinois Central R. R. contemplates double-tracking its bridge over the Ohio river at Cairo, Ill.

—The Lexington & Eastern Ry. (Louisville & Nashville) has completed plans for construction of a railroad bridge over the north fork of Kentucky river near Hazard, Ky.

—The International & Great Northern Ry. is receiving bids for a 150-ton Strauss bascule bridge to be erected near Houston, Tex.

—The Cincinnati, Bluffton & Chicago R. R. contemplates the erection of a bridge over Wabash river, near Bluffton, Ind., on the site of the bridge recently destroyed.

—The Southern Railway has let contract to Koehler Bros. & Fowler Construction Co., Memphis, Tenn., for the proposed viaduct at Madison avenue, Memphis. The cost, including approaches, is said to be \$50,000.

—The Chicago, Milwaukee & St. Paul Ry. is reported as contemplating the construction of a new viaduct over the Menominee valley at Grand avenue, Milwaukee, Wis.

Buildings, Terminals, Etc.

—Bids are being received by the Pennsylvania Lines West of Pittsburgh for the construction of a new passenger station at Canton, Ohio. The building is to be used solely for station purposes, with an exterior of brick and terra cotta and a main facade 145 feet long. The main waiting room will be 50 by 62 feet and 30 feet high.

—The receivers of the Pere Marquette R. R. have awarded contracts to Roberts & Schaeffer Co., Chicago for two 100-ton concrete coaling stations, for installation at Blenheim, Ont., and Port Huron, Mich.

—The Chicago Great Western R. R. has awarded contract to Roberts & Schaeffer, for three 100-ton reinforced concrete coaling plants, for installation at St. Joseph, Mo.; Carroll, Iowa; and Kenyon, Minn. Also a 50-ton capacity frame coaling station at Red Wing, Minn.

—The Seaboard Air Line Ry. is reported as planning extensions to its shops at Portsmouth, Va.

—Agreements regarding the proposed union station at Quebec, Que., were compelled some months ago, but a difficulty arose over the purchase of some land and this delayed matters but it is now expected that the Canadian Pacific Ry. will call for tenders at an early date. The station will be built at the Champlain market at an estimated cost of \$70,000.

—The Illinois public utilities commission has approved plans of the Union Station Co. for its new terminals at Chicago. The project is temporarily held up pending negotia-

tions between the Chicago & Alton R. R., and the other lines over the transfer of property of the Alton. The station company needs this property before its plans can be carried out.

—The Northern Pacific Ry. has awarded contract for the construction of a round house, shops and other terminal buildings at Lewiston, Idaho, to the E. J. Rounds Construction Co., Seattle, Wash., at an estimated cost of \$70,000.

Vanadium Steel in Locomotive Construction.

In view of the present increasing tendency toward the use of higher grade materials in the construction of the modern heavy locomotive, the accompanying chart is of interest. This shows graphically the development during the last six years in the application of vanadium steel and iron to locomotives. Curve "A" shows the number of locomotives built each year for United States and Canadian roads from 1908 up to the present time on which this material has been used. Curve "B" shows the percentage which this number in any given year bears to the total number of locomotives built that year for the above countries. The number of locomotives is read from the scale on the right, and the percentage from the scale on the left of the chart. As will be seen at a glance, the increase in the use of vanadium steel has been constant and rapid.

In 1908, when it may be properly said that vanadium steel first received serious consideration as a locomotive material, this material was specified on only 50 locomotives, or only 2 per cent of the total output for the countries considered. Last year over 1100 locomotives, or 25 per cent of the total, had vanadium parts. Up to May 15th of this year, vanadium steel had been specified on 349, or 57 per cent of all the locomotives ordered for United States and Canadian roads. This chart is plotted from official returns from the locomotive builders and the railroads and from statistics as to the annual locomotive output published in the railroad tech-

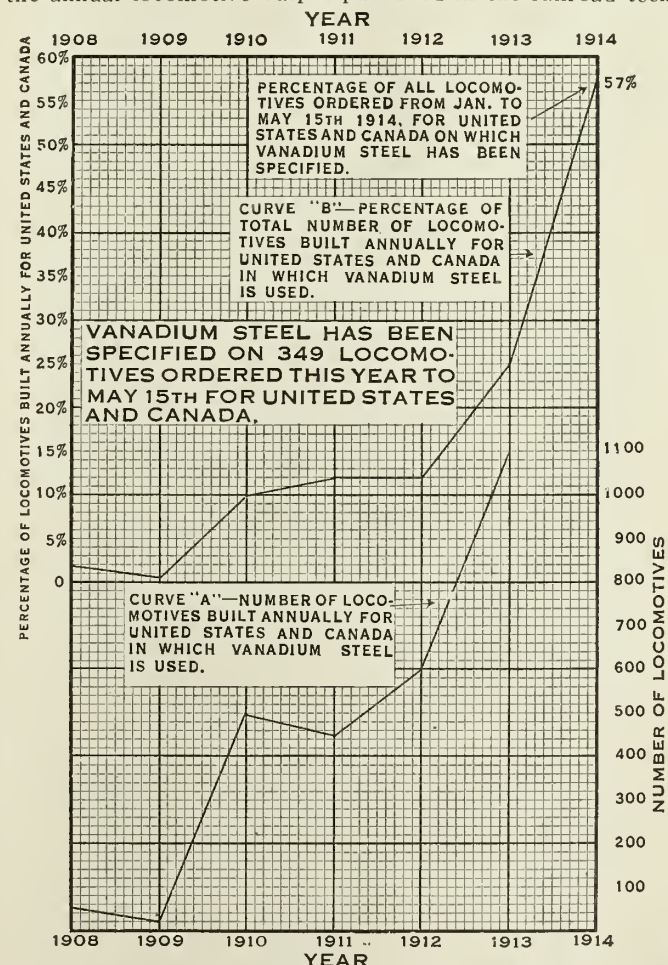


Chart Showing Increased Use of Vanadium Steel in Locomotive Construction.

nical papers. These latter statistics, on which the percentage curve is based, include, of course, all classes of locomotives from Mallets to contractors' "dinkeys."

Considering only what may be classed as heavier power for which vanadium steel is chiefly advocated or considered, the percentages would be much higher than those shown in the chart. For example, statistics show that last year this material was specified on 48 per cent of all the locomotives weighing over 225,000 pounds built for the United States and Canada. The curve showing the number of locomotives having vanadium parts includes only new power and does not cover the large number of locomotives to which vanadium steel parts have been applied in repair work. It is significant that this development has taken place during a period in which there has been greater curtailment by the railroads in their expenditures than in any other equal period during the past 15 years. This indicates that, while the use of vanadium steel as a locomotive material is in the first stages of development, it has passed far beyond the experimental stage and on many roads is now considered as standard for certain parts for heavy power.

The following table itemizes the number of different parts of vanadium steel applied to locomotives built last year and ordered so far this year and the number of locomotives in each case so equipped:

Vanadium Parts Applied to Locomotives from January, 1913, to May 15th, 1914.

Name of Part	Number of Engines Equipped	Number of Parts Applied
Driving axles.....	476	1297
Main rods	377	822
Side rods	384	1986
Frames	993	2054
Crank pins	198	612
Piston rods	69	138
Springs (engine and tender).....	366	....
Engine truck axles.....	62	62
Wheels .....	...	700
Tires .....	...	1150
Cylinders (vanadium cast iron).....	260	540

As stated above, these records cover only new power, except in the case of wheels and tires.

Patents On Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, JUNE 2, 1914.

Extension car steps, 1,098,049—John Nelson, Selah, Wash.
 Railroad tie, 1,098,096—Jay D. Clement and Nathan C. Taylor, Detroit, Mich.
 Signaling system for electric railways, 1,098,112—Arthur D. Hughes and Thomas H. Hertzog, Washington, Pa.
 Car coupling, 1,098,135—John C. Taylor, Findlay, Ohio.
 Electric rail bond, 1,098,192—Bartlett H. Thompson, North Adams, Mass., assignor of one-half to George Wallace, Williamstown, Mass.
 Locomotive headlight, 1,098,196—Charles H. Walter, Connellsville, Pa.
 Hydraulic weighing scale, 1,098,197—Edward J. Walters, Groveland, and William P. Symons, Arlington, Cal.
 Combination adjustable track gage and level, 1,098,253—Gustav Gruetzman, Arpin, Wis.
 Rail joint, 1,098,267—Merrit D. Kinsman, Elmira, N. Y.
 Automatic pipe line coupling for cars, 1,098,269—George W. Kuehn, Philadelphia, Pa., assignor to Kuehn Automatic Pipe Line Coupler Co.
 Safety railroad appliance, 1,098,270—John Kush, Jr., San Antonio, Tex.
 Trap door for the vestibules of railway cars, 1,098,310—Roy T. Axe, Syracuse, N. Y., assignor to Oliver M. Edwards, Syracuse, N. Y.
 Dump-door operating mechanism, 1,098,315—Claus J. Werner Clasen, Davenport, Iowa, assignor to The Bettendorf Co., Bettendorf, Iowa.
 Sleeping car having upper and lower berths, 1,098,332—Hamilton P. Richardson, Chicago, Ill.
 Car mover, 1,3734, reissued—William Lewis Chittun, Spring Hill, W. Va.
 Uncoupling mechanism, 1,098,392—George C. Murray, Chicago,

Ill., assignor to Keyoke Railway Equipment Company, a corporation of Delaware.
 Bag-rack for postal cars, 1,098,396—Seward N. Peck, Chicago, Ill.
 Hand brake mechanism, 1,098,415—Frederick J. Trumper, Cleveland, Ohio, assignor to The National Malleable Castings Company.
 Brake-beam fulcrum, 1,098,425—Jacob J. Byers, Chicago, Ill., assignor to The National Malleable Castings Company, Cleveland, Ohio.
 Hand brake mechanism, 1,098,427 and 1,098,428—Walter E. Coffin, Cleveland, Ohio, assignor to The National Malleable Castings Company, Cleveland, Ohio, a corporation of Ohio.
 Car-truck frame, 1,098,463—Andrew Strobel, St. Louis, Mo.
 Wheel for railway-carriages, 1,098,481—Albert A. Coates, New York, N. Y.
 Car-axle journal-box, 1,098,500—Herbert H. Hewitt, Buffalo, N. Y.
 Car record and index book, 1,098,540—Joseph Alvin Williams, Winnipeg, Manitoba, Canada.
 Mechanical stoker for locomotive boilers, 1,098,565 and 1,098,566—Gustav de Grahl, Zehlendorf, Germany.
 Compound rail, 1,098,614 and 1,098,615—David F. Crawford, Pittsburgh, Pa. Filed Dec. 30, 1912.
 Car-heating system, 1,098,619—William L. Garland, Llanerch, Pa., assignor, by mesne assignments, to Standard Heat & Ventilation Company, Inc., New York, N. Y., a corporation of New York.
 Compound rail, 1,098,635—John P. A. Pearson, San Francisco, Cal.
 Roof-carline, 1,098,687—William H. V. Rosing, St. Louis, Mo.
 Overhead-trolley construction, 1,098,717—George Gibbs, New York, N. Y.
 Locomotive-tender cistern, 1,098,746—Andrew M. McGill, Sayre, Pa., assignor, by direct and mesne assignments, to said McGill, and Alexander W. Whiteford and Gilbert H. Pearsall, New York, N. Y., and Frank N. Hibbits, Bethlehem, Pa., trustees.
 Railway-car, 1,098,748—John O. Neikirk, Morgan Park, Ill., assignor to Rodger Ballast Car Company, a corporation of Maine.
 Car-truck, 1,098,749—John O. Neikirk, Morgan Park, Ill., assignor to National Dump Car Company, Chicago, Ill., a corporation of Maine.
 Bank-retainer for culverts, 1,098,766—Bartholomew Scully and Alfred Ernst Rigby, Winnipeg, Manitoba, Canada.
 Beamless brake, 1,098,806—Harvey L. Jones and Roy Anderson, Charleston, Ill.
 Brake-hanger, 1,098,808—William F. Kiesel, Jr., Altoona, Pa.
 Railway-switch-throwing mechanism, 1,098,809—Harry C. Kinsel, Altoona, Pa.
 Railway-tie, 1,098,810—George Lessig, Reading, Pa.
 Car construction, 1,098,820—Emil J. P. Meyer, Chicago, Ill.
 Rail-joint, 1,098,829—John R. Nagy, Martins Ferry, Ohio.
 Railroad-tie, 1,098,877—Samuel Berger, Blooming Glen, Pa.
 Refrigerator-car, 1,098,904—Charles A. Huse, Philadelphia, Pa., assignor of one-half to Linwood L. Hallman, Philadelphia, Pa.
 Rail-joint, 1,098,909—Franciszek Klimeczek and Jacob Zelezniak, Filbert, W. Va.
 Valve gear for three-cylinder locomotives, 1,098,940—Francis J. Cole, Schenectady, N. Y.
 Switch-lock, 1,098,958—Joseph D. Moore, Folkston, Ga.
 Weed-killing car, 1,098,964—Ingomar F. Orton, Galveston, Texas.
 Track-bridle, 1,098,966—Mathew Patterson, Buffalo, N. Y.
 Four-cylinder compound locomotive-engine, 1,098,986—Pierre Smal, Brussels, Belgium.
 Railway-car, 1,098,989—James Wesley Spaur, Cable, Mont.
 Railroad-tie, 1,098,996—John F. Tudor, Wilmington, Ohio, assignor of one-fourth to Grover C. Kessingner and one-fourth to Charles N. Secrist, Wilmington, Ohio.
 Train-pipe hanger, 1,099,018—Jacob D. Callahan, Jersey Shore, Pa.
 Railway-switch thrower, 1,099,036—Hiram R. Harding, Richmond, Va.
 Rail-tie, 1,099,060—John H. Kussman, Abbotsford, British Columbia, Canada.
 Automatic car-brake-controlling apparatus, 1,099,074—William Reed, Chillicothe, Mo.
 Joint for articulated locomotives, 1,099,076—Samuel M. Vauclain, Philadelphia, Pa., assignor to The Baldwin Locomotive Works, Philadelphia, Pa., a corporation of Pennsylvania.
 Railway signalling apparatus, 1,099,118—Gustaf Dalen, Stockholm, Sweden.
 Poultry-car, 1,099,119—Elnino D. Davis, Chicago, Ill., assignor to Francis X. Mudd, Chicago, Ill.
 Slack-adjuster, 1,099,145—John Edward Anger, Preston, England.

RAILWAY REVIEW

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Interest Allowed on Supply Bills.

A decision of great importance to the railway supply industry was rendered by the United States Supreme Court in October, 1913, in the case of the American Iron & Steel Manufacturing Co., against the Seaboard Air Line. It allowed interest on accounts for supplies furnished before the receivership, in cases where the property after a term of receivership is turned back to its owners. This decision also led to another in the case of the Pennsylvania Steel Co., et al., vs. New York City Railway Co., and Metropolitan Street Railway Co. in the United States Circuit Court of Appeals for the Second Circuit; which was to the effect that interest at six per cent per annum be allowed on bills for supplies necessary to the operation of the road, where there are any surplus funds in the unmortgaged assets. Such accounts were allowed first preference and interest, which in this case was for seven years. Claims amounting to \$559,111, were represented together in this case, and there was about \$1,000,000 besides. These creditors were allowed a total of about 40 per cent interest. It is understood that the court intended to deny the interest claim; when one creditor learning of the United States Supreme Court decision, took active steps to bring it to their attention, with the above result. The establishment of the principle that interest cannot be denied because the delay is due to court proceedings is most important. It adds a much-needed security to those who furnish supplies without which a road on the verge of insolvency could not continue to be operated.

Fines Under 28-Hour and Quarantine Laws.

For violating the law that prohibits the confinement of live stock for more than 28 hours without unloading for feed, water and rest, the following railroads have been fined a total sum of \$3,000, and in some instances additional costs, according to recent announcements of the United States Department of Agriculture: Atchison, Topeka & Santa Fe Ry., 12 cases, total penalty, \$1,600; receivers of the Kansas City, Mexico & Orient Ry., 3 cases, \$300; Chesapeake & Ohio Ry., 1 case, \$100; receivers of the St. Louis & San Francisco R. R., 1 case, \$100. Six cases were recently terminated against the St. Louis, Iron Mountain & Southern Ry. for violation of the live stock quarantine law, in each of which the company was fined \$100 and costs. The St. Louis Southwestern Ry. was also fined \$100 and costs in each of three cases for violations of the live stock quarantine law.

Meeting of the Association of Railway Electrical Engineers.

The Association of Railway Electrical Engineers held its mid-year convention at Atlantic City, N. J., June 12, while the Master Car Builders' Association was in session. Reports were received from the various standing committees, covering the following subjects: Axle equipment, data and information, electric traction, head end equipment, illumination, outside construction and yard lighting, wire crossings, shop practice, axle belting, standards, rules for car wiring, wiring cables and yard facilities for charging storage bat-

teries. These reports were in general limited to progress. The committee on axle belting, however, presented a report which included a final draft of specifications for belting for the purpose of driving axle generators as agreed upon by the committee. The committee on illumination presented a report covering a series of illumination tests in day coaches, made by the association in the shops of the Lake Shore & Michigan Southern Ry., at Cleveland, Ohio. The committee on standards reported an outline of subjects recommended for discussion at the next annual meeting. A special committee on lamps reported action taken at a meeting held in Chicago, May 18, at which a schedule was adopted of lamps divided into two general classes: first, lamps to be recommended for adoption as standard for train lighting service; second, lamps accepted for train lighting service, but the use of which is not recommended.

A Simple Means of Improving the Service.

The Pennsylvania Railroad has given instructions to its passenger trainmen, that whenever passenger coaches are crowded, a member of the train crew must announce the number of seats available in other coaches, and must also tell the number of seats available in each coach. Special attention is directed to this practice at the larger terminals where passengers are liable to be inconvenienced by the congestion of travel. These instructions for trainmen to find seats for passengers followed a recent investigation which developed that almost invariably when some cars on a train were crowded, there were sufficient seats available in other cars on the train to accommodate all the passengers who were standing, if the passengers could only be made to know of it. It is now made the business of trainmen to see to it that no passenger is compelled to stand if there are any seats left in any part of the train. The policy of the management is to provide sufficient cars to seat all the people normally using any train.

Steel Cars on the Pennsylvania System.

The Pennsylvania R. R. announced, in 1906, that all future additions to its passenger equipment would be of all-steel construction, and on January 1, of this year, almost one-half of its passenger equipment had been replaced with steel cars. The Pennsylvania had 6100 passenger equipment cars in service on January 1, 1914, including passenger coaches, postal cars, baggage cars, express cars, etc. On that date the latest for which statistics are available, the system had 2554 all-steel passenger cars in service and 379 others under construction, and it owned more than one-third of all the steel passenger equipment cars in use in the United States. The above figures are exclusive of sleeping and parlor cars. The total number of all-steel passenger cars, other than Pullman cars, in service in the United States on January 1, 1914, was 7377. To replace with steel all wooden passenger cars now in use in the United States will cost about \$581,000,000. There were 2115 steel sleeping and parlor cars in service on all roads on January 1, 1914, and 750 (more than one-third) of this number were in use on the lines of the Pennsylvania system. Every sleeping car now normally in use on the Pennsylvania is of all-steel construction.

Formalities for the Opening of the Panama Canal.

Preliminary arrangements have been completed for the formal opening of the Panama canal, shortly after the close of the next session of congress, March 4, 1915. The occasion will be marked by a naval parade through the canal, with President Wilson, on board the battleship Oregon, at its head. On board the Oregon besides the president will be Secretary Daniels, Admiral Dewey, Admiral Clarke and possibly Secretary of War Garrison and Colonel

Goethals. Other members of the cabinet will be on board various ships in the line passing through if it is possible for them to arrange to attend the formal opening. While the formalities of opening the canal will not take place until the president can reach there conveniently after the closing of congress, the canal will be open for business probably as early as January. Sugar barges are already using the canal as a supplement to the Panama railroad, and it is expected that all danger of slides will have been removed within six months. Eleven nations have already signified their intention of taking part in the naval parade, which will be the chief ceremony of the formal opening. Austria, Argentina, Cuba, France, Great Britain, Germany, Italy, Japan, Portugal, Spain, Russia and Sweden are the nations which have promised to be represented by battleships at the great pageant and several more are expected. It is practically certain that Chile and Brazil will send battleships. Not only will the president head the greatest naval parade of history but he will remain on board the Oregon, and be convoyed to San Francisco by the greater portion of the ships which go through the canal. Secretary Daniels and his staff will accompany the president to the San Francisco exposition.

Bridge Span Wrecked by a Barge.

A 150-ft. span of the Wheeling & Lake Erie R. R., at Toledo, Ohio, was knocked off its piers and fell into the Maumee river, by being struck by the barge G. E. Hartnell, on June 14. No one was injured in the accident, and the vessel was damaged only to the extent of three broken plates in her bow.

Second Test of Watches, U. S. Bureau of Standards.

The Bureau of Standards, United States Department of Commerce, has announced that the second test of watches will begin on Tuesday, August 11, for class A watches, while that for class B will begin fourteen days later, on August 25. These tests were inaugurated in April, and are intended for the benefit of owners or prospective purchasers of high-grade adjusted time pieces, and consist of determinations of the accuracy of the adjustments of a watch for position, temperature and isochronism. The daily rates of the watches under various conditions are observed and certain criterions are applied to the results to ascertain whether the time piece is adjusted to a reasonable degree of accuracy. Certificates of performance are granted to watches of which the rates fall within certain tolerances. Watches may be submitted for test by individuals, by wholesale or retail dealers in watches, or by the manufacturers. The watches may be delivered personally at the Bureau of Standards at Washington, or sent by express. In either case they should reach the bureau not later than the day before the test begins. Application for the test of a watch should be made upon a form which will be furnished upon application to the Bureau of Standards, Washington, D. C. A fee estimated to cover the actual cost of the test as closely as possible, is charged for the work, amounting to \$5.00 for the class A test and \$3.00 for the class B test.

Electrical Engineering Research at the Massachusetts Institute of Technology.

The activities in electrical engineering research at the Massachusetts Institute of Technology have developed very rapidly during the past year and a noteworthy extension of the organization for administering the researches has recently been effected. This has been aided by the co-operative agreement between Harvard University and the Institute of Technology whereby the departments of electrical engineering in the two institutions were practically merged. By this new organization for the research laboratory there

is created a research committee, and any member of the staff, whether professor, instructor, or assistant, who desires to carry out any original investigation may become identified with the research work through the research committee. The study of a wide variety of problems has already been undertaken by the laboratory. During the past year, the collection of data upon the study of the relative economic fields for electric, horse, and gasoline trucks, which was begun in 1911, has been completed; an abstract of the results of the investigation has been presented, and the final report will probably be completed early this summer. The study of the methods of handling miscellaneous freight at the Boston freight terminals, begun late in 1912, has been completed, and a paper covering the methods and results of the study has been prepared for presentation at a fall meeting of the New York Railroad Club. An extended study of the effect of the length of passenger ride on street cars upon the net return on the investment in street railway properties is being conducted; it is expected that this study will require about 5 years, during which time the revenues, expenses, and traffic data of the street car systems in a number of the large cities will be analyzed. An analysis is being made of the delivery service of a large department store in New York City, with the object of presenting information upon the factors affecting the operation of the delivery service of such department store; this investigation will be completed during the present summer.

Rails of 120-Pound Section on the Pennsylvania R. R.

According to current reports the Pennsylvania R. R. will try rails weighing 120 pounds to the yard, and orders of 10,000 tons each have been given to the Cambria Steel Co. and the Pennsylvania Steel Co. The object in view is, of course, to secure a stronger rail than the present standard one that is of 110-pound section.

Bill to Place Water Carriers Under Interstate Commerce Commission.

A bill was introduced into the house of representatives, June 15, by Chairman Alexander, of the house committee on merchant marine and fisheries, which would provide complete and stringent regulation by federal authority of carriers by water engaged in foreign and domestic commerce. The responsibility for such supervision is placed, by the bill, upon the Interstate Commerce Commission, whose membership would be increased from seven to eleven, to care for the additional work. The measure is stated to be the outgrowth of the commission's investigation of shipping combinations. The provisions of the bill are summarized as follows: The Interstate Commerce Commission is empowered to regulate the division of through rates between railroads and water carriers; the issuance of through bills of lading and access to their terminal facilities by railroads to steamship lines on equal terms. The bill declares all deferred rebate arrangement, whether in export, import or domestic trade, to be illegal. Copies of all arguments and conference arrangements between steamship lines must be filed for approval with the Interstate Commerce Commission. Discriminatory practices of all kinds giving unfair preferences, or advantages or persons and localities, false bills, false classification and false weighing are made unlawful. Both foreign and domestic carriers are prohibited from carrying retaliatory measures against shippers by refusing or threatening to refuse space when such are available. Rate cutting or injuring a competitor is prohibited. The commission is authorized to reduce rates where they are found to be unreasonably high or excessive. Water carriers are required to observe the same rules in the filing of rates that are enforced against railroads. It is made unlawful for any railroad to discriminate between a rail and water

route. Railroads are prohibited from acquiring any interest directly or indirectly in any canal in the United States or in any common carrier or forwarding company on such canal unless such acquisition is approved by the Interstate Commerce Commission. Railroads can also be required by the commission to account separately for the income, expenses and other financial and property characteristics of water carrier in which it may be interested. The Alexander bill will be referred to the committee on merchant marine and fisheries, but it is understood that no effort will be made to pass it at this session of congress.

Transportation of Exhibits at the Panama-Pacific International Exposition.

Facilities for handling incoming shipments of exhibits at the Panama-Pacific international exposition, to be held in San Francisco, Cal., next year are unusually complete. Fully three years before the opening, noted authorities on transportation were called into consultation on the subject and devised a system by which the exhibits might be handled perfectly without any derangement of the ordinary traffic. It is expected that thousands of freight trains will be despatched to San Francisco loaded with exhibits and each of these will be switched off into the exposition's private railways at the terminal. The exposition has constructed its own system of tracks which covers every part of the 635 acres of the site, and upon arrival a train loaded with exhibits will be hauled directly into the exhibit building for which the display is intended. Rails have been laid inside the building so that it will be possible to have the car unloaded on the spot which the exhibit will occupy. Exhibits arriving by vessel will be transferred to trains and handled in the manner described in the foregoing paragraphs. It is estimated that the charges on the transportation of exhibits, in spite of the material reduction made, will aggregate a total of more than five million dollars. Railways in the United States and Canada have uniformly agreed to handle the exhibits on a basis of full

usual charges on the journey to San Francisco and providing for free transportation from San Francisco to the point of origin at the close of the exhibition. A large number of the principal steamship lines with service between the United Kingdom and other European ports and the United States have agreed to handle the exhibits in the same manner, not requiring the return charge to be paid, providing the exhibits have not changed ownership. Steamship lines from other parts of the world have made reductions in their usual rates ranging from 50 per cent to 66 2-3 per cent. These reductions do not include, however, exhibits despatched from the Orient, in which case the full charge must be paid to San Francisco and one-half the full charge for the return voyage. From inquiries and reservations already made it is estimated that \$125,000,000 will be expended upon passenger fares to and from the exposition.

Divorcing Rail and Water Lines Delayed.

A Washington dispatch says enforcement of the law requiring the divorce of rail and water lines operating injuriously to the public interests probably will be delayed a year or more on account of the vast burden of work piled up on the Interstate Commerce Commission. It also may be necessary for Congress to amend the Panama Canal Act providing this separation. The Panama Canal Act provides that after July 1, next, it shall be unlawful for any railroad to retain an interest in any vessels with which the land carrier, in the judgment of the commission, does or may compete. To meet the situation the commission has interpreted the act as contemplating and authorizing a continuance after July 1 of any existing common ownership of rail and water carriers not traversing the Panama Canal.

Marvin Hughitt, Jas. J. Hill and A. J. Earling are all quoted exceedingly optimistic regarding the crops and business prospects of the Northwest.

British-Built Locomotives for the West Australian Government Railways

By F. C. COLEMAN.

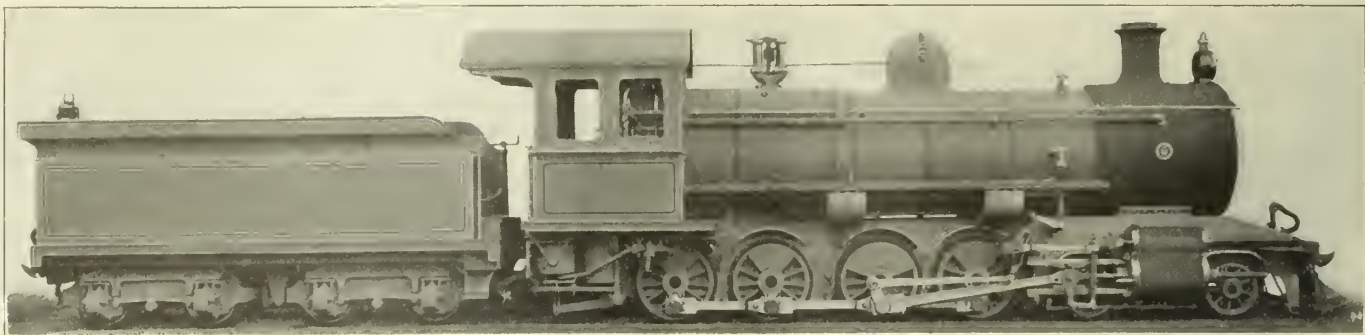
The photographic illustrations herewith show three interesting types of locomotives, a large number of each of which has recently been introduced by the West Australian government, which operates about 1800 miles of 3 feet 6 inch gage track, and whose headquarters are at Perth. These engines have all been constructed by the North British Locomotive Co., Ltd., of Glasgow, according to the designs of E. S. Hume, of Fremantle, the chief mechanical engineer of the West Australian Government Rys.

The engines have been built to a common specification and the

fittings are uniform and interchangeable. The valve-gear is of the Walschaert type and the engines are equipped with the vacuum automatic brakes, operating on the coupled wheels of the engines and all wheels of the tender trucks. The vacuum cylinders are 18 inches diameter on the engines and 21 inches diameter on the tenders. The trucks are of the four-wheel type, constructed of frame plates of mild steel and supported and bound together by means of steel castings. They are allowed sufficient side-play and radial movement to enable the engines and tenders to negotiate a 5-chain radius curve. The trailing trucks



Pacific Type Locomotive for Passenger Service, West Australian Government Rys.



Twelve-Wheel Locomotive for Freight Service, West Australian Government Rys.

are of the Bissel type and are suitable for carrying loads of six tons at express speed. The class "D" locomotives are being used for the Perth suburban service, which previously was worked almost exclusively by four-coupled engines having a four-

has made a study of this phase of the American transportation question which is illuminating to shippers and the public.
"There are several things entering into the transportation

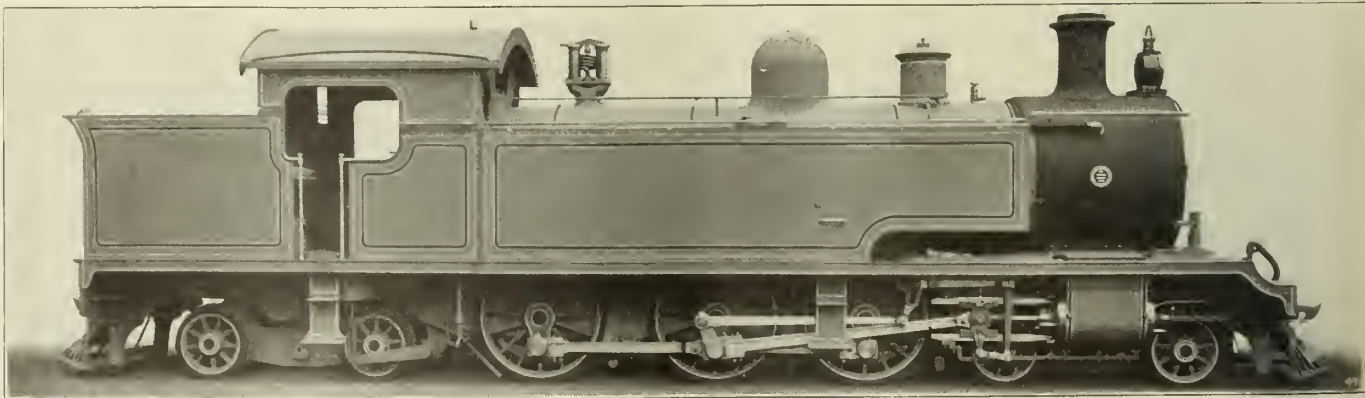
	Class D.	Class E.	Class F.
Type	4-6-4	4-8-0	4 6-2
Service	Suburban	Freight	Passenger
Cylinders	17x23 ins.	17x23 ins.	17x23 ins.
Valves	Piston	Piston	Piston
Valve gear	Walschaert	Walschaert	Walschaert
Tractive power	16,160 lbs.	.....	.....
Boiler, type	Straight	Straight	Straight
Minimum diameter	55 ins.	57 3/4 ins.	57 3/4 ins.
Working pressure	175 lbs.	175 lbs.	175 lbs.
Grate area	18.6 sq. ft.	19.2 sq. ft.	19.2 sq. ft.
Tubes, number (diameter, 1 3/4 ins.)....	231	248	248
Heating surface, firebox.....	118 sq. ft.	118 sq. ft.	118 sq. ft.
Tubes and flues.....	1206 sq. ft.	1300 sq. ft.	1250 sq. ft.
Total	1324 sq. ft.	1418 sq. ft.	1368 sq. ft.
Driving wheels, diameter.....	54 ins.	42 1/2 ins.	54 ins.
Truck wheels, diameter.....	30 ins.	30 ins.	30 ins.
Weight, total engine.....	134,200 lbs.	108,000 lbs.	108,000 lbs.
Weight, total engine and tender.....	134,200 lbs.	171,000 lbs.	171,000 lbs.
Tender, wheels, diameter.....	.....	2 ft. 6 ins.	2 ft. 6 ins.
Capacity, water	1600 gals.	2200 gals.	2200 gals.
Capacity, coal	4 tons	5 1/2 tons	5 1/2 tons

wheel truck at either end, and a tractive force of 12,160 pounds, as against the 16,160 pounds for the new class "D" engines.
The leading features of these locomotives are indicated in the accompanying table.

Speeding Up the Freight Car Movement.

Answering the criticism that the railroads could increase their revenue by "speeding up" the movement of freight and increasing the average distance of 22 miles a day when calculating both fast and slow service, George H. Campbell, assistant to the president of the Baltimore & Ohio

of freight with which the public may not be familiar," said Mr. Campbell in connection with his investigation. "The bald statement that cars are moved 22 miles a day is misleading and the impression naturally would be that something is wrong. In the first place, a railroad cannot always store its idle cars near to the place where they may be needed next. The freight cars are collated in order that they may be kept under supervision. Then when cars are ordered it is necessary to move them to the industry, which takes time, but is calculated against the average movement.



Tank Locomotive for Suburban Service, West Australian Government Rys.

"Other delays are encountered over which the railroads have no control. Shippers are allowed 48 hours in which to load cars—two whole days that likewise enter into the calculation. The two days do not include Sundays nor holidays; and in the case of many articles of commerce it does not include rainy days. After cars have started in transit the consignees have 48 hours additional in which to unload shipments, and this, taken in connection with the time taken to move over the road is balanced against the distance the shipments are transported. That explains very largely why the average day's run of freight cars is small. Even though a carload of goods were shipped only five miles, there would be four days' time allowed for loading and unloading.

"While the average capacity of freight cars today is more than double what it used to be, the penalty for delays beyond the time limit prescribed by the car service rules remains the same. The shipper still pays \$1.00 a day when using the car for storage purposes.

"Further than this, from five to seven per cent of a rail-

road's freight car equipment is undergoing repairs; so that a road that has 100,000 cars often has between 5,000 and 7,000 cars in the shops and out of service. This is a further factor which lessens the average movement of shipments as set forth by statistics.

"Taken separately, however, fast freight service is entirely different and makes a far better showing than the average. Fast freight trains on the Baltimore & Ohio, for instance, will cover 350 miles a day. The next fastest service is moved at the rate of 190 miles a day. The speed average of coke cars is high, as is that of cattle, which usually are loaded in a few hours. Refrigerator cars, which also are quickly loaded, are put through to their destination without delay.

"Viewing the transportation question from this phase, it will be seen that the railroads are not altogether to blame for the slow average movement of freight. The railroads are trying to obviate the delays at shipping points, but that is another big problem, the solution of which lies largely in the size of terminals."

Convention of the Master Car Builders' Association

(Continued from page 865.)

COUPLER AND DRAFT EQUIPMENT.

The extensive report of the committee on coupler and draft equipment, read by R. L. Kline, chairman of the committee, began with a recapitulation of the work done prior to June, 1913, and reported on at last year's convention. The results of both static and road service tests which were continued through the year on the experimental couplers in comparison with typical couplers of the usual types and makes, were reported and served to show an encouraging measure of advantage for the proposed new types over the old. As in the case of last year's report, wherein the minutes of meetings of the coupler committee with the manufacturers' representatives were given, there was included in this year's report the minutes of similar meetings at which it was determined which of the nine experimental couplers should be chosen to enter the elimination trials in extended service on the roads in all parts of the country. The several couplers considered at these meetings and from which two selections were made for entry in the elimination trials were as tabulated herewith:

Type Lock.	Contour.	Coupler Designation.
A. S. F. No. 3 modified		
Alliance	Straight.....No. 5.....	Tc
A. S. F. pinless Coupler.	Radial Wedge.No. 5.....	Td
Buckeye S. C. Co. No. 4.	Straight.....Straight Line	Uc
Monarch S. C. Co. enlarged Lion	Straight.....Straight Line	Vb
Gould Coupler Co. "GC".	Wedge on Knuckle Side.Straight Line	Wb
Gould Coupler Co. "GC".	Straight.....Straight Line	Wc
McC.&T.Co. Penn. No. 3.	Straight.....Straight Line	Xc
McC.&T.Co. Penn. No. 4.	Straight.....No. 5.....	Xd
N. M. C. Co., Bazeley...	Wedge.....Straight Line	Ye
N. M. C. Co., Bazeley...	Straight.....Straight Line	Yf

Each of the above couplers was taken up and each minute detail, both of design and operation, was thoroughly considered, and by carefully weighing all the points at issue it was decided to try out two couplers, and the following were selected to enter the elimination trial in service: American Steel Foundries No. 3 modified Alliance coupler; and the National Malleable Castings Co. Bazeley coupler; both of which are shown in the illustrations herewith.

During the try-out of the two couplers selected, the committee arranged to distinguish one from the other by designating that the coupler submitted by the American Steel Foundries be termed "Type A Experimental Standard M. C. B. Coupler," and the one submitted by the National Malleable Castings Company be termed "Type B Experimental Standard M. C. B. Coupler." When the trial or experimental period is completed, the word "Experimental" will be dropped, leaving the coupler finally selected or adopted as the "Standard M. C. B. Coupler."

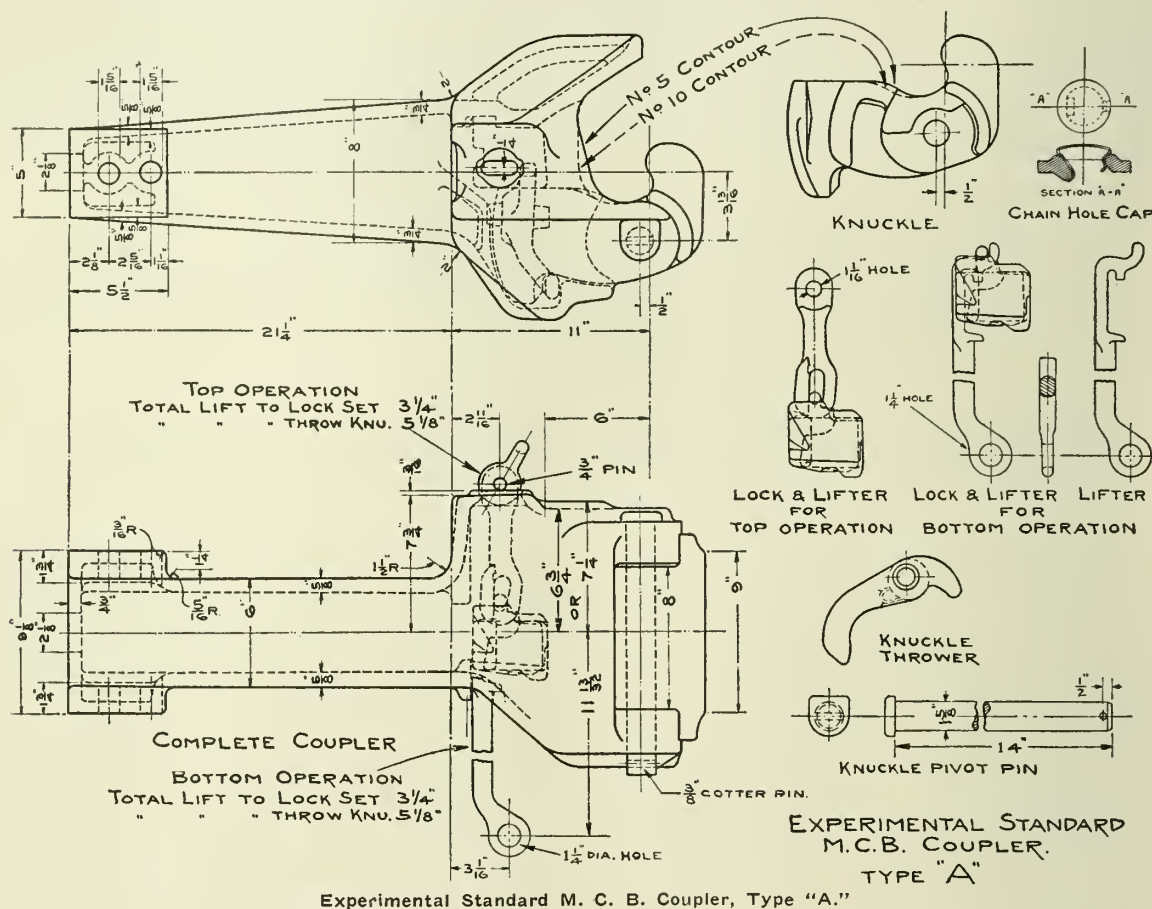
Having arrived at the point above noted, the committee caused to be issued circular No. 16, dated Nov. 25, 1913, advising as to the progress made, giving directions for ordering experimental couplers of the types selected and urging the roads to co-operate by placing numbers of these couplers in service so as to yield the committee the necessary information on which to base final action in the selection of the one single standard coupler. In its report the committee announced the proposed continuance of the miscellaneous laboratory tests already applied to the larger number of experimental couplers, the data derived thereby to be used in conjunction with the service test data, in formulating a final decision. An urgent appeal was made to the members to participate in the elimination trials so that a sufficiently wide range of experience could be drawn upon in choosing the final standard.

In the discussion of the foregoing report, no little comment was made in appreciation of the effort of the individual members of the committee in bringing about the results that have been thus far obtained. F. F. Gaines, Central of Georgia R. R., made an important suggestion and one that is likely to be acted upon by the executive committee for the coming year, that being to the effect that the scope of the committee's responsibility be divided and that there be created a second committee charged with the responsibility of working up a report for next year's convention on the subject of draft equipment. The discussion closed with statements on the part of several prominent members that they were in hearty accord with the purpose of the coupler committee and would use their best efforts to get numbers of them placed in service on their respective roads. The report was accepted and the committee continued.

SAFETY APPLIANCES.

An oral report on the subject of safety appliances was presented by M. K. Barnum, chairman of the committee. Mr. Barnum referred to a circular of inquiry recently sent out by his committee but which developed so little information of real value that a formal written report on the subject was not warranted. He explained that there appears to be a

a proper interpretation of the law. The wrong repair proposition and the lack of agreement between the federal inspectors themselves were cited as circumstances to be guarded against. In concluding the discussion, the fact was brought out that the executive committee already has under advisement a form of instruction book covering the use of safety appliances and that it will probably be placed in circulation



Experimental Standard M. C. B. Coupler, Type "A."

serious lack of understanding as to the exact requirements of the law and made an appeal for a campaign of instruction to the end that car men may come to understand, before July 1, 1916, when penalties for non-conformity with law become operative, just how and where these appliances should be placed on the cars.

The discussion brought out the opinion that the great difficulty which the roads would encounter in this connection would be because of dissimilar interpretations in interchange. The advisability of establishing some method of instruction whereby the car men of the whole country can be educated in the proper interpretation of the law was urged, one suggestion being that the association issue an official circular with illustrations to show the proper methods of application. Education by means of a corps of authorized district instructors was also suggested. The necessity for immediate action regarding this matter was urged by several members, the extent to which present conceptions are nebulous as to the requirements of the law being indicated by the fact that in one important interchange center, 20 per cent of the applications were found to be such as to constitute penalty defects under the law. Several of the roads have instituted interesting methods of correctly meeting this situation, the New York Central System, for instance, is getting out an illustrated book of instructions covering the work. On the Union Pacific R. R., one of each of the several classes of cars used on that road was studied and fitted up by a special committee and used as a means of demonstrating what was conceived to be

in the course of the next few months. By formal motion, the report of the committee was accepted.

RULES FOR LOADING MATERIALS.

The report of the committee on rules for loading materials was read by A. Kearney, chairman, and showed a very general revision for the purpose of eradicating many of the minor errors and making numerous small changes, the desirability of which has become evident since the 1912 code was adopted. The discussion of the report indicated the importance of closer co-operation in the enforcement of the rules already extant. The report was accepted and referred to letter ballot.

OVERHEAD INSPECTION OF BOX CARS.

A. Kearney, chairman of the above named committee, read a report on this subject in which it was advised that the committee had explained to the American Railway Association sub-committee in detail the code of rules for the overhead inspection of box cars, which had been formulated at their suggestion. Several changes were made, without, however, disturbing its general plan or principle, and the code was finally accepted by the American Railway Association committee and laid before the American Railway Association at their semi-annual conference, held in Chicago, November last, at which time it was accepted by that association and proposed as recommended practice. It is the understanding that the railroads will, through the American Railway Association, he asked to give the project a thorough trial. The committee expressed a wish that should any objections be

found, the circumstances may be fully explained to the committee, so that the code may be improved in detail, rather than set to one side as a whole, should they not perhaps meet certain local conditions. The committee in making this explanation of the status of the work advised that it is its understanding that its work is now at an end temporarily, that is, until some report is made pointing out needed alterations in the card or code. A transcript of the rules as finally adopted was included in the committee's report, which was received and the committee continued.

INTERLINE LOADING OF COMMODITIES.

The committee having this subject in charge, A. Kearney, chairman, made a progress report, which was accepted without discussion. The committee was continued for further investigation of the subject and report at next year's convention.

CAR TRUCKS.

The committee on car trucks covered in its report, read by L. C. Ord, member of the committee, the following items:

- 1. Limiting dimensions for cast steel truck sides for 80,000, 100,000 and 140,000 pounds capacity cars and revised specifications covering same.
- 2. Design for cast steel truck bolsters for 80,000, 100,000 and 140,000 pounds capacity cars and revised specifications covering same.

in fact, in the different frames used on the same road. The limiting dimensions finally determined upon for both side frames and bolsters are shown in the sketch herewith.

Specifications and Tests of Truck Sides: Proof test weights were recommended as shown in the table:

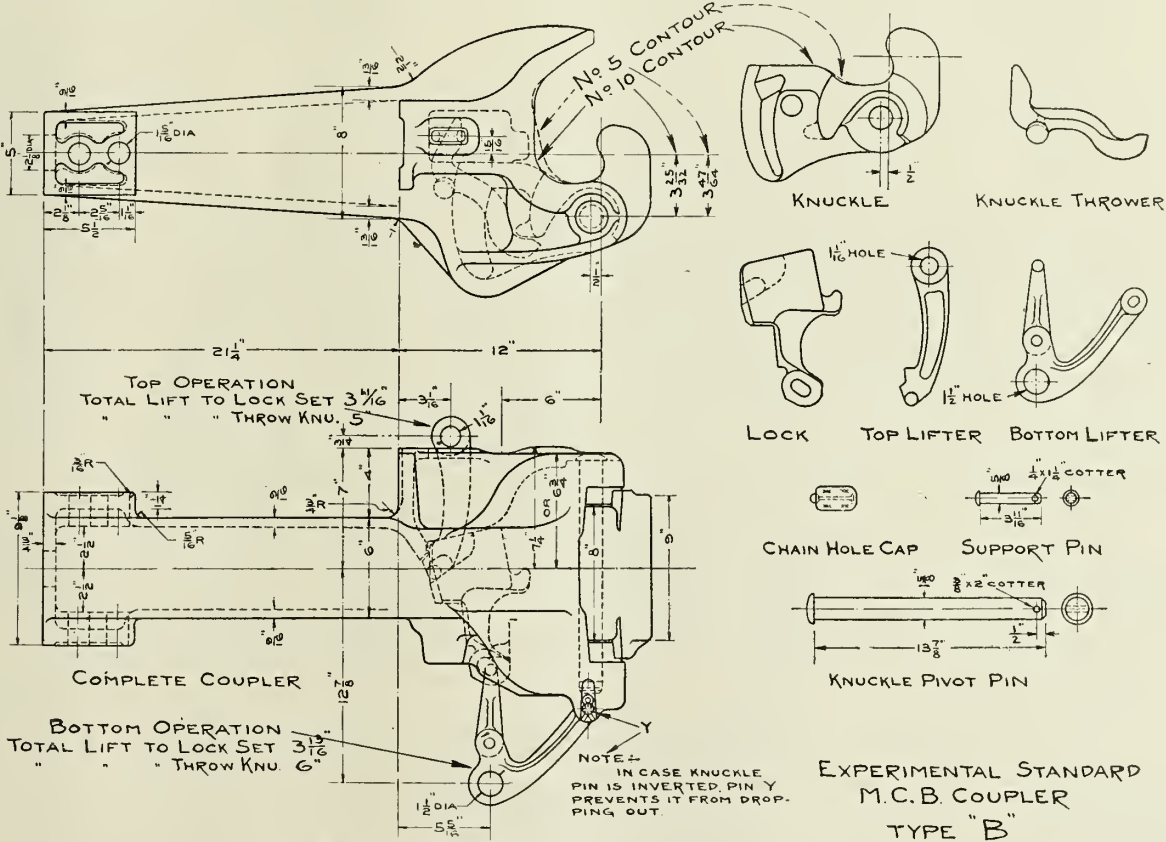
Car capacity, pounds.	Initial load, pounds.	Load, pounds.	Proof tests.	
			Maximum deflection, inches.	Maximum Set, inches.
80,000	20,000	110,000	0.15	0.01
100,000	25,000	125,000	0.15	0.01
140,000	35,000	175,000	0.15	0.01

Limiting weights of truck sides were recommended as shown below:

Car capacity, pounds.	Weights, pounds.		
	Minimum.	Normal.	Maximum.
80,000	*415	*425	*445
100,000	490	500	520
140,000	645	660	685

*Estimated.

Designs of Cast Steel and Pressed Steel Truck Bolsters: Owing to the admitted superiority of the drop-forged form of center plate, the committee prepared designs of bolsters both of the cast and the pressed steel variety, for cars of



Experimental Standard M. C. B. Coupler, Type "B."

- 3. Spread of side bearings, center to center, on various capacity cars from 60,000 to 100,000 pounds.
- 4. Clearance of side bearings.
- 5. Construction of center plates for standard freight cars.
- 6. Springs for trucks.
- 7. Strength of arch bar trucks as compared with cast steel truck sides.

Limiting Dimensions for Truck Sides and Bolsters: The committee found entire lack of uniformity of dimensions in the cast steel truck sides hitherto produced by the various manufacturers and already in use by the different roads, and

80,000, 100,000 and 140,000 pounds capacity, respectively, in which the detachable drop-forged type of center plate was provided for. The illustrations herewith show the details of the designs for 100,000 pounds capacity cars and are characteristic of the designs prepared for the 80,000 and the 140,000 pounds capacity cars.

Specifications for Cast Steel Truck Bolsters: Under the heading, specifications and tests, the committee recommended the following schedule of limiting weights to supersede the present requirements that the weights be not more than three per cent above nor more than two per cent below the weight previously determined upon as the normal:

Car capacity, pounds.	Weights, pounds.		
	Minimum.	Normal.	Maximum.
80,000	*660	*675	*700
100,000	735	750	780
140,000	*855	*875	*910

*Estimated.

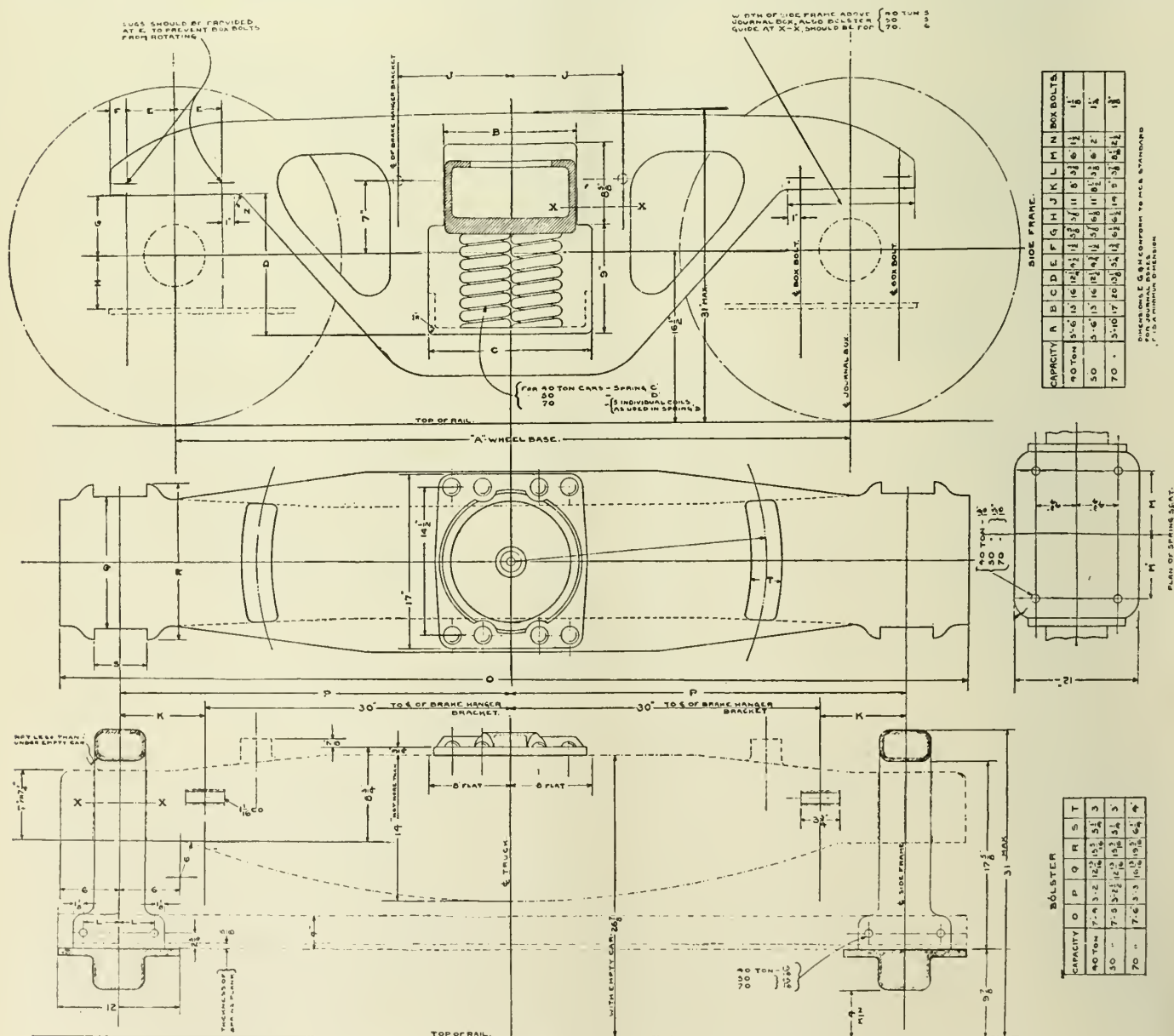
Spread of Side Bearings: On account of the great difference in opinion among the various roads, the committee was not able to decide on the proper distance for spread of side-bearings on 100,000-pound cars and those of less capacity, and in view of the fact that there are comparatively few 140,000-pound capacity cars in the country, the committee recommended a spread of 50 inches, center to center, on cars of this capacity and expressed the opinion that it would be wise to make the same recommendation in regard to other capacity cars, but requested another year's time in which to go over the matter thoroughly before making a definite recommendation.

Clearance of Side Bearings: The committee recommended a minimum of $\frac{1}{8}$ inch and a maximum of 5-16 inch clearance per side bearing or $\frac{1}{4}$ and $\frac{5}{8}$ inches per truck, respectively.

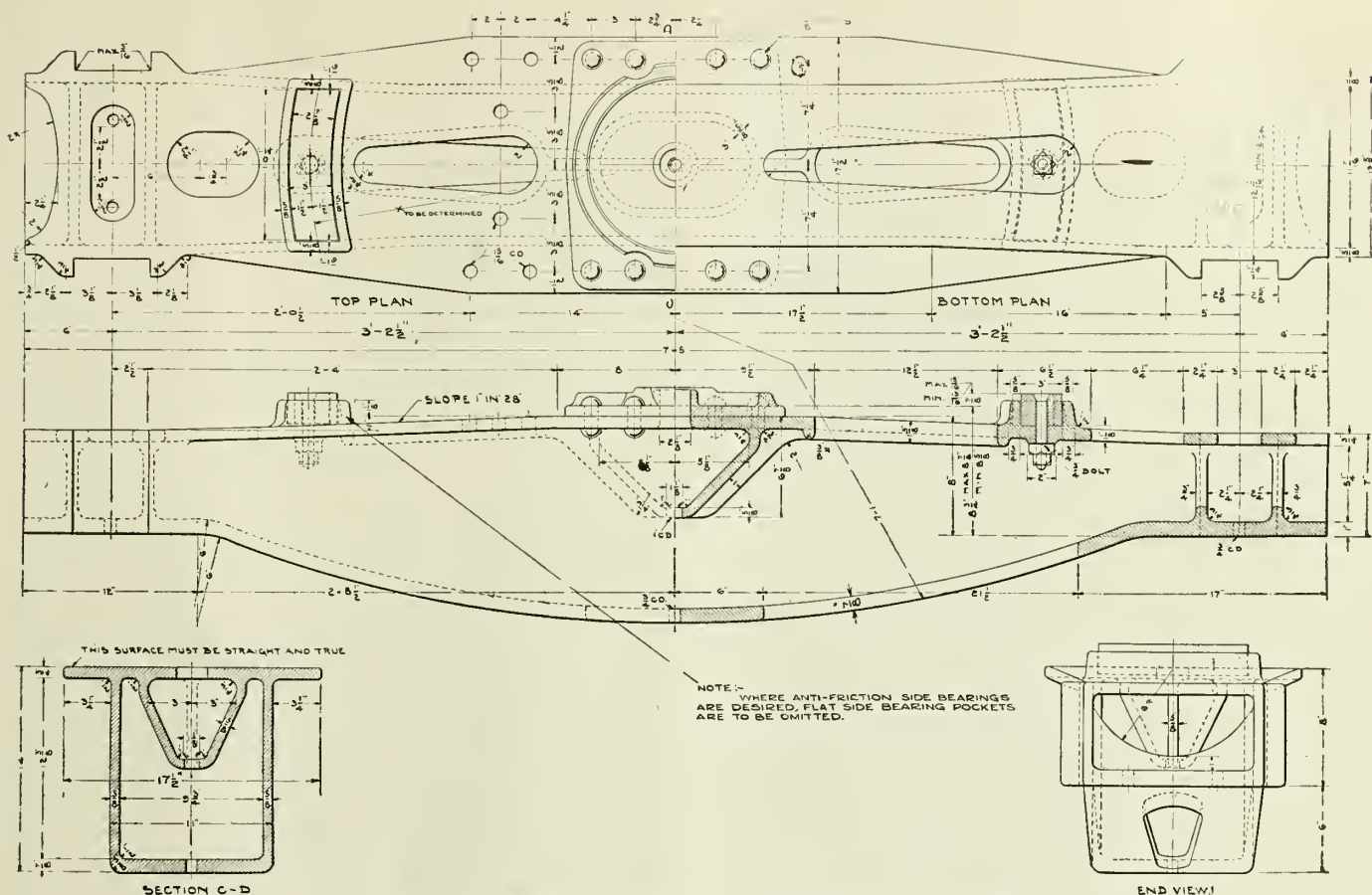
Construction of Center Plates: The committee received no requests for changes in the present center plate standards, and expressed a belief that the performance of the M. C. B.

standard center plate under cars of 80,000, 100,000 and 140,000 pounds capacity has been satisfactory. A change in the overall height of the center plates as well as the rivet spacing, however, was found to be necessary to make these center plates applicable to cars of steel construction and to the bolsters as above recommended. It was considered essential that the center plates be made of either steel castings or drop forgings; the latter being preferable as they can be more accurately manufactured and have smoother bearing surfaces; the cost also being slightly in favor of the drop forging. Sketches of the center plate, modified as above, were submitted.

Springs for Trucks: The committee advised that the cast steel truck side limiting dimensions and the bolsters for the 80,000, 100,000 and 140,000 capacity freight cars had been designed to accommodate the springs shown on sheet M. C. B. "H" of recommended practice, as follows: Spring "C" for cars 80,000 pounds capacity, spring "D" for cars of 100,000 pounds capacity, and a five double-coil cluster—made up of coils the same as used in spring "D"—for cars of 140,000 pounds capacity. This enables the same design outside and inside coils to be used for all three capacity trucks by varying the combination of number of coils and using the different design of spring caps according to capacity. The centers corner coils of the proposed "H" spring are disposed at the



Limiting Dimensions for Cast Steel Truck Sides and Bolsters for 80,000, 100,000 and 140,000 Lbs. Capacity Cars.

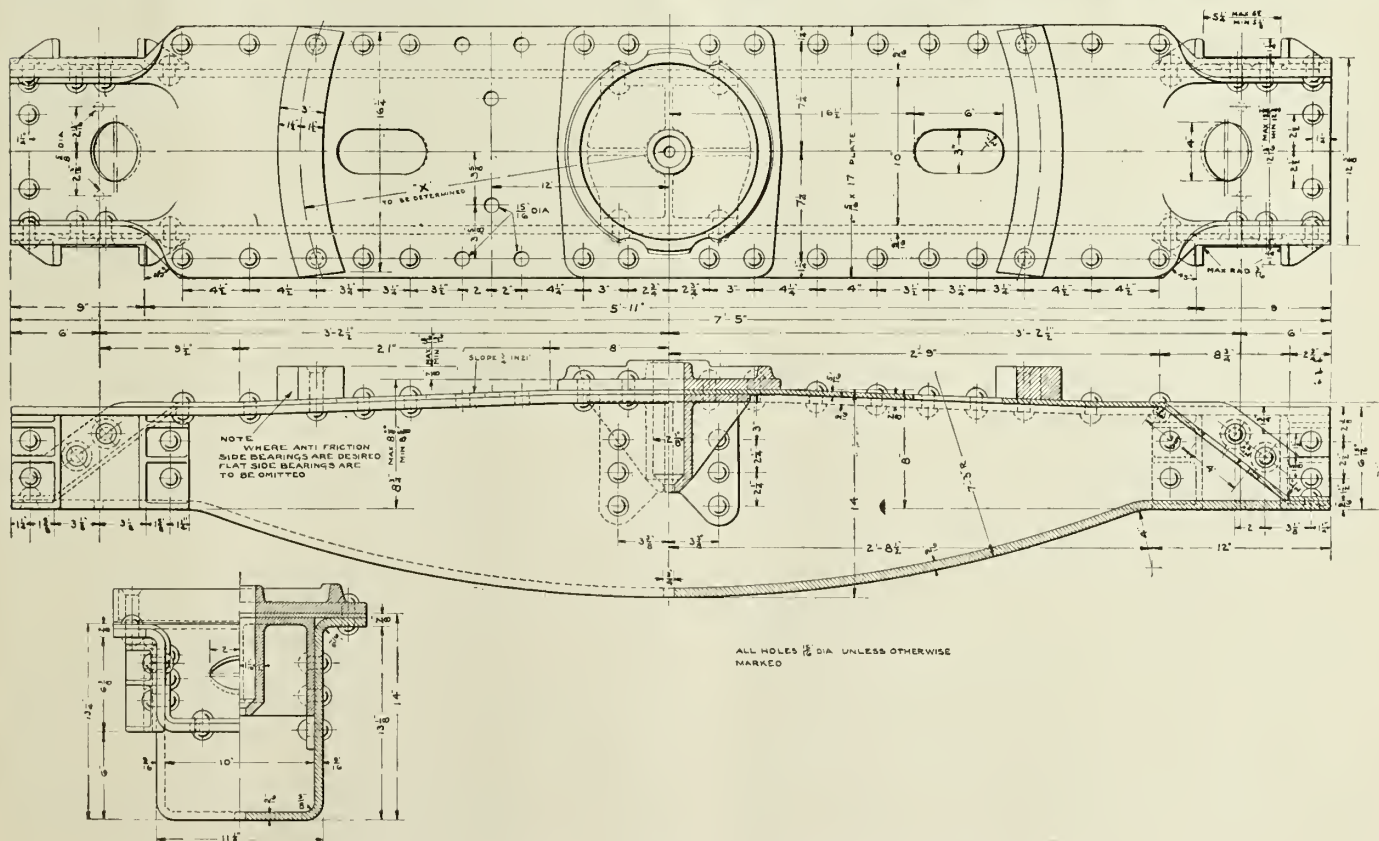


Design of Cast Steel Truck Bolster for 100,000 Pounds Capacity Cars.

corners of a rectangle whose dimensions are $9\frac{3}{4}$ by $5\frac{5}{8}$ inches.

Strength of Arch Bar Trucks: The committee having been requested to prescribe limiting strains per square inch for

arch bar trucks, had physical tests conducted with truck side frames built up of M. C. B. and other designs of arch bars. Tests were also conducted on cast steel truck sides and the results of two of these, which were representative of the



Design of Pressed Steel Truck Bolster for 100,000 Pounds Capacity Cars.

modified M. C. B. specifications, as well as the results with the arch bar types, were plotted graphically to show comparative center line deflection and permanent set. These comparative tests, the tabular results of which accompanied the report, showed conclusively the decided superiority of cast steel truck sides.

Safety Hangers for Brake Beams: The committee by request gave consideration to the subject of safety hangers for brake beams and stated that their experience with the majority of brake beam safety hangers has been that these devices have been inefficient and a source of expense from a maintenance standpoint. Unless they are designed with a strength at least equal to the loads imposed upon the brake beam hangers and in such manner as to prevent wear, they will not be efficient when the emergency arises for them to perform their functions. Furthermore, with the present lack of interchangeability and the uniformity of design of brake beams and trucks, it would be impracticable to design a standard safety hanger which would be generally applicable. The committee reported that it could find little, if any, cause for the employment of brake beam safety hangers where the brake beam hangers and connections are designed and manufactured with proper care and expressed the opinion that the remedy lies along these lines rather than in the adoption of the auxiliary device of brake beam safety hangers.

Miscellaneous gages for checking the dimensions of truck sides, bolsters, and journal boxes were illustrated and instructions for their use were given. In addition to these, the committee announced its intention of preparing a set of limiting gages with which to insure the free working and the interchangeability of center plates, and with the addition of this latter feature the report was accepted and referred to letter ballot.

TRAIN LIGHTING.

T. R. Cook, chairman of the committee on train lighting, submitted a report dealing mainly with the matter of pulley fits on the axles of dynamo-carrying trucks. The recommendations of a similar nature made by the committee at last year's convention were rejected on letter ballot. Similar action was met with by the committee's recommendations of last year as to the dimensions of battery boxes. Both of these items were recommended a second time to letter ballot, to which they were referred at the conclusion of the report, on motion by E. W. Pratt.

TANK CARS.

The committee on tank cars gave a general resume of the tank car situation, recommending the following modifications to the 1913 specifications for tank cars:

That a new paragraph be added under General Requirements (page 2) as follows: "(d) Tanks which do not meet the prescribed tests shall be withdrawn from transportation service."

That section 5, test of specifications for ordinary tank cars, be amended to read as follows:

"Tanks must be carefully inspected and tested before being put into service, again at an interval of ten years, and after that at intervals of not over five years; with the exception that where tanks are used for carrying corrosive products, deterioration is to be expected in a shorter time, and the first test period shall then be reduced to five years. Tanks requiring this five-year test shall be those used for carrying chemicals, such as acids, ammonia liquors, and such other products as hereafter may be specified. Provided, that any tank damaged to the extent of requiring renewal of sheet, or extensive riveting or recaulking of seams, shall be retested before being returned to service. All tests shall be made by completely filling the tank with water of a temperature which shall not exceed 70 degs. F. during test. The prescribed pressure must be held for not less than ten minutes after the tank has been caulked tight, and may be ap-

plied in any suitable manner. The tests for tanks built prior to 1903 shall be at 40 lbs. per sq. in., and for tanks built since that date at 60 lbs. per sq. in., which they must stand without leak or evidence of distress. After January 1, 1915, all tanks tested to less than 60 lbs. pressure shall be stenciled 'not to be used for liquids requiring the inflammable placards under the I. C. C. regulations.' After January 1, 1918, all tanks in transportation service shall be subjected to the full test requirements of 60 lbs. per sq. in. Tanks when tested must be stenciled with the date, pressure at which tested, place where test was made, and by whom, as follows: Tested (date), Pressure (lbs. per sq. in.), At (place), By (name of firm). The tank-car owner shall be responsible for the proper carrying out of all inspections and tests and stenciling, and for the certification of the tests to the bureau for the safe transportation of explosives and other dangerous articles."

That section 7, test of safety valves, specifications for ordinary tank cars, be amended to read as follows:

"Safety valves must be tested and adjusted if necessary (a) on new cars, before the cars are put into service; (b) on existing cars, by January 1, 1916; and thereafter on all cars at intervals of not over two years. When valves are tested, the date, pressure to which tested, place where test was made, and by whom, must be stenciled on the body of the tank, near the end and adjacent to the stenciling for test of tank, as follows: Tested (date); Pressure (lbs. per sq. in.); At (place); By (name of firm). In addition to stenciling on body of car, there shall be stamped on body of valve, in $\frac{1}{4}$ or $\frac{3}{8}$ in. figures, the date of test and pounds pressure to which valve was tested. Date of test on tank and last date on valve must correspond. The test may be made without the removal of the valve from the car, provided the valve unseats at a total pressure corresponding with the area of the seat multiplied by the required pressure. Valves improperly set, or not tested and stenciled at proper intervals, shall constitute defects for which the owner shall be responsible. The tank-car owner shall be responsible for certification of tests to the bureau for the safe transportation of explosives and other dangerous articles."

Also that a new paragraph, "No. 8, Certification of Tests," be added, reading as follows: "Certificates of all tests of tanks and their safety valves shall be sent to the bureau for the safe transportation of explosives and other dangerous articles, in such form as may be prescribed by the bureau."

In an appendix to the committee's report there were given the results of a series of inertia tests with a car whose tank was partially filled with water to determine what effect the shifting and kicking of a tank in and about switching yards may have in inducing leakage. From the results of the test it was concluded that "a tank which will stand 20 lbs. water pressure without leaking will withstand the shock acquired in transportation when filled with a liquid of the same viscosity as water."

A. W. Gibbs, chairman of the tank car committee, commented on the faulty construction of discharge valves, believing that this matter is deserving of more careful attention from the owners than is being given. The agitation whereby an effort has been made to induce the M. C. B. Association to authorize the marking of light weights and capacities, was referred to as being impracticable, owing to the wide variation in the weights of the various liquids hauled, besides which it is a traffic matter toward which the traffic departments also are ill-disposed. The secretary was instructed to advise the General Managers' Association of the Southeast, the body that has been most actively agitating for the stenciling of weights on tank cars of the attitude of the convention. On motion of J. J. Hennessey, the report was received and referred to letter ballot.

DAMAGE TO FREIGHT CAR EQUIPMENT BY UNLOADING MACHINES.

The first of the technical reports to be considered in the concluding session on Friday morning, was that of the committee on damage to freight car equipment by unloading machines. The committee was able to announce that much has been accomplished in reducing the damage to freight cars by the application of blocking to the movable platen type of car dumping machines in accordance with typical design submitted to the 1913 convention, and adopted as recommended practice. It was stated that manufacturers of other types of machines are attempting to follow out the recommendations made last year, and that the steel manufacturers and industrial plants are taking a keen interest in the matter and have had a committee of thoroughly competent members going over the individual machines, for the purpose of having blocking applied as per M. C. B. recommended practice to movable platen type machines and corrections made to those of the solid floor type. The committee wished to impress on all the need of properly spotting cars in the cradles, the importance of maintaining blocking by renewing the faces thereof, the absolute necessity of maintaining extension clamps at all times, and of proper supervision of machines at industrial plants to insure their carrying out the recommendations of the association. The report was accepted and the committee was discontinued.

SPECIFICATIONS AND TESTS FOR MATERIALS.

The above named committee was instructed to revise certain specifications of the association and prepare new ones covering certain other classes of material covered in the recommendations of last year's committee on form. Accordingly specifications covering sixteen different classes of material were sent out for criticism by the members, and, as a result of these criticisms and subsequent meetings, it was agreed that the following named materials only could be handled this year: air-brake hose, heat-treated knuckle pivot pins, steel axles, refined wrought iron bars, welded pipe, helical springs, chain and journal-box brasses; and that the specifications covering the following materials could be further investigated and specifications offered at the next annual meeting: refrigerator car heat insulation materials, mild-steel bars for miscellaneous parts, steel castings, rivet steel and rivets, structural steel and steel plates, galvanized sheets, malleable-iron castings and elliptic springs.

The committee, through correspondence with the Association of Rubber Goods Manufacturers during the year, has been co-operating with that body in order to establish standard methods of making tests and standard test apparatus, as there are no standards covering the testing work for this class of material in existence today. The specifications covering air brake and signal hose for passenger and freight equipment cars were revised, changing the form of the specifications and explaining the methods of test, but the committee endeavored not to make any changes in the requirements of the specifications other than those in existence as standard, and as adopted in 1913. The committee recommended that the revision of the specifications for air brake and signal hose for passenger and freight equipment cars be made standard, that the specifications offered for steel axles be adopted as standard, and that the following specifications be submitted to letter ballot as recommended practice; refined wrought-iron bars, heat treated knuckle pivot pins, welded pipe, helical springs, chain, and journal box brasses. C. D. Young, who is engineer of tests, Pennsylvania R. R., is chairman of the committee, and at the conclusion of the report explained that the only change in the air brake hose specifications as compared with last year, is that the temperature at which the tests shall be made has been increased 15 degs. and that the first sentence of the section covering the inspection of hose has been eliminated. No change was made in the specifications for axles other

than to provide for a drop test for 6 by 11-in. axles and a more stringent requirement as to the allowable phosphorus content.

The courtesy of the floor was extended to representatives of the rubber manufacturers, and was accepted, the respondent expressing his conviction that the new hose specification would produce the results desired. He expressed satisfaction in the treatment accorded the manufacturers by the committee, and urged that an effort be made to standardize the apparatus used on the different roads for the purpose of making air hose tests.

The report was accepted and referred to letter ballot, the committee being continued.

CAR CONSTRUCTION.

The committee on car construction, through its chairman, W. F. Kiesel, presented a very complete report, covering the subjects of center sills for new and old cars, box car end construction, car doors and fastenings, and specifications for complete new doors, placard boards for box cars and draft gears.

Center Sills for New Cars: For cars to be used in interchange, the committee recommended that the center sills conform to the following minimum requirements: area of center sills, 24 sq. in. minimum; ratio of stress to end load, 0.06, maximum, and length of center or draft sill members between braces, 20 d, maximum ("d" being the depth of the member, measured in the direction in which buckling might take place).

Box Car End Construction: The committee recommended that when existing box car ends need renewal they be reinforced between corner posts with the equivalent of two steel braces, each having a section modulus of 4, or more, the braces being applied vertically, horizontally or diagonally, as preferred. New cars to have $\frac{1}{4}$ -in. steel plate ends reinforced between corner posts with the equivalent of either two vertical steel braces with a total section modulus of not less than 9; or one vertical and two diagonal steel braces with a total section modulus of not less than 10; or three horizontal steel braces with a total section modulus not less than 10. The following alternative arrangement was suggested: Three or more steel braces, two of which run diagonally, with a total section modulus of not less than $12\frac{1}{2}$, and wood lining $1\frac{3}{4}$ in. thick. To concentrate strength at a point near the floor line on the vertical center line of the car, diagonal braces should extend from the center sills to the side plates, and not from the bottom corner to the ridge. The attachments for the braces and the members to which they are attached should be sufficiently strong to realize the full strength of the braces.

Hardwood or yellow pine may be considered equivalent to the steel members, if the section modulus is four times as great. Wooden posts and braces should be set in metal pockets not less than $1\frac{1}{2}$ ins. deep, and must be held in place by adequate tie rods. The lining at the car ends should be supported at intervals not greater than thirty times the thickness. Types of end similar to the Van Dorn ends, made of $\frac{1}{4}$ -in. plate, or the Murphy ends, with the lower half made of $\frac{1}{4}$ -in. corrugated plate, and the upper half with 3-16-in. corrugated plate, were suggested as acceptable substitutes for those described.

Car Door and Fastenings: The committee laid particular stress on the importance of substantial car door construction and offered the following specifications for the reinforcement of existing car doors:

"1. The necessary additional number of bottom door guides should be provided to make four on each side of the car—one adjacent to each door post, one in the middle of the doorway, and the other between the back door post and the open door stop, located approximately as shown on revised sheet M. C. B. 30 (reproduced herewith), and similar in de-

Dowel omitted from door guide. Design of lip changed from $1\frac{3}{4}$ -in. radius to square top with $\frac{1}{4}$ in. radius at each corner. Distance from center of bolt hole to bottom of guide changed from 2 in. to 3 in.

In the closed door stop, and in the open door stop, dimension of 2 inches from back of stop to lip changed to "To suit construction of door."

In the door-hasps staple, the design has been changed so that staple will fit over 3-16 by $1\frac{1}{2}$ -in. staple fastener. Number of bolts reduced from four to two, and staple extended.

Placard Boards for Box Cars: The committee recommends that the space available for placards should be not less than 16 by 24 inches on each end and each side of car. Box cars with sufficient space available on wood siding, or exposed lining, should have a rectangular space, painted black, on each side and each end. Other box cars should be provided with placard boards, made of soft wood, not less than 16 by 24 by 1 inch. The vertical edge should be reinforced with metal protection, and the bolts fastening the boards to the car should be not less than six in number, and should pass through the metal reinforcing pieces, three through each. The boards may be made of more than one piece, and should then be tongued and grooved. The distance from the floor line of the car to the bottom of the board should be not less than 4 ft. 6 in. Routing card boards, preferably the same size as the placard boards described, should be placed on the side of the car, as near as possible to the door seal.

Draft Gear: The committee recommends that cars should not be accepted in interchange unless equipped with draft gears and attachments having strength or capacity equivalent to or greater than the following requirements: The section area of draft timbers located underneath the center sills must be not less than 32 square inches. Each draft timber must be not less than 4 inches wide, nor less than 6 inches deep, and must be held securely to the center sills and end sills by not less than seven $\frac{7}{8}$ -in. bolts, or six 1-in. bolts. Draft timbers extending through or beyond the bolsters must be secured to the center sills by two or more additional bolts. Draft gear yokes must be not less than 4 inches wide by 1 inch thick, made of wrought iron or steel, and attached to the coupler side with not less than two $1\frac{1}{8}$ -in. rivets. Draft springs must have a capacity of at least 19,000 pounds.

In the case of cars requiring repairs to bring them up to these minimum requirements, the following recommendations were offered: Draft timbers should butt against the body bolsters and shoulder against the end sills, both of which in turn should be well secured against shifting from either pulling or buffing strains. Draft-gear stops should, whenever possible, be gained into the draft timber or heeled on the end sills. Front and back draft-gear stops may be made in one piece, or may be secured to a metal plate not less than 5-16 inch thick, or made separate. Each stop (counting two stops riveted to a 5-16-inch plate as one piece) must be secured to the draft sill by not less than six $\frac{3}{4}$ -inch bolts or their equivalent. The center sills should be strengthened by the use of a filling or packing piece secured between the same, butting against the end sill and extending beyond the body bolster toward the center of the car, a distance at least as much as between the bolster and end sill. The present M. C. B. coupler side clearance of $2\frac{1}{2}$ inches should also be provided.

The report concluded with reference to the possible value of design of box car by a committee of the association to serve mainly as a guide to the smaller roads not maintaining a designing staff, in the ordering of their house car equipment.

Discussion on the report, particularly as regards the recommendations for underframes, developed considerable ar-

gument as to the advisability of going on record as being in favor of the very radical changes in existing equipment as its provisions would seem to require. The great need of strengthened equipment and the realization that the proposals contained in the report, if approved by letter ballot, would establish recommended practice only, caused the several recommendations contained in the report to be disposed of by being accepted and referred to letter ballot. The suggestion as to the sample design of box car was referred to the incoming executive committee.

RETIREMENT OF LOW CAPACITY CARS.

At the convention in 1913, the question of the retirement of cars of 40,000 and 50,000 pounds capacity from interchange service was considered and a motion prevailed that a committee be appointed to consider the question in all of its phases. To the committee appointed to consider the subject it seemed desirable to give consideration to some of the principal features of the construction of the cars, as well as the marked capacity, and it accordingly addressed to the members of the association the following inquiries:

First: Have you any restrictions in force regarding the use of cars of 40,000 and 50,000 pounds capacity?

Second: Do you accept in interchange cars of 40,000 and 50,000 pounds capacity; if so, is the lading transferred?

Third: Do you regard it practicable to prohibit the use of cars of 40,000 pounds capacity in interchange?

Fourth: Do you regard it practicable to prohibit the use of cars of 50,000 pounds capacity in interchange?

The committee at the same time requested the members to advise as to the number of cars of the various capacities and several constructions operating on their lines. Based on the returns from this inquiry, the committee recommended that the following proposed rule be submitted to special letter ballot: "After October 1, 1916, all cars of less than 60,000 pounds capacity, having wooden or metal draft arms which do not extend beyond the body bolster, will not be accepted in interchange." A more definite recommendation, it was explained, was not warranted by the rather incomplete and unsatisfactory returns that were received.

The above quoted proposal, after some discussion, was accepted and referred to letter ballot.

ELECTION OF OFFICERS.

Having finished the last of the technical reports as above, the convention proceeded to the election of officers for the ensuing year, the result, which followed the recommendations of the nominating committee as previously announced, being as follows: President, D. F. Crawford; first vice-president, D. R. MacBain; second vice-president, R. W. Burnett; third vice-president, C. E. Chambers; treasurer, John S. Lentz; executive committee, R. E. Smith, J. C. Fritts and H. T. Bentley.

Appropriate remarks of acceptance were made by the newly elected president and first vice-president. F. W. Brazier officiated in presenting the past president's badge to the retiring president, Mr. Barnum, and the convention adjourned.

Cost of Legislation to the P. R. R.

The Pennsylvania R. R. has compiled elaborate statistics which disclose what it has cost that company to comply with the recent legislation, both state and federal, regulating the operation of railroads. Three classes of laws alone have added an average of \$2,775,000 a year to the operating expenses of the Pennsylvania system, including both eastern and western lines. All of this money is being spent in directions assumed by the lawmakers to be of advantage to the traveling public, or to the employees of the system, but which add nothing at all to its yearly revenues. The laws of the three classes, with the yearly cost of complying with each class, follow:

Hours of service laws	\$1,080,000
Boiler inspection laws	515,000
Full or "extra" crew laws	1,180,000

In addition, when the Pennsylvania system has placed on all its equipment the safety appliances required by law, a sum estimated at \$5,185,000 will have been expended for this purpose. To date the system has spent \$603,000 in complying with the law regulating the character of ash pans on locomotives, and the work of replacing the old ash pans is not yet finished.

Paying off employees semi-monthly, instead of monthly, involves an additional expense for the work of clerks, paymasters, etc., of \$400,000 a year in round figures, which is not included in the first mentioned total of \$2,775,000. Another cause of added expense of which few outsiders probably would ever think is found in the "Jim Crow" laws. Compliance with these statutes in the portions of "Jim Crow" territory through which the Pennsylvania lines run costs the system about \$43,000 a year, a small sum compared with other items of legislative expense, but typical of a numerous class of small expenses, which, in the aggregate, run into a good deal of money. The total cost to the Pennsylvania system of obeying the "Jim Crow" laws from their first appearance on the statute books to June 30, was \$300,700.

Expenses directly incurred by the Pennsylvania lines in obeying specific orders of various state commissions up to June 30, 1913, were as follows:

New York	\$233,314
New Jersey	196,606
Pennsylvania	65,704
Maryland	6,485

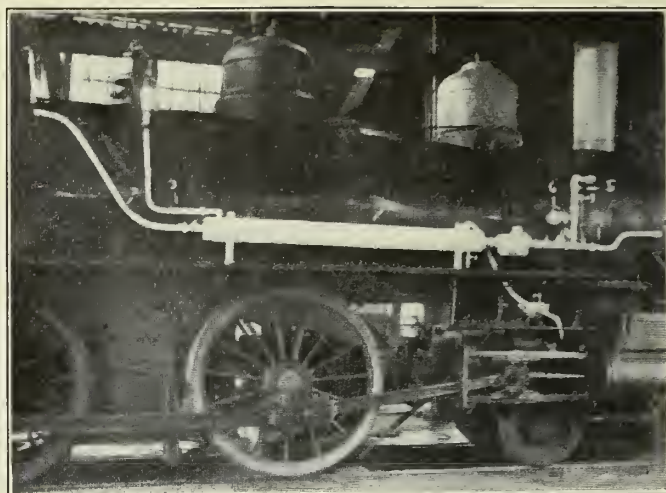
If the letter of all the laws regarding grade crossings removal were to be enforced the cost to the Pennsylvania lines would be \$63,850,000, the statistics show. By far the greater portion of this sum would be spent in New Jersey, which enacted a most drastic grade crossing law, placing the full burden of the cost on the railroads. As a matter of fact, railroad men say, the New Jersey law is not being enforced to the letter because of its obvious impracticability from a financial point of view.

Feed-Water Heaters, New Orleans Great Northern R. R.*

By MONRO B. LANIER.

The New Orleans Great Northern R. R. is equipping its locomotives with a device gotten up in its own shops for the purpose of pre-heating the feed water. In construction and design this pre-heater is simple, consisting of an auxiliary exhaust heater operated in tandem with a front-end or smoke-box heater.

The auxiliary heater consists of a cylindrical shell 8 to 10 feet in length, containing a number of copper tubes running lengthwise with the shell. This device is applied on the feed pipe between the injector and the boiler check and is connected with an exhaust pipe from the pump. The feed pipe continues from the forward end of the heater through the front end into the lower forward portion of the smoke-box heater. The front end heater is simply a hollow diaphragm supplementing the regulation diaphragm for each respective engine, yet of the same shape and arrangement with regard to location, etc. The space within the diaphragm is arranged in sections by diverters, placed in such position as to force the circulation of the water over the

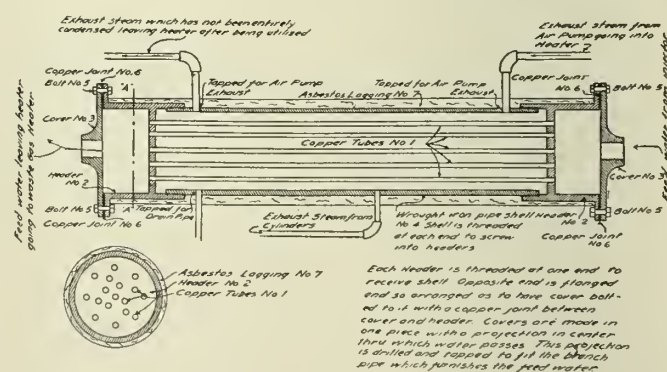


Application of Feed Water Heating Apparatus to Locomotives of the New Orleans, Great Northern R. R.

widest possible area; no set rules are given as to the exact location of the diverters, this being governed by the size and shape of the diaphragm.

With the injectors in operation, the feed water passes from the feed pipe through the copper tubes of the exhaust heater, absorbing heat from that steam which is exhausted from the pump, into the lower rear end of the shell. The exhaust steam passes upwards over and between the copper tubes, the condensation flowing from the lower forward end of the shell through a drain pipe to the ground and the heated feed water flowing from the copper tubes through the continuation of the feed pipe into the front end of the smoke-box heater, then passes upward, circulating over the hot flattened surface around and through the diverters, leaving the heater and then flowing past through the boiler check into the boiler. Line checks are placed in the feed pipe at both ends of the auxiliary heater, an exhaust pipe to the atmosphere relieving the shell of such steam as is not condensed.

A "tee" on the branch pipe between the exhaust heater and the front end connects with the boiler check, and valves are so adjusted on both lines as to divert the feed from the



Exhaust Steam Feed Water Heating Apparatus, New Orleans, Great Northern R. R.

front end heater at any time this may be desired. A connection is made from the lower portion of the boiler to the smoke-box heater, permitting when opened, the circulation of water from the boiler through the heater.

The increase in feed temperature from each of the two heaters is governed by working conditions, such as the operation of the injectors, the size and speed of the pumps and the front-end temperature. The following observations were made in regard to delivery temperature from each

*Extracted from a paper read at the recent convention of the International Railway Fuel Association.

heater, and the degree of pre-heat obtained under approximately similar working conditions:

GAUGE PRESSURE 185 (200 ABSOLUTE).

Injector Monitor No. 10	Delivery Temperature from Injector	Delivery Temperature from Exhaust Heater	Delivery Temperature, Front End Heater	Total Degree Pre-heat.	Percentage Indicated Economy.
Operating Full open	150	195	220	70	6.28%
3/4 open	160	200	220	60	5.94%
1/2 open	180	210	230	50	5.00%
1/4 open	210	230	260	50	5.15%
Average	160	200	220	60	5.94%

It is claimed by the mechanical department of the New Orleans Great Northern R. R. that their engines equipped with this pre-heater are operating more economically than heretofore and that former poor steaming engines are now readily kept at a high and even pressure, and further, that troubles from leaky flues and mud rings, and from broken stay bolts have been reduced to a minimum.

Affairs of the Master Mechanics' Association.

By D. R. MacBAIN.

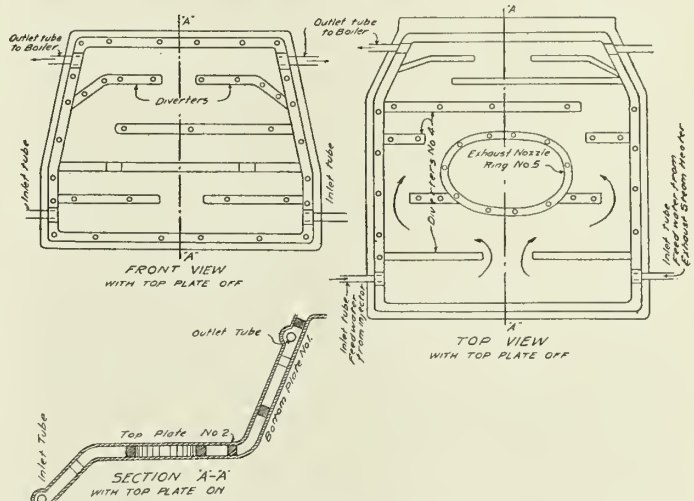
The following comment is abstracted from the address delivered by Mr. MacBain, as president of the American Railway Master Mechanics' Association, at the opening session of the recent convention of that organization, in Atlantic City, N. J., on Monday, June 15, 1914:

The past year has made its mark in the way of legislation and regulation, but thus far, though materially adding to our burdens, we seem to have assimilated the new things, in part at least, and the prospects seem to be good that the new problems of the past year eventually will be solved without serious inconvenience. The question regarding the factor of safety applicable to locomotive boilers in service prior to January 1, 1912, was settled recently, and it is my belief that the agreement reached at the conference of the railroad representatives and the officers of the government is equitable and should prove satisfactory to all concerned. On the whole, the spirit of co-operation manifested by the representatives of the railroads toward the representatives of the federal and various state governments, in my opinion, has been of great value in associating us on a common, workable plane, and I would urge that we all give to this particular phase of our business the necessary thought and co-operation in order that we may receive due recognition by the several governments of the fact that we are endeavoring to do our utmost in all things that are essential, regardless of whether we succeed at all times to their entire satisfaction.

At the present time there are numerous features in relation to design, construction, maintenance and operation that are common to nearly every railroad on this continent, and therefore it would seem that there should be prevalent something in the nature of standard practices. While we may not have quite as many different practices as we have railroads, we will, for the sake of argument, let the assertion stand. Is it not probable that in all things pertaining to design, construction, maintenance and operation there must be at least a few items that this association could pass upon authoritatively and make recommendations which, if put into practice, would result in much good, not only to ourselves by reason of diminishing our troubles, but also to the respective companies we serve by reducing the cost of transportation? In all the things with which we have to cope in life, the right and wrong means to the end desired are recognized, and in the locomotive field there is, perhaps, greater likelihood of error in the selection of the right methods than there is in any other branch of railroad service. Why not, then, cast our individuality aside and endeavor to adopt and foster the right methods, and thereby fulfill the most important function of this association?

It is fully realized, of course, that even this action would not be dominant in every particular case and entirely eliminate the idea of individual superiority and importance, but nevertheless it has been the author's experience that the men who really do things are those not blind to the fact that someone else might be in the right and they themselves in the wrong. It is felt, however, that ultimately it will be found that nearly all of the men are broad-minded enough to discern the difference between the right and the wrong and will avail themselves of the benefit of the doubt.

At the convention of this association in 1906, President Ball, in his annual address, told us of the increase in tractive power during the period from 1896 to 1906. In the eight years intervening since that time wonderful changes have occurred in this respect. Comparing the average tractive effort of approximately 1000 locomotives operating on one of the important trunk lines, we find that since 1906 there has been an increase of 7600 pounds, or 26.48 per cent. In the face of this large increase, it is rather laughable to think that but a few years ago



Front End Auxillary Feed Water Heating Apparatus, New Orleans, Great Northern R. R.

we were all pretty well agreed that the limits of size of locomotives, both passenger and freight, had been reached. Nor has the limit been reached yet; we are still going ahead; the evolution of the locomotive continues, and larger and more powerful units are being produced daily and are performing work, with efficiency and economy, far beyond the fondest expectation of the most optimistic of the men who introduced these types. And last, but not least, insofar as size is concerned, comes the triplex articulated locomotive, the value of which is still to be determined.

It is gratifying to note that during the past five or six years more attention has been directed to the question of proper boiler proportions, and the effects of these changes have been very satisfactory in the production of unit efficiency, as well as in the reduction of haulage cost per ton mile. This is believed to be one of the wisest steps taken by the mechanical officers of the railroads in many years, and it is pleasing to note that the change is almost universal in the acquirement of new power. On older engines of quite modern design, where the boiler proportions are not quite as symmetrical as those on the power being built today, we have been able to increase the unit efficiency and decrease the fuel consumption per ton mile by the introduction of modern devices, chief among which and by far the greatest benefactor, being the superheater. This has afforded the means of taking the longest single step in advance in locomotive service that ever has been observed on this continent. During the few years since the superheater was generally adopted by the railroads, we have been able to overcome the difficulties attendant upon its use, and we now feel that we could



New Type of Military Transport Car, Great Indian Peninsula Ry.

not afford to get along without it. The question of lubrication and that of procuring suitable metals for packings and bushings, which at first appeared to be serious problems, now have become mere history for the most part, and those of us most skeptical in the beginning are now the strongest advocates of the superheater.

To demonstrate what can be accomplished in the way of reducing the amount of fuel consumed by locomotives equipped with the superheater, it is desired to quote a few figures obtained from a test conducted to determine this point. In this test there were used three class "K" pacific type locomotives—one a saturated steam engine, one built with a superheater, and one that had a superheater applied after having been built. The results of this test follow:

Engine number	Kind	Direction	Pounds of coal per dynamometer h. p. per hour	Percent Saving per dynamometer h. p. per hour (Taken as unity)
3441	Saturated	West	5.76	
3433	Built with superheater	West	3.97	31.1
3555	Equipped after building	West	4.09	28.1
3441		East	5.65	(Taken as unity)
3433		East	4.07	27.9
3555		East	3.91	30.0
3441	(Average east and west bound)		5.71	(Taken as unity)
3433			4.02	29.6
3555			4.00	29.9

The extensive use of the brick arch has proved to be another long stride toward unit efficiency and economy, and the change of sentiment that has taken place with respect to this device within the past five years, affords a splendid exhibition of the healthiness of this association in determining the factors that contribute to the general betterment of locomotive operation.

A few very interesting figures herewith, show the results of a test conducted with a Mallet engine in its three different forms, namely, the original non-superheater Mallet, the same engine with a superheater, and the same engine equipped with superheater and a brick arch. The figures represent the pounds of dry coal consumed per dynamometer horse power and are given as follows:

Speeds in miles per hour	Original Mallet	Mallet with Superheater	Mallet with superheater and brick arch
12.5	4.67	3.15	2.90
15.0	4.75	3.56	3.25
17.7	4.69	3.40	3.27
Average	4.70	3.37	3.14
Per cent saving in fuel.....		28.3	33.2

There are many other items of betterment that might be reviewed, each of which has its own important function in attaining general betterment. Where these devices have been installed and properly maintained, together with good adjustment and general maintenance of the locomotive, the results are indeed gratifying. To verify this, we need but quote further from the records of the trunk line previously referred to, showing that during the past ten years these conditions have brought about a fairly good saving in the consumption of fuel alone. We have selected a summer and a winter month in the year 1903 to

compare with a summer and a winter month in 1913, showing passenger and freight services separately.

Service	Month and year	Coal consumed	Per cent saving
Passenger	July, 1903	332 lbs.	
	July, 1913	239 lbs.	
		93 lbs.	28.01
Passenger	December, 1903	378 lbs.	
	December, 1913	253 lbs.	
		125 lbs.	33.07
Freight	July, 1903	144 lbs.	
	July, 1913	133 lbs.	
		11 lbs.	7.64
Freight	December, 1903	206 lbs.	
	December, 1913	155 lbs.	
		51 lbs.	24.76

These figures are authentic and would seem to justify what has been done by our executives and the members of this association as regards advancement, and surely such figures must expel from the minds of the stockholders all serious doubt as to the wisdom of the policy pursued.

New Military Trains in India.

By F. C. COLEMAN.

To meet the problem of better arrangements for the transport of British troops in India, which has been before the military authorities there for some time past, the Great Indian Peninsula Ry. has recently turned out of its Matunga shops in Bombay, a new type of car, designed by A. M. Bell, the company's wagon and carriage superintendent. The body of the vehicle, 68 feet long by 10 feet wide, is built directly on to a strongly braced steel underframe, the side sills being bolted to longitudinal angles running the full length of the solebars. The side pillars are braced by diagonals and the whole structure pulled together with long tie bolts passing through from the cant rails to the sills.

The framing of the superstructure is of Burmah teak, which is sheathed with planished steel panel plate on the outside, and lined with teak on the inside. Between the two skins a space of two inches exists which is divided by a layer of heat-resisting "Uacolite." The roof is treated in a similar manner, which represents the standard practice for all new passenger vehicles built for the Great India Peninsula Ry. since the old "sunshade" arrangement has been discarded.

The car is of the corridor type with end doors and vestibules to I. R. C. A. standard dimensions. The internal arrangements consist of galvanized steel tubular framing which supports the berths in tiers of three, a total of 66 soldiers being provided for in each car with berths 7 feet long, one above the other. The lowest forms a seat by day with the middle one folding down to form a back for it while the uppermost folds back against the parcel rack.



Interior of Military Transport Car, Great Indian Peninsula Ry.

There are no partitions to form compartments, but the berths being arranged transversely and opening off the side corridor, give a similar effect, with the advantage that the tubular framing and the open slats of the berths give the car an open and well ventilated interior. The men's rifles are stored below the lowest berths, while their kits are accommodated in parcel racks above the uppermost berths.

To secure a maximum cross section with the utmost permissible height without departing from the standard 3 feet 7 inches diameter wheels, the floor has been brought down on to the underframe. The interior therefore measures from floor to floor 8 feet 5 inches. At each end of the car are two lavatories and also a washbasin with plentiful water supply. The arrangements for the latter have been carefully studied, and about two tons of water are carried in galvanized cylindrical steel tanks placed below the carriage underframe, the supply for the high level tanks, etc., being pumped as required by semi-rotary hand pumps.

Incandescent gas lamps are used for illuminating the interior controlled by cocks at one end of the car. The gas reservoirs are fitted with "safety" valves to prevent escapes of gas should the pipes become damaged. For ventilating, a double row of "Monarch" exhausters are placed "hit and miss" along the roof, and above the windows are openings which may be closed either by venetian blinds or by shutters. This combination permits of the inlet of a steady current of air from the outside, through the interior and out by the roof. It is intended to run these cars in fixed trains with a canteen or refreshment car at the center, the troops having

meals provided at regular intervals. Officers will be accommodated in corridor sleeping cars attached.

By the help of these trains, it is intended to reduce considerably the time of transport of troops over many of the long runs between military depots in India, for no "rest halts" will be required, and as the "canteen" car will carry the commissariat arrangements, only stops for locomotive and train purposes will be necessary. There can be no comparison between the comforts provided in these new trains for the British soldier with those he has had to experience in the older types of four-wheeled, third-class carriages pressed into trooping service, one of which is illustrated herewith.

Cape Cod Canal Nearly Ready.

The canal across Cape Cod is approaching completion. Dredges working from opposite sides are expected to meet in the first days of July. By the middle of August the engineers estimate a depth of 20 feet at high water will be available for shipping throughout the eight miles of the new waterway joining Cape Cod bay to Buzzard's bay. For the present a depth of 25 feet will be established, but ultimately this will be increased to 30 feet. The canal is built at sea level. The width of the bottom of the approaches in either bay is 200 feet and the width of the bottom of the passing places is 250 and 300 feet. The canal, when completed, will be illuminated throughout on the street lighting plan and it will contain various aids to navigation of the most modern type. The construction of the Cape Cod canal, which is the fulfillment of an idea which has been more or less active since the days of the Plymouth colony, is due to the enterprise of a private company, the Boston, Cape Cod & New York Canal Co., of which August Belmont is president, the chief engineer being William Barclay Parsons. The engineering difficulties have not been serious, and fears of light soil and quicksands have not been realized. The benefits navigation will derive from the canal should be very great considering that the current will be unappreciable. The cut of eight miles will reduce the length of the water journey from New York to Boston from 326 miles via Pollock Rip to 260 miles via the canal through Long Island sound. The distance from New York to Boston via Nantucket Light is 402 miles. A saving of 70 miles will thus be effected between Boston and New York, Philadelphia, Baltimore, Norfolk and other Atlantic ports. It has been pointed out that the tonnage passing round Cape Cod through Vineyard sound equals that using the Suez canal, being more than 20,000,000 tons of cargo, more than half of which is carried in tugs and steamers. The tolls will be for the round trip, averaging seven cents for ships with cargo and three cents without. The cost of the canal will be about \$12,000,000.

Capitalization of Railways of the U. S. Relatively Small.

STATISTICS ON INVESTMENTS IN THE WORLD'S RAILWAYS SHOW U. S. ROADS LEADERS IN MILEAGE, BUT FAR BELOW SMALLER NATIONS IN COST.

Although railways of the United States, in 1912, comprised more than one-third the total mileage of the earth, their capital represented but little more than one-fourth of the entire investment in the world's railways. Average capital per mile of United States railways, in other words, was only slightly over three-quarters the average per mile of the entire world. How moderate is the capitalization of our railways in comparison with most foreign countries is shown strikingly in figures prepared by the Bureau of Railway News and Statistics and based on the yearly figures



Type of Car Formerly Used in Troop Trains, Great Indian Peninsula Ry.

given out by the Royal Prussian department of public works.

During the year 1912, according to these figures, approximately \$1,745,000,000 was added to the world's investment in railways, or an average of \$119,455 for every mile added to the total mileage during the year. This brought the aggregate capital of the world's railways at the end of 1912 to the gigantic sum of \$58,695,209,664. For the United States, however, capital in 1911 is placed at \$19,200,000,000, or \$78,722 per mile. This is the erroneous gross capital, which includes all duplications due to intercorporate ownership, and disregards the Interstate Commerce Commission's figure of \$15,000,000,000, or \$63,944 per mile, as the correct capital of United States railways. Making this correction, total world capital is \$54,502,553,664, or \$81,264 per mile, against \$63,944 in the United States.

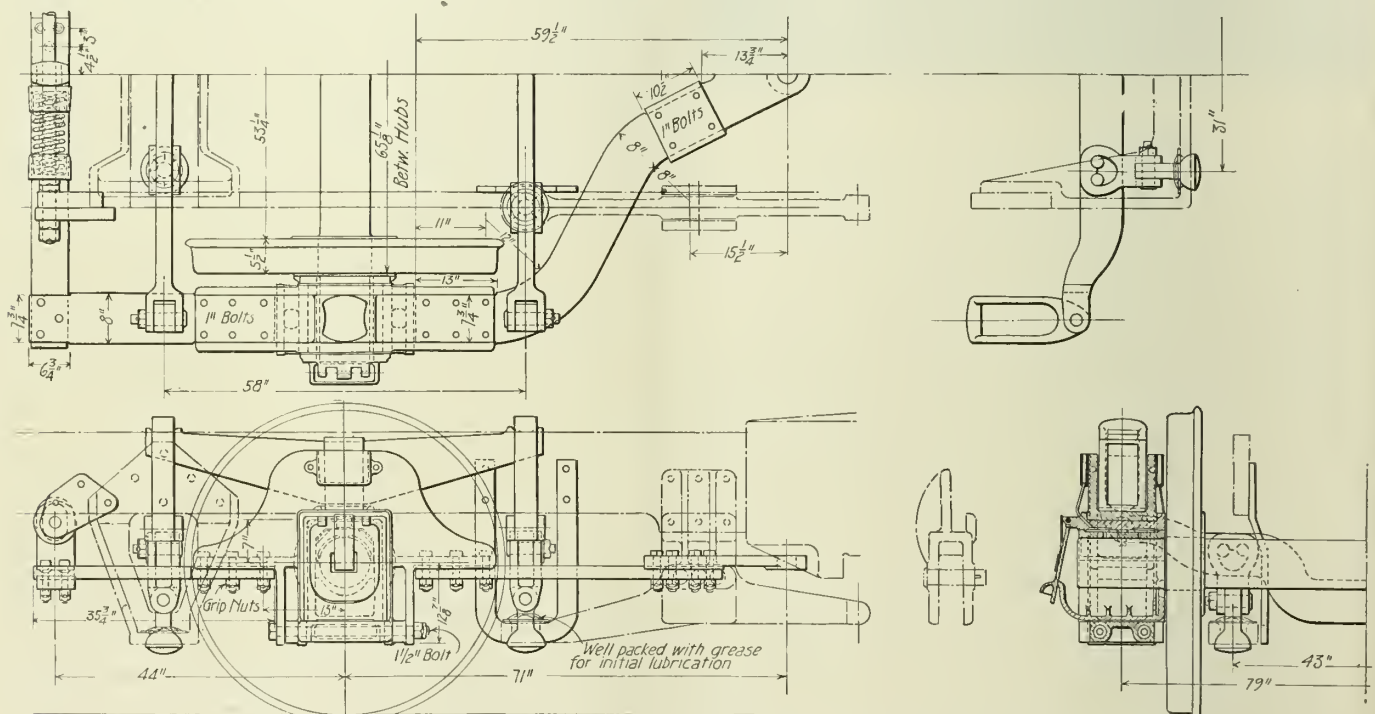
This places the United States 18th in the list of countries in order of capitalization per mile, though by a margin of more than 200,000 miles first in point of mileage. The countries which exceed the United States in capital per mile are, in order: England, \$269,495; Belgium, \$189,023; France, \$143,435; Brazil, \$142,080; Italy, \$124,116; Austria, \$120,311;

America have only 22,237 miles of state-owned roads, against 321,406 of private. Australia has the largest proportion under government ownership, 18,970 miles out of 21,678, while in Asia, 43,840 out of 66,534, and in Africa 15,835 out of 26,491 are state-owned. For the world, private companies own 456,416 miles or 68 per cent of the total; government, 214,581 miles, or 32 per cent of the total.

Austin Improved Trailing Truck for Locomotives.

Description of an improved type of trailing truck for locomotives of the Pacific, mikado and similar types, and recently applied by the Lima Locomotive Corporation to Pacific locomotives for the Great Northern Ry.

The Lima Locomotive Corporation, Lima, Ohio, is supplying the Austin improved trailing truck on engines of the Pacific, mikado or similar types, as a feature exclusive with this manufacturer. This truck, the construction of which is shown by the accompanying illustrations, was designed with a view to improving the action and maintenance of trucks applied as trailing



The Austin Trailing Truck for Locomotives, Lima Locomotive Corporation.

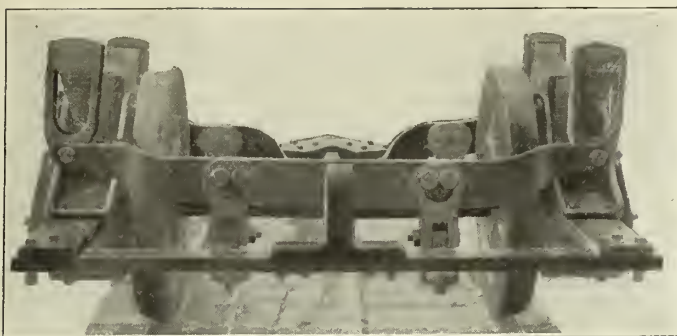
Switzerland, \$117,953; Germany, \$116,661; Roumania, \$88,937; Spain, \$88,368; Japan, \$84,301; Russia, \$83,496; Holland, \$82,796; Servia, \$73,373; Hungary, \$69,084; New South Wales, \$65,989; Algiers, \$64,019; United States, \$63,944.

Some of these countries of higher capital have narrow gage railways, while many others offer service and equipment which would not be tolerated in the United States. Only the following countries, continuing the order, are below our own railways in capital per mile, most of them being countries of very poor railway facilities, while for some the latest figures represent capital from five to ten years ago: Sumatra, \$60,885; Denmark, \$59,683; Victoria, \$58,588; Argentina, \$56,821; Uruguay, \$52,921; Chile, \$52,480; New Zealand, \$52,206; Sweden, \$51,386; Canada, \$50,952; South Africa, \$50,380; Gold Coast, \$49,152; Bulgaria, \$45,651; East India, \$45,089; Norway, \$43,256; Cuba, \$42,624; Tasmania, \$42,239; South Australia, \$39,928; Siam, \$38,681; Finland, \$36,864; Lagos, \$33,792; Queensland, \$32,600; West Australia, \$25,599; Sierra Leone, \$20,582.

Europe retains by a large margin the leadership for the state-owned railways, 113,699 miles being under government ownership, against 98,952 under private. North and South

wheels. The component frame members, which may be identified by reference to the drawing reproduced herewith, are simple and easily assembled. The frames, right and left, are interchangeable and reversible. The radius bar is made in heavy rectangular section and is well attached to a separate cast steel radial hinge. The rear end of the framing is composed of two side bars adjoining the cast steel frame and a cross bar connecting transversely. On this bar is mounted a centering device, but this centering device is unnecessary and can be omitted if desired, the features of the truck being so arranged that "gravity centering" is accomplished through the medium of the heart shaped links which are component parts of the suspension cradles, both front and back of the wheels.

These suspension cradles consist of cross equalizers as illustrated. The rear cradles are attached to the outside spring hangers and in turn suspended from a positive fulcrum by the heart shaped links which are somewhat in the form of universal couplings. The lower portion of these links has a spherical head which allows twisting movements in all directions and also allows the transverse radial motion for the entire cradle. The first knuckle joint above these spherical ends allows a fore and aft movement, so that when the truck radiates the apparent



Austin Trailing Truck.

lengthening and shortening of the side members is fully accounted for. The transverse movement of the cradle is governed at the bottom by the spherical head, but at the top by two pins connecting the heart links with the cradle. These pins give a positive bearing while the engine is on a straight track and assure stable equilibrium on account of their three point suspension effect. When transverse movement on the cradle occurs, the heart links radiate from one or the other of their pins, according to the direction of movement and always tend to recenter by falling back on the double pins; the condition of the link while raised on one pin being always one of unstable equilibrium. The truck is thus a gravity suspension truck, and is similar in its action to any other positive heart shaped link, such action being well demonstrated by front trucks having this type of bolster suspension.

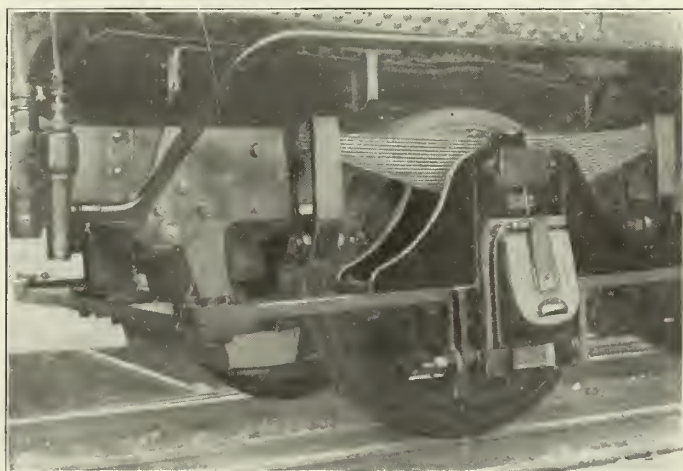
By the employment of this truck, the rear end of the engine is held in alignment with the drivers by the force of gravity instead of being held by the more or less capricious action of helical centering springs. The cradle on the front of this truck is essentially the same as the one described at the rear, except that it connects with the driving equalization through the medium of the equalizer located at the back of the rear drivers. Particular emphasis is placed upon the fact that this cradle is not restrained by any jaw or contrivance on the frame and is therefore subject to no tendency to nip off outside the frame.

When this truck acts on a curve there is very little angular stress on any one component member of the cradle construction, as transverse flexibility occurs not only at the spherical end of the heart link but also at the top or centering end and again at the outside connection of the cradle to the spring hanger. These trucks have been observed on 23-deg. curves, and their action, it is stated, is remarkable in this particular, the compensating effect of the members of the cradle being particularly noticeable. The angular position of any one member is slight, as the component members of the cradle adjust themselves in the manner described.

To remove the wheels and axles from trucks built with integral boxes, the box must be entirely dismantled; and to re-

move the box itself for purposes of replacement and repair, the framing structure of the truck must be separated because the box is also a part of the framing. Removal of wheels and axles not only involves the removal of component parts of the truck, but frequently of auxiliary pedestal tie bars which exist on false pedestals on the engine frames. The Austin truck has a separate journal box fitted in a cast steel frame and this box can be removed from the frame without further dismantling the truck. It is merely necessary to remove the pedestal tie at the bottom of the jaw holding the box in the frame, and the boxes, wheels and axles can be dropped or removed by the usual processes of jacking or lifting. The box itself is comparable to a large sized tender box and can be handled in much the same manner. It is of less weight for handling during shipment or in carrying to a machine. The first casting is also of less weight in the foundry. This box is fitted with a spring lid. The brasses fitted to this truck are usually of the "collarless" variety, somewhat similar to a large tender brass, and they can be made of any dimensions suitable for the weight carried. Wheels, axles and journal brasses can be made to interchange with those used on any of the other well known types of trailing trucks.

The journal box is oiled in the usual manner by packing placed in the cellar below the axle. It also has an oil cellar located on both the inside and outside frame members, the inner oil

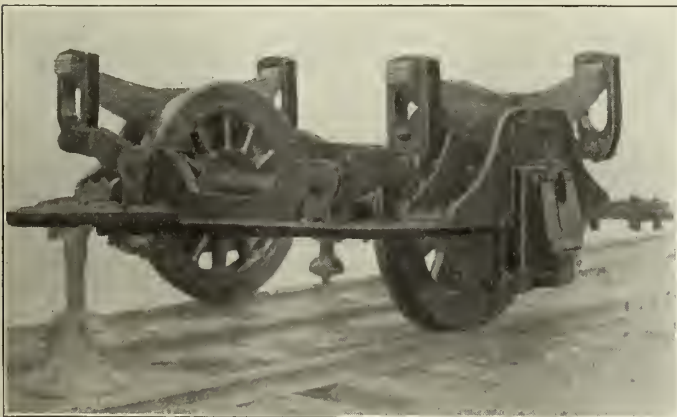


Austin Trailing Truck as Applied to Locomotive.

cellars serving to oil the hub of the wheel where it bears against the box and the outer cellar serving as an auxiliary oiler for the crown brass. This latter is particularly valuable when breaking in a new journal. The cellar is also fitted with a felt guard.

One of the points of improvement advanced for the Austin truck is that the radius bar is so arranged as to be approximately on the center line with the thrust against the axle and thus greatly improves the strength of the structure. Radius bars on other trucks are sometimes broken because of the low position of this radius frame which passes under the box and which increases by its leverage action the stress due to reaction against the center of the axle. The truck has a strong steel frame rigidly fastened to the radial bars and in no wise dependent on the thimble tie below the frame, this thimble tie having for its sole function the retention of the box in its jaw.

The engine frame construction used with this truck is of the simple slab variety and has no auxiliary pedestal or pedestal binder below the axle which must be removed when assembling the truck. Pedestal binders of this description are found on the bar frames used with some trailing trucks and they serve no useful function except to bind in the structure of the framing itself. Such a trussing or binding effect, it is claimed, is not necessary with a slab frame forged from a solid steel billet and practically in line with the pull of the drawbar.



Austin Trailing Truck.

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WILLARD A. SMITH	- - - - -	President and Manager
HAROLD A. SMITH	- - - - -	Assistant Manager
W. M. CAMP	- - - - -	Editor
CLYDE F. BURNS	- - - - -	} Assistant Editors
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Eastern Office, 30 Church St. (Hudson Terminal), New York
A. E. HOOVEN - - - - - Manager, Eastern Dept.

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SATURDAY, JUNE 20, 1914.

After evident perplexities in adjusting all considerations relative to the matter, President Wilson has now completed the personnel of the federal reserve board, which will have supervision of the initial workings and subsequent operation of the new national banking and currency system. The President's nominations were sent to the senate, Monday, June 15, and comprised the following: Charles S. Hamlin, of Boston, Mass., for a term of two years; Paul M. Warburg, of New York, for a term of four years; Thomas D. Jones, of Chicago, for a term of six years; W. P. G. Harding, of Birmingham, Ala., for a term of eight years; A. C. Miller, of San Francisco, Cal., for a term of ten years. Mr. Hamlin is now assistant secretary of the treasury, in charge of fiscal bureaus. Mr. Warburg is a banker and associated with Kuhn, Loeb & Co., of New York city. Mr. Jones is a retired lawyer and a long-time friend of the President. He is wealthy and has been identified with large affairs; he is known to be a student and an expert in finance. Mr. Harding is president of the First National Bank, of Birmingham; and Mr. Miller is Flood professor of economics and commerce in the University of California, and at present assistant to Secretary Lane in

the Department of the Interior. William G. McAdoo, secretary of the treasury, and John Skelton Williams, controller of the currency, are ex-officio members of the board. Satisfaction has been expressed in many quarters that the President has given men accustomed to the responsibility of large interests so large a representation on the board. On the other hand dissatisfaction with the President's nominations has been expressed on the same score, and it is possible that opposition to the appointments may develop in the senate, which body must confirm the appointees to office. The politics of the federal reserve board will be overwhelmingly democratic. It will be noted that of the seven members, four are office holders under the present administration. President Wilson has stated that he will not designate the governor of the new board until his nominations have been confirmed by the senate. This, however, will not occasion material delay, and the organization committee of the federal reserve system is expecting now to have the twelve regional reserve banks in operation by August 1.

Railway Mail Pay.

The Joint Commission on Railway Mail Pay has been accorded amazing treatment at the hands of congress and the administration. This body, one of the ablest commissions appointed by congress in recent years, has been studying the problem of compensation for carrying railway mail, for more than a year. It consists of three republicans and three democrats, and ex-Senator Bourne, of Oregon, is chairman. It pursued long and earnestly an investigation for a basis of pay that would be fair to the railroads and to the government alike, and having finished its studies and reached a conclusion, had prepared a report which was to be presented to congress with a draft of a bill embodying its recommendations. A procedure was outlined, in consultation it is understood with the committees of congress and Postmaster General Burleson as a representative of the administration, by which the measure would receive prompt consideration in congress; and a statement covering the substance of the report was given out to the press. At this juncture a piece of strategy from some inner legislative circles caused a sudden shift in the plans. The postmaster general, with what other backing in administration circles does not yet appear, transferred his support from the commission's bill, to a bill prepared by Chairman Moon of the house committee on postoffices and post roads. A hearing was called upon this measure, and as matters stand at present, the rules committee of the house had adopted a recommendation that the bill come up for consideration immediately following the civil appropriation bill which is now before the house.

The commission's report, as stated in the Railway Review, June 6, is a voluminous document; and it

condemns the present system of paying for railway mail as antiquated, inaccurate and unfair to both the government and the carriers. It proposes a scheme of compensation based upon the space occupied in postoffice cars, half cars and quarter cars on each route. The rate of compensation recommended is 22½ cents per car mile, which is ten per cent less than the 25 cents per car mile earned by the railroads for carrying passengers. On this basis it included also compensation for carrying parcel post, which the railroads are now compelled to handle without pay. The distinction between the Moon bill and that proposed by ex-Senator Bourne's commission is that the former seems to be based upon a political appeal and the latter upon scientific principles. The Bourne bill was calculated upon the exhaustive investigations of the commission, and was agreed to be just and equitable by all members of that body. It was not entirely satisfactory to the trunk line railroads, but they were disposed to accept its terms as the nearest approach to fairness they could hope to receive from congress. The Moon bill, on the other hand, seems to make no claim to a scientific or logical basis, and its sole evident justification is that it cuts the pay of the railroads. Its rates are arbitrary; it fixes the line rates at a cent a mile less than the commissioner's bill, and reduces the terminal allowances 25 per cent. The present compensation of the railroads, already too small by fifteen million dollars, will be reduced by the Moon bill to the extent of ten million dollars annually, or twenty per cent.

Aside from the inequity of the bill itself the recent action was most ungracious in thus anticipating the recommendations of the congressional commission. It is a matter of deep chagrin and indignation to the members of this body that their work of a year is now ignored and undermined at the last moment. Their labors have been painstaking and conscientious; Mr. Bourne, for example, has continued his residence in Washington at his own expense, and served on the commission without pay. In fact, he abandoned his campaign for election to the senate in order that he might complete this work. The commission and its supporters do not engage in argument as to the propriety of the rates of compensation proposed in the respective bills. Their main point of contention is that their own rates are fair, and that there is no merit in either increasing or reducing the compensation of the railroads on general principles, particularly if it appears that political considerations rather than justice are the governing factors. Ralph Peters, president of the Long Island R. R. and chairman of the Committee on Railway Mail Pay, representing 218,000 miles of railroad, says in reference to the subject: "This proceeding not only seems highly inappropriate in advance of the recommendation of the congressional committee, but in itself proposes an imposition upon the railroads which is without warrant and is in the highest degree unjust. It cannot be that such a plan will have the support of the American peo-

ple, when the people realize what the plan actually means."

Educating Employees in Language.

It is commonly known that railroad companies maintain courses of instruction in the use of special mechanisms, such as the air brake, block signals and other apparatus, in which some apprenticeship is necessary to familiarize the employee with apparatus that is found only in the special line of employment. That some railroad companies are actually engaged in teaching foreigners the rudiments of the English language is not, however, so well known, yet conditions of the labor market have come to such a pass, and the ratio of foreign-speaking employees has become so large that it is found desirable, if not actually necessary, to teach these employees the language of the country, in order that a reading knowledge of the necessary rules and regulations may be had. The Pennsylvania R. R. now employs something like 11,000 Italians, principally on its tracks, and men of this nationality have obtained such a foothold, or, perhaps, rather have become so indispensable to the service, that it is found desirable to give them every possible opportunity to fit them for advancement beyond the grade of common laborer.

Of the 600 trackwalkers employed by this railroad more than half are Italians. On the Pittsburgh division more than half of the track foremen are Italians, and about eighty per cent of the assistant foremen are of the same nationality, showing to what extent this race stands in line for promotion. On other divisions the proportion of foremen, assistant foremen, watchmen, etc., of Italians is about the same, and among common laborers it is even larger. Such being the case the company has found itself obliged to establish what is known as the Italian-English correspondence course, in order that these men may so acquaint themselves with the language as to be able to make proper reports of labor performed, materials handled, inspections and other matters connected with track work. The benefit of this course is given to all who apply for it, and more than 2000 of the 11,000 men of this race employed are studying the course.

A pamphlet entitled "What Italians are Doing on the Pennsylvania R. R." has been published by this railroad company, in which it appears that men of the said nationality are now represented, to more or less extent, in practically all railroad positions, including train conductors and enginemen, clerks, telegraph operators, signalmen, shop and roundhouse men, as well as watchmen and trackmen; and half-tone portraits are shown of representatives of the race who have made notable advancement or reached positions of prominence.

The changing labor conditions of the track department has been a subject well discussed and debated by the Roadmasters' and Maintenance of Way Asso-

ciation for a number of years, and the manner in which the Italian has been adapting himself to this field of labor is quite well understood. More than a decade ago roadmasters began to experience difficulty in securing competent English-speaking foremen for their track gangs, and on some roads the track labor was being performed almost exclusively by this one race from southern Europe. To the idea of promoting these men to foremen was the practical objection of their unfamiliarity with the language of the country, and especially the written language, for it is impracticable for officials to supervise track forces without a considerable amount of written instructions and correspondence with the foremen. The progress of the times, however, shows that this difficulty is being overcome, at least in a way, for Italian foremen can now be found on all or nearly all of the railroads of the East and central West. In the West, also, the industrious Japanese have so applied themselves unto learning our language that not a few of them have been advanced to the grade of track foremen, and at least one railroad, the Union Pacific R. R., has issued instruction pamphlets to employees of this Asiatic race in their own language.

Verily the management of a railroad is a diversified occupation, for it must attend not only to the maintenance of property and operation of trains, but many of the railroads have seen fit to instruct the public in agriculture, horticulture, cattle breeding, road making and other related things; and now we find them teaching language to foreigners.

Forecasting the Rate Decision.

There have been a number of wild guesses made regarding the substance of the five per cent rate decision, which is expected to be made public any day; but one which somebody in Washington put out this week seems to us to come pretty close to the mark. The author of it is pretty well posted and has evidently followed the case carefully. We publish it because it coincides almost exactly with our own prognostications, and it will be interesting to note how far it is from the decision. The question which will occur at once to the reader is what proportion of the entire five per cent asked for, would this amount to—leaving out the possible additional revenue from the abolition of free service. Probably taking the whole territory it will amount to two per cent instead of five—that is approximately twenty millions of dollars; leaving thirty millions to be derived from the charges to be imposed in other ways. If Commissioner Harlan's estimate that the abolition of free service to the industrial or plant roads, considered in his decision, would yield fifteen millions of dollars, is correct, the whole reform might easily yield thirty millions.

Evidently it will take a long time to fully adjust charges for spotting and switching in view of

recent supreme court decisions, so that the railways may obtain any considerable additional revenue. But there are a dozen or more other items in the category which can be acted upon quite promptly. Should the commission take strong ground in favor of fair payment for carrying the mails, this would be a strong endorsement of the report of the Bourne Commission, and ought to influence Congress into being honest.

In estimating the importance of such a decision, it is well to remember that if made on these lines it will help all of the railways in the country, while the actual rate advance only helps those in the Official Classification territory. It is also to be remembered that whether the additional revenue obtained under such a decision is large or small, the principle, involved is the most important thing.

The prognostication alluded to is as follows:

1. Advances will be sanctioned on class rates in Central Freight Association territory, which is between Pittsburgh and Buffalo and the Mississippi river.
2. No advance will be sanctioned on commodity rates in Central Freight Association territory.
3. No advances in any rates will be sanctioned in trunk line territory, which is east of Buffalo and Pittsburgh.
4. The commission will point out to the carriers in trunk line territory how they may conserve their revenues by discontinuing certain practices which now prevail.
5. Pending the outcome of efforts by the carriers in trunk line territory to increase their revenues in this manner the commission will hold open the question of an advance in rates for final disposition.
6. No advance in lake and rail rates will be sanctioned; nor:

Allowance to and services for concerns controlling industrial railroads, about which it expressed itself at some length in the industrial railways case last January.

Free switching and spotting, or placing cars on private sidings.

Trap car service.

Free lighterage and tunnel service at Chicago and free lighterage and boatage at New York harbor.

Free storage of carload and less than carload freight.

Free loading and unloading of carload freight.

Free transportation of containers.

Free furnishing and transportation of tonnage.

Free wharfage or dockage.

Refrigeration service.

Free reconsigning of carload freight.

Milling in transit.

Free passes and transportation of private cars.

In addition the commission will probably point out that the railroads are underpaid by the government for the transportation of mail, and it may even send a recommendation to Congress that a fair basis of payment be established.

Southern Ry. Improvements at Forrest Yard, Near Memphis.

The Southern Railway has begun the construction of a modern classification yard and engine terminal on property located at Buntyn, six miles east of Memphis, Tenn. The terminal is to be known as Forrest Yard, in honor of the great confederate cavalry chieftain, General Nathan Bedford Forrest. Contract for grading has been let to C. W. Lane & Co. of Atlanta, Ga.

In the yard will be laid 14.7 miles of track, which will

comprise two separate groups; each group consisting of a receiving and distributing yard. The group including the east-bound classification yard and the westbound receiving yard will have twelve tracks, each with a capacity of from 60 to 65 cars, while the group including the eastbound receiving yard and the westbound classification yard will have an equal number of tracks.

Among the facilities to be provided at Forrest Yard will be an 18-stall roundhouse with a 90-ft. power turntable of latest type and heaviest capacity, strong enough to accommodate the heaviest class of power now in use, and a modern plant for furnishing coal, water and sand to locomotives.

A coal handling plant of reinforced concrete and of most modern type, with machinery for mechanically handling and automatically weighing the coal issued to locomotives will be constructed. It will be electrically operated, and coal dumped from hopper-bottom cars will be conveyed to an overhead storage bin of 1000 tons capacity, from which it will be dropped to weighing pockets and issued direct to locomotives, the supply given to each locomotive being weighed by subtracting-beam type-registering scales. In connection with the coal handling plant there will be complete machinery for drying, handling, and issuing sand to locomotives. A water supply system to serve locomotives and the entire terminal will also be provided, and it will be so arranged that it will be possible for a locomotive at one point to receive supplies of fuel, water and sand simultaneously.

A machine shop and boiler room for running repairs to locomotives will also be constructed, and a shed for the repair of freight cars will be built. A battery of air compres-

sors will be provided which will afford pneumatic service throughout the terminal for testing brakes and the operation of air tools used in repair work. In connection with the roundhouse, a washroom with lockers for employees will be provided and there will also be a fire-proof oil storage house and a storehouse for the issue of supplies.

A commodious two-story building with tile roof will be erected as a yard office for the use of the yardmaster and his force of billing clerks, and the yard will also be provided with modern automatic track scales of the heaviest capacity.

The entire layout of buildings will have complete fire protection by an adequate system of mains and hydrants, and the whole terminal with its buildings will be thoroughly lighted by electricity. Signaling and interlocking facilities for the protection of main line train movements, as well as the handling of trains into and out of the yard, will be installed at each end.

These new facilities are being provided by the Southern Railway to provide for the better handling of its Memphis business and the growing business through the Memphis gateway. With the completion of Forrest Yard all freight trains will be made up and all freight engines cared for there. As a result there will be a great reduction in the amount of switching into and from the Madison avenue yard adjacent to the Southern's freight terminals in Memphis, as no cars will be sent to the Madison Avenue yard except those to serve the freight house, team tracks and adjacent industries. The new facilities will thus, at the same time, make possible greater dispatch in handling both the business local to Memphis and business through the Memphis gateway over the Southern Railway.

Convention of the Master Mechanics' Association

The American Railway Master Mechanics' Association met for its forty-seventh annual convention at Atlantic City, N. J., June 15, 16 and 17, 1914, the several sessions being presided over by D. R. MacBain, president of the association. The opening session on June 15, was begun with an invocation followed by the president's annual address, an abstract of which is given on page 907, of this issue.

MISCELLANEOUS BUSINESS.

At the conclusion of the president's address there was a brief intermission, followed by the transaction of miscellaneous business by the association. This included the secretary's report showing the present membership to be 1046, and that of the treasurer, showing a balance of \$941.51. Secretary Taylor explained the status of the several technical college scholarships maintained under the patronage of the association, there now being three such scholarships at the Stevens Institute of Technology and the prospect of a second one at Purdue University. A modification of the constitution of the association whereby the so-called "life" membership shall be absorbed in the "honorary" branch was proposed by the executive committee and approved by the convention, the constitution now reading: "Members of the association, active or associate, who have been in good standing not less than twenty years, and who, through age or other cause, cease to be actively engaged in the mechanical department of railway service, may, upon the unanimous vote of the members present at the annual meeting, be elected honorary members. The nominations must be made by the executive committee. The dues of the honorary members shall be remitted and they shall have all the privileges of active members, except that of voting."

The presence of W. H. Corbett as a representative of the Traveling Engineers' Association was officially recognized, Mr.

Corbett being formally granted the privileges of the floor for the several sessions of the convention. Communications from the International Railway Master Blacksmiths' Association soliciting closer co-operation of the two bodies and extending an invitation to the convention of the blacksmiths' organization to be held in Milwaukee, Wis., August 18, 19 and 20, were read, as were also solicitations from prominent western railway officials suggesting that the 1915 convention be held in San Francisco, Cal.

LOCOMOTIVE STOKERS.

The report of the committee on mechanical stokers was the first on the technical program; a general resumé, as heretofore in connection with reports on this subject, as well as explicit reference to each of the several varieties of stokers extant, being given. The gist of the committee's report is as follows:

The development of the locomotive stoker continues, though nothing notable has been observed during the past year. In the committee's last report allusion was made to the apparently accepted utility of the device, and its adaptability to locomotive service. References were also made to the higher average steam pressures maintained, and especially toward the latter part of a division run, simplicity of operation, work performed, etc., and the committee stated its belief that most of the statements appearing in their last report have been borne out in practice, according to such observations as the additional year has permitted. In last year's report it was pointed out that the several types were, in the main, divided into two general classes, namely, the underfeed and the scatter or overfeed types, but as last year, the committee did not wish to advance an opinion as to which type will, in the end, prevail. The committee again made reference to the difficulties surrounding the designing of a machine to suit present locomotive construction; not so much on ac-

count of the work to be performed, but the absence of choice as to arrangement, the absolute limitations of space, and the conditions under which such a machine must operate. It is believed that as time goes on, greater latitude will be given the designers, and consequently more will be accomplished, where it is preconceived that the stoker is to be a part of the locomotive.

Street Stoker: 418 in service; \$2 on order—handles crushed or run-of-mine coal. A characteristic example of its performance is given in the following tabulation from the records of the Norfolk & Western Ry.

Total mileage made by engines equipped with stokers...	2,296,802
Total stoker failures	165
Miles per stoker failure.....	13,920
Total cost for labor and material chargeable to stokers..	\$12,179.22
Cost of stoker repairs per 100 miles, cents.....	.53

Two engines fitted with Street stokers have not as yet had a stoker failure charged to them, having made 36,089 miles and 35,778 miles, respectively, since the engines were put in service new in April, 1912.

Crawford Stoker: 301 in service. Original principle of operation adhered to, details being improved. Handles run-of-mine coal, being most successful with high volatile coals. These stokers on the Pennsylvania Lines West of Pittsburgh to Jan. 1, 1914, had made 98,181 trips, of which number 55,913 were 100 per cent efficient and 21,787 were below 70 per cent efficient.

Hanna Stoker: 3 in operation, 21 applications being contemplated. In 37 trips on the Norfolk & Western Ry., or 86 per cent, 32 were perfect.

Standard Stoker: A recent promising development, uses run-of-mine coal. Two in service, three applications being made.

Ayers Stoker: Being developed on the chain-grate principle by A. R. Ayers, mechanical engineer, Lake Shore and Michigan Southern Ry.

Brewster Stoker: No further development; patents have been taken up by the Standard Stoker Co.

Strouse Stoker: No new developments.

Gee Stoker: One stoker been built to date. Is still considered in an experimental stage.

Elvin Stoker: New in principle, belongs to the "scatter" or "overfeed" group, it may be referred to as the "shovel" type in that it is made up of two shovels, one operating to the right and the other to the left, distributing coal over the bed of the fire, as might be expected under expert hand firing.

Rait Stoker: Understood to have most of the machinery below the deck of cab. Is mentioned as being usable either as an underfeed or a scatter type. None in operation, as yet undergoing development.

Barnum, Dickerson, Erie, Hayden, Hayden Modified, McMullen, Harvey, Hervey and Kincaid: No developments during the past year, thought to be none in service.

Commenting generally, the committee states:

"During the past year opportunities have been afforded to observe a much larger number of stokers in service, many of them working in pool runs, which rather strengthens the belief that they are capable of going along, faring under the usual average attention given a locomotive, without developing prominent or serious defects that result in materially increasing terminal turning time. The most natural inquiry would refer to the durability of such machines as a whole. It goes without saying that the stoker, with all of its parts, is susceptible to wear, but those in service have no doubt surpassed the general expectation. They require attention and repairs, but the cost figures are not excessive, considering the stage of development through which they are passing. There is no particular work the firemen can do in the way of making repairs on the road, but attention on their part, though slight as a rule, is beneficial and helpful toward preventing failures. The performance of the stokers in service during the past year has served to show what must be met in the way of durability, and what is neces-

sary to withstand the operating strain. Alterations are now in progress looking toward stronger and more durable machines, which should in turn favorably affect the cost of maintenance.

"It is noteworthy that when the demands upon the boiler are fairly uniform, permitting a regular feed of coal, the operation of the stoker practically takes care of itself, but, in the absence of automatic manipulation, manual control does not always result in efficient regulation of the fire; on the contrary, the boiler, if anything, is allowed to blow off more than necessary, not only under working conditions, but quite freely when the demands are reduced, and when the engine is not using steam, carrying with it some waste of fuel, due, however, to want of attention. Then, again, there is some tendency, through neglect, to allow the fire to get low while standing on the road, making rebuilding necessary; still with the stoker the fire is readily revived, and little, if any, time is lost thereby.

"It is still a mooted question as to whether it is economical to use run-of-mine or screened coal. Both schemes are worthy of consideration, depending upon local conditions, and in the same way that it is necessary a road contemplating the use of stokers can only work out the advantages to be gained after taking into consideration the physical character of the road, the size of engines, and the tonnage now being handled, it should ascertain whether upon taking into account all local conditions it is more profitable to use the screened or run-of-mine coal.

"As for fuel consumption, it has been pretty clearly shown that the amount of coal used by the stoker (as to some extent obtains in hand firing) largely depends upon the physical character of fuel rather than the heat value, so long as the latter is within a reasonable range. The establishment of data to show the relative fuel consumption by hand firing as compared with the operation of the stoker was sought, but so far there seems to be very little statistical information in such shape as to permit a general ready comparison to be made. At the same time some very complete tests have been conducted under a range of operating conditions, character of fuel, etc., but none of them permit conclusions to be drawn without taking into consideration the character of fuel and conditions under which the highest efficiency was obtained. In order to make a true comparison, therefore, it is necessary to ascertain and fully account for local conditions, character and price of fuel.

"The year's experience seems to give color to the belief that the stoker is not necessarily a coal-saving device, but that its advantages tend in other directions. Dynamometer tests have shown that the capacity of the locomotive is increased, and according to further reports made by the Pennsylvania R. R. an increase approximating 5 per cent in trainload with the Crawford stoker for an equal amount of fuel hand-fired has been obtained. The Baltimore & Ohio reports an increase in train tonnage from 5 to 10 per cent. In both, however, it should be remembered that the differences indicating increased capacity were largely dependent upon local conditions. The Hocking Valley advises, in connection with the Street stoker, that they are using fuel known in the Hocking Valley district as "coarse slack." It is coal that passes through a $\frac{3}{4}$ -inch mesh screen. As for fuel consumption, the Hocking Valley reports that no definite tests have been made, adding, however, that their fuel record showing consumption of coal per engine per 1000 miles does not indicate there has been any reduction in fuel per 1000 ton-miles, but that the grade of coal used is purchased at about 40 per cent less than run-of-mine.

"In tests made on the Norfolk & Western Ry it was found with one of the scatter-type stokers that there was a considerable increase in coal consumption using Pocahontas slack as compared with Pocahontas run-of-mine hand-fired. The difference in quantity of coal consumed as between screened coal stoker-fired and run-of-mine hand-fired was found to diminish as the physical character approached the run-of-mine, or a product containing a less amount of fine material. While standing along the road it is quite necessary, as can be readily appreciated,

to occasionally watch the fire in order to keep it in proper condition and in readiness, especially where sack fuel is used, as the depth of the fire is relatively lighter, but it is not materially unlike what is needed for efficient and economical hand firing.

"The fuel consumption seems to vary almost in proportion to the physical fineness of the coal used in stoker firing with the scatter-type machines, a percentage of the lighter material being evidently drawn through the tubes by the heavy action of the draft. Using Pocahontas nut stoker-fired and run-of-mine hand firing, the consumption figures are not far apart. From this it would appear that with the higher volatile coals containing a smaller amount of fine product, the consumption of fuel as between hand-fired and stoker-fired should be very close. It also seems evident that though the consumption increases as the coal becomes finer in character, the stoker is better able to maintain steam with it than might be secured on an average hand-fired.

"With reference to the emission of smoke: It was mentioned in the committee's last year's report in substance that, as combustion is improved in stoker firing as against irregular hand firing, there should be some diminution in smoke. Some observers have reported that with a thin fire and conditions otherwise favorable, stoker firing, as with hand firing well executed, little objectionable smoke is emitted, but as the difference in the range of operating conditions and character of fuel are usually so large, a liberal view must be taken of what might be expected. Your committee has not had the opportunity to make extensive investigations, but has received reports that when the feeds are not forced beyond the limits of complete combustion, the reduction in smoke is longer maintained with the underfeed than with the scatter types, on account of the fuel being delivered up through the bed of the fire as combustion progresses, under conditions of service and character of fuel suitable to their present stage of development.

"Following the presentation of our last year's report on this subject, some very interesting remarks were made with reference to contemplated experiments with pulverized fuel on locomotives. It is understood that the New York Central has made some investigations in connection with the use of such fuel on switching locomotives, and that the Pennsylvania R. R. has also given it some consideration, but in neither case have they anything of interest to offer."

The protracted discussion on the stoker question was participated in by several representatives of the stoker interests and by a number of railroad men having had experience with stoker methods of firing locomotives. One speaker expressed the opinion that because the strenuousness of the fireman's work had been mitigated, he should not be permitted to slacken in diligence as the opportunities for wastefulness are too great. Very encouraging reports as to the ability of stoker fired engines to handle heavy tonnage under extremely adverse conditions were freely cited.

REVISION OF STANDARDS.

Castellated Nuts, Standard: In accordance with instructions from the executive committee, the committee revised the table of standard proportions of castellated nuts in order to provide for steel nuts with the height of the U. S. Standard for rough nuts. Laboratory tests were made in more or less detail of steel castle nuts made in full proportions to agree with the present standards excepting in the height of the nut, which was made the same as the U. S. Standard rough nuts. Also the threading for the bolts was extended to the top of the castellation. The results of these tests showed that for working pressures ordinarily used, these steel nuts have ample proportions. The committee accordingly presented for consideration a table of proportions for these nuts, taking as a basis, the rough diameter of U. S. Standard nuts, the rough thickness of U. S. Standard nuts for sizes one inch and over and the present thickness of thin castle nuts for sizes $\frac{7}{8}$ inch and smaller; the proportions of the present slots for thick and thin castle nuts; extending the bolt-

threading to the end of the bolt to obtain the full benefit of the threading in the castellation and maintaining the present sizes of cotter and taper pins and holes.

Specifications for Steel Tires, recommended practice: The committee concurred in a recommended change in section 7 of the specifications for steel tires and proposed the following revised requirement:

Class.	Tensile strength lbs. per sq. in.	Elongation per cent in 2 inches.	Reduction in area per cent.
(A)	105,000	12	16
(B)	115,000	10	14
(C)	125,000	8	12
(D)	The elasticity shall be at least 50 per cent of the tensile strength.		

Journal Box Wedges, standard: The committee concurred in a recommendation in so far as 5 by 9 inch and $5\frac{1}{2}$ by 10 inch journals are concerned that the use of solid wedges only be permitted and that the note allowing the use of skeleton wedges be omitted.

Specifications for Cast Iron Wheels, recommended practice: The committee approved a suggested correction calling attention to the title and note under the cut on sheet E, and advising that in order to agree with the M. C. B. specifications for cast-iron wheels, and also to conform to the loading for which the $4\frac{1}{4}$ by 8 inch journal axle was designed, this should read "maximum gross weight not to exceed 95,000 lb.," instead of "112,000 lb." The same correction was suggested for the title of the specifications, page 498, and the table of weights on page 500.

Checking Formulae for Main and Side Rods, recommended practice: A recommendation to the effect that the above named formulae be advanced to standard was approved.

New Business: The committee concurred in the suggestion, the M. C. B. journal box and contained parts for 6 by 11 inch journal axles be adopted as recommended practice.

The recommendations regarding each of the foregoing items were accepted by the convention and referred to letter ballot. Citation was made by the committee to three other proposed changes that were not endorsed by it and also to 12 others in which minor alterations and corrections to the notes and drawings in the code of standards were approved. The two following matters were referred back to the committee for further advisement:

Maximum and Minimum Flange-Thickness Gage, standard: Attention was called to the cut of maximum flange-thickness gage for cast-iron wheels on Plate M. M. 14, with the advice that apparently the wheel-flange outline is incorrectly dimensioned. The committee noted the confusion, and sought to refer the detail to the M. C. B. committee on car wheels, with the recommendation that the secretary be instructed to correct the drawing on advice from that committee.

New Business, Instructions: Under instructions, the committee was requested to rearrange all specifications for material to conform to the outline adopted by the Master Car Builders' Association. Believing that all specifications should at the same time be revised to agree with the latest recommendations of the Master Car Builders' Association and the American Society for Testing Materials, especially the latter, the committee referred the matter to the convention for further instructions, with the result previously noted.

SAFETY APPLIANCES.

An oral report on the subject of safety appliances was given by D. R. MacBain, chairman of the committee. According to his information the work appears to be practically completed, and progress in the equipping of the locomotives has been very satisfactory. A few, however, are not up to standard, and it was urged that every one who knows these appliances are not up to standard, correct them as soon as possible. This report was duly received and approved.

DIMENSIONS FOR FLANGE AND SCREW COUPLINGS FOR INJECTORS.

O. M. Foster, master mechanic of the Lake Shore & Michi-

gan Southern Ry. read an individual paper on the above subject in which there were illustrated and described various forms of connections for the above named purpose, also the results of tests made to determine the merits of various forms referred to. In developing the subject matter for this paper, the writer sent out inquiries to a large number of railroads requesting data covering designs and proportions of brazing rings, coupling nuts, pipe unions, etc., in use, the replies indicating that in most cases manufacturers' standards for these parts were being followed. Upon request, each of the injector manufacturers furnished a very complete set of detail drawings covering the standard parts entering into the make-up of the pipe connections used with his various types and sizes of injectors, these representing the designs shown on the drawings presented in the paper.

The details covered were: Threaded couplings, pipe connections, coupling nuts, iron pipe unions, brazing rings, "mechanical" connections, and flanged injector connections. In concluding his paper, the writer made the explanation that no endeavor had been made to make any recommendations covering dimensions for injector connections, but rather to present the available data in such a manner as to make apparent the desirability of committee action within the coming year. He accordingly recommended that a committee be appointed to make definite recommendations covering design and sizes for brazing and beading rings, iron-pipe unions, coupling nuts and flanges. This recommendation, after some discussion, was approved.

THE USE OF ELECTRIC MOTORS IN RAILWAY SHOPS.

The above title served as the subject of an individual paper by B. F. Kuhn, assistant master mechanic of the Lake Shore & Michigan Southern Ry., Collinwood, O. An abstract of this paper, which was read by W. E. Dunham, is as follows:

In taking up the discussion of this subject it may be stated in the beginning that no hard and fast rule can be laid down as to just what system should be used in any particular shop until the local conditions at that particular point have been thoroughly studied and analyzed. There are two great divisions in the application of electricity. One being the alternating-current system and the other being the direct-current system. Each has certain advantages and because of these facts each system has its champions, but before adopting either the alternating-current or direct-current system the actual cycle of operation of each individual machine must be carefully considered before a selection is made.

With the direct-current system as considered for railroad shop service, our voltage is automatically established for us, as 500 volts direct-current is unsuitable for use on account of its tendency to hang on after an arc has once been formed, and the severity of a flash, shock or burn that an attendant might receive, and 110 volts is too low a voltage on account of the amount of copper required and also on account of brush, commutation and contact requirements of the motors, controllers, etc., 220 volts seems to be the ideal voltage for direct-current motor drive and where the load is a mixed load of motors and lighting, three-wire direct-current generators can in many cases be used to advantage. The three-wire direct-current distribution also has its advantages for motor drive in that a wide range in speed can be secured and the motor will be operating very efficiently at all times.

"Types of Motors: The type of motor to use in any particular case must necessarily depend on the operation to be performed. Thus on cranes and hoisting work the motors should, in most cases, be wound, but there are some cases in hoisting and conveying work where it is necessary to use either a compound winding or an interpole motor, as it is possible under certain conditions for a straight series-wound motor to run away with a light load, and this would not be possible where the motor is provided with a shunt winding to prevent the speed of the motor reaching the danger point. This type of motor is also suitable for use

on transfer tables and turntables. There are other operations which require a heavy starting torque from the motor and when in operation requires that the motor drop off in speed as the load comes on, such a cycle of operation, for instance, as occurs on a punch or shear, or any other tool provided with a fly-wheel, and for this class of service a compound-wound motor should be used. Still other drives require comparatively small starting torque but require constant speed after being put in operation, such as driving line shaft or any similar operation, and for this class of drive a shunt-wound motor should be used.

"In applying motors to machine tools the cycle of operation must be carefully considered before selecting the winding for a motor. On this account many of the motors used on machine tools are combinations of the three different types of motors described above. On some machine tools a small amount of variation is sufficient, and increases in speed from 10 to 15 per cent may be secured on the straight shunt motors, but where the range in speed would amount to two to one, three to one, or four to one, motors for such operation should be of the shunt-wound interpole type. These motors commute very successfully over the whole range in speed. Wherever a cycle of operation is 'peaky' as in the case of a planer, motors of the interpole type should be used. Just to point out what can be done in this matter of speed variation it may be stated that there are in use today motors of 100 h-p. capacity that have a range in speed from 100 r. p. m. to 1200 r. p. m. This variation in speed being secured without keeping in service any series resistance.

"The direct-current motors of the compound-wound, shunt, and interpole types are generally provided with starting devices equipped with overload and no voltage release coils, this being a simple and effective means of protecting the motors and tools from injury due to an overload or to the failure of power and its sudden restoration to the line before an attendant might have an opportunity to cut the motor out of circuit. Direct-current machines have their commutators and brushes which require care and attention, but commutator trouble has been reduced considerably owing to the fact that motor manufacturers have adopted one method or another to increase the commutating capacity of their motors. Thus the direct-current system has certain advantages particularly in its flexibility for it is possible to secure a direct-current motor that will efficiently meet almost every conceivable cycle of operation.

"Alternating-current motors are divided into three general divisions, namely, the short-circuit type induction motor, the slip-ring type induction motor and the synchronous type of motor. The short-circuit type induction motor requires from $3\frac{1}{2}$ to $4\frac{1}{2}$ times full-load current from the line while developing full-load torque at starting. The slip-ring type induction motor will draw $1\frac{1}{2}$ times full-load current from the line while developing full-load torque at starting and the synchronous motor will draw approximately three times full-load current from the line while developing three-tenths of full-load torque. The short-circuit type induction motor does not lend itself to variations in speed as does the shunt-wound direct-current motor and it is, therefore, suitable for constant speed operation only. The resistance of the motor, however, may be varied so as to give almost the same characteristics as the compound-wound direct-current motor. This type of motor is especially adapted to punches, presses, etc., of moderate sizes, but there are cases where extremely large presses are used where it is desirable to use the slip-ring type induction motor rather than the short-circuit type. The slip-ring type induction motor is used for hoisting, conveying, cranes, etc.

"The advantage of the short-circuit type of induction motor is that it has no moving contacts, the only rubbing parts be-

ing two bearings. The short-circuit type alternating-current motors are normally also provided with no voltage release coils in their starting devices and are also provided with overload release coils or fuses. The series-wound direct-current and slip-ring type alternating-current motors are also provided with fuses or circuit breakers, as the case may be, depending upon the class of work they are being called upon to do. Other features that have been developed for different controls are the remote control which allows the operator to start or stop a motor which may be located some distance away. There is also the master-type controller in which the operator simply manipulates the master control and the controller itself is operated by means of electromagnets, thus relieving the operator of all the manual work. There has also been developed the push-button type controller, which simply requires that the operator, to start a machine, press a button and the machine will automatically come up to speed, the current being limited at all times by the controller so that there is no unnecessary jar or strain as the tool starts from rest and comes up to its normal speed.

"Motor for the Woodworking Department: In the woodworking department in many cases, the motors can be direct connected to the machines, and in most cases high-speed motors can be used. If direct-current motors are used for this class of service they should be shunt wound and entirely enclosed, the starting box also being enclosed in metallic case lined with asbestos. If the short-circuit type, induction motor is used for this class of service it need not be dust-proof, but the bearings should be dustproof and arrangements should be made to have the sawdust and shavings blown out of the motors at regular intervals and the motors should be provided in large sizes with oil-immersed compensators. In small sizes, where they are thrown directly across the line, the starting switches should be enclosed in asbestos-lined metallic cases.

"As a general thing motors in the woodworking department should be provided with shaft extension on both ends, for there are many cases where it is important that each machine be provided with its own blower for carrying away the sawdust. Where machines are equipped in this way with their own individual blowers, a great saving is effected as the blower is in use only during the time that the machine is in service, whereas if one common blower is used for the whole woodworking department the load is practically the same whether a few machines are in operation or all the machines in operation. Individual blowers are saving some woodworking departments a steady load of between 40 and 50 h-p.

"Motors in General: Motors have been made for almost every conceivable method of mounting: floor, wall, ceiling, vertical and even for back-gear drive; they have also been used for belt, chain and rope transmission and also gear drive and in still other cases the motor shaft has been direct coupled to the driven shaft. Motors have been made of the open type, semi-enclosed and dustproof type. They have been provided with bronze bearings, babbitt bearings and ball bearings. Motors have been furnished of two-bearing type and of the three-bearing type. For gear driving 20 h-p. is about the limit for two-bearing motors and there are some cases where even motors of 15 h-p. should be provided with a third bearing in order to properly support the shaft, for as a general rule standard motor shafts are not heavy enough to stand the shocks met with in gear drives.

"In actual practice it has been determined by experiment that the friction loss from engine to tool where the shop is equipped with line-shaft drive ranges from 30 to 60 per cent, and in some cases the losses have exceeded 66 per cent. The losses in transmitting power electrically from engine to tool

in the case of a shop equipped with individual motors for each tool seldom exceed 30 per cent. This is not the only advantage in the case of the individual motor for each tool. Take the case of a machine-shop containing a large number of tools at a time when you wish to operate only a few tools: the line shaft and friction losses are practically the same, as they are when all tools are in use, while in a shop with each tool provided with its own motor these friction losses are entirely eliminated.

"Again, in the case of the shop depending upon line-shaft drive, if anything goes wrong with the main belt or the line shaft, all of the tools are put out of service, while in case of tools equipped for motor drive this does not occur. Even going back to the prime movers in the case of belt transmission and line-shaft drive there is only one avenue of transmitting power from the engine to the line shaft, whereas with an electric drive there are as a rule, duplicate units, and if for any reason one set is put out of service the auxiliary set is always ready to be put into commission.

"There is also the advantage in having the generating station composed of several units so that if anything goes wrong with one unit only a portion of the shop may be shut down. Then, too, this is not always necessary, for generating stations will, as a rule, easily carry 25 per cent overload for a couple of hours and thus give sufficient time in some cases to make necessary repairs. It is almost always necessary to run the steam plant at all times for supplying current for lighting and power at some points in close proximity to the shop, and should the occasion arise where some special job has to be taken care of during the time when the shops are not in actual operation, the current is always available for the motor at any point which might be desired. Engine-houses and coaling plants which require power and light can be thus supplied without having a power-house installed at these points.

"A few years ago the load factor of railroad machine-shops was about 19 per cent, and due to the introduction of high-speed tool steel and the motor for individual drive, the load factor has been raised in some shops to approximately 37 per cent. With a shop equipped with tools for motor drive, the whole shop layout can be rearranged from time to time to suit the various conditions which may arise in the method of handling the different work and also the installing of additional new tools, and it is also possible to take advantage of floor space which, in the case of a shop with line shafting, would be impossible. Another very distinct advantage that the shop equipped with motor-operated tools has over the shop operated with line shafts is that the belts and overhead work are done away with, such shops are lighted much more efficiently and a great deal of danger is eliminated."

The discussion on the foregoing paper was very freely participated in and developed some very interesting examples of motor applications as well as of market economics over previous methods of driving machinery. Increased output, particularly of woodworking machinery by the use of individual motors was attested in several instances as was also the advantage of motor drive in the use of pumps located at a distance and automatically controlled. The blower systems of woodworking mills also received attention, the preference seeming to be for individual blowers for each machine rather than a single blower for the entire plant. Generally speaking, the individual motor drive system is preferred both in woodworking and in machine tool plants except where groups of machines requiring less than four or five horsepower each can be arranged.

The first day's technical program was concluded with the above discussion. Other notable features of the proceedings were the election to honorary membership of R. H. Briggs,

who has been a member since 1879, and Wm. Garstang who has been a member since 1887. These gentlemen served the association in the capacity of president during the terms of 1889-1890 and 1894-1895 respectively. Prof. A. J. Wood of Pennsylvania State College was elected to associate membership during the Monday session.

LOCOMOTIVE HEADLIGHTS.

The opening feature of the second day's program was the report of the committee on locomotive headlights whose very exhaustive inquiry into the subject had covered six months time, had employed simultaneously as many as 40 men, and covered in the printed form, over 300 pages of text and illustration. Elaborate tests, both in the laboratory and on the road, were made and reported on. In making the tests and in rating the headlights it was decided to assume as the reference plane, the horizontal plane 3 feet above the rail ahead of the locomotive, and to consider the intensity of the rays striking this plane at various points. All laboratory readings were taken normal to the ray in a vertical plane 25 feet ahead of the focal center and perpendicular to the axis of the beam. Readings were taken at angles to correspond to stations in the reference plane 50, 100, 200, 300, 400, 500, 600, 700, 800, 900 and 1000 feet ahead of the focal center measured along the axis of the beam. Three points were taken for each station—one corresponding to the center of the track and one corresponding to 20 feet each side of the center, the three points being in the same straight line at right angles to the axis of the beam.

Laboratory tests were made of practically all types of headlights now on the market, with an additional number of headlights made up of various designs of reflectors with concen-source of light, making a total of about thirty headlights and two hundred combinations. The illumination in foot-candles at the center and sides of the reference plane were plotted, and from these plots, considering only the center values of the headlight 9 ft. 7 in. above the rail, a series of headlights was chosen so as to cover in increments, variations from the lowest intensity oil to the highest intensity arc headlights. Of the various headlights tested in the laboratory, the following were chosen for the outdoor tests, the tabulation indicating the nature of the light and the average apparent beam candle-power in each case.

Head-light	No.	Type	Source of light	Average apparent beam candle power
3	Oil	.....	1½-in. burner 150 degs. oil, felt wick.....	500
1	Oil	.....	100-A burner 150 degs. oil, cotton wick.....	1,800
18	Acetylene	....	¼-in. Cyco Prest-o-lite	1,800
1¾	Oil	.....	100-A burner, safety "C" oil, cotton wick.....	*2,500
1½	Oil	.....	100-A burner 150 degs. oil, cotton wick.....	2,500
15½	Incandescent		.25 watts, 24 c. p., 6 volts Conc. Filt. Tung. Lamp.....	10,000
13½	Incandescent		.35 watts, 33.6 c. p., 6 volts Conc. Filt. Tung. Lamp.....	30,000
19	Arc	.....	26 amperes, 30 volts ⅝-in. carbon and 9/16-in. copper	60,000
21	Arc	.....	8 amperes, 100 volts ¾-in. copper and ½-in. magnetite	150,000
26	Arc	.....	26 amperes, 30 volts ⅝-in. carbon and ½-in. copper..	350,000
22	Arc	.....	25 amperes, 32 volts ⅝-in. carbon and ½-in. copper..	1,000,000

Ability to See Objects Ahead of the Train: In the out-

of-door work, the headlights listed above were first tested to ascertain the distance at which dummies could be seen with the dummies standing abreast between rails. Three dummies were used—one dressed in dark blue overalls and jumper, one dressed in blue and white striped overalls and jumper and one dressed in white overalls and jumper. The ability to see dummies with lamps of moderate intensities was fairly well established, there being no apparent difference in the ability to see dummies with a given intensity of light, whether the source is oil, acetylene or incandescent lamps. However, with arc lamp No. 19, with 60,000 apparent beam candle power, the dark object could be seen only 557 feet. Calculating from this the visibility of the dark dummy for oil, acetylene and incandescent lamps, the dark dummy would be seen at the same distance with an apparent beam candle power of only about 14,000. This effect is attributed to the predominance of short violet waves in the arc rays to which the eye does not readily respond.

From an examination of the data acquired, it became evident that there was only one headlight which is qualified to meet the 1100-foot requirement of a certain state with a sufficient margin to maintain this requirement in service, namely, headlight No. 22, and even this headlight will not meet the requirements of those states that call for 1500 un-reflected candle power. The intensity of this headlight (1,000,000 apparent beam candle-power) is decidedly dangerous to railroad operation, its only redeeming feature being the illumination of objects with sufficient intensity to render them visible to the engineman at some distance. In view of the fact that 800 feet is about the average distance at which an object can be seen on a clear dark night, this is a very doubtful advantage, as it would be impossible for the engineman to apply the brakes in sufficient time to stop a fast train before hitting the object, even though he should be looking at the exact spot at the instant the object came into range of vision.

Misreading of Signals: A second set of our-door tests was conducted to ascertain the effect of these headlights upon the reading of semaphore lights, switch and dwarf signals, fuses, red lantern set in the center of the track, red lantern swinging across the track, and classification signals. The tests were conducted both with and without opposing headlights. When opposing headlights were used they were of approximately the same intensity.

The classification lamp practically disappeared with an intensity of 40,000 apparent beam candle power when using opposing headlights, and that serious errors in reading semaphore signals were made at and above 90,000 apparent beam candle power, reaching 12 per cent error at 330,000. The above errors are taken from the curves in which the confusion of yellow and white signals is excluded, as the observers were not accustomed to the yellow signal, and practically all of the errors between yellow and white signals were the reading of yellow signals as white. Further, as there is no condition in railway operation where yellow and white signals are given in the same aspect, the committee considered the errors were not of such a character that they should be considered in this investigation.

The phantom signals, that is, the reading of colored signals when there was no light in the semaphore lantern, began to appear with a beam intensity of 30,000 candle power, this error increasing up to 33 per cent with an apparent beam candle power of 1,000,000. With the No. 22 headlight, in 41 cases the red roundel in position in front of the semaphore lamp with the light not burning was read as a white indication, that is, the engineman got a phantom clear signal to proceed, when as a matter of fact the semaphore was set at danger or stop. It became evident that phantom lights were being obtained with an apparent beam candle power in the neighborhood of 20,000, and further, that the most serious effect of high intensity of light was the obscur-

ing of danger signals on the track, such as red lanterns being swung across the track, red lanterns located in the middle of the track, and fuseses.

In order to fully establish the effect of the opposing headlight, a series of tests was conducted with opposing headlights for the picking up of danger signals in the center of the track only, three seconds being allowed to pick up the danger indication, which is considerably more time than enginemen generally have. The headlights of these tests varied from 2500 to 40,000 apparent beam candle power. The results of these tests showed that the percentage of errors varies from 0.67 per cent at 2500 apparent beam candle power to 26.3 per cent at 40,000 apparent beam candle power. This means, in the case of 26.3 per cent error, that out of 152 opportunities to observe there were 35 failures to pick up danger indications. None of the red indications above mentioned were at a distance greater than 1500 feet from the observers, and it must be acknowledged that this extremely high percentage of failures is a very alarming and dangerous condition.

In order to check these results with the regular railroad observers, a duplicate set of tests was conducted, except that in addition to the headlights used by the headlight committee, other tests were conducted with arc headlights, the maximum being 1,000,000 apparent beam candle power in the opposing headlight. The errors varied from 8.3 per cent at 2500 apparent beam candle power to 38.9 per cent at 1,000,000 apparent beam candle power.

Throughout the tests the percentage of error in reading classification signals was found to increase uniformly with the intensity of the opposing headlight.

Classification signals can be correctly determined up to a distance of 1100 feet with an apparent beam candle power of 2500, then gradually decreasing to 600 feet at an apparent beam candle power of 22,000. With two trains approaching each other on a double-track road, the classification signals are just about obscured by the front end of the locomotive at 600 feet, so that even with an apparent beam candle power of 2500 the engineman has only 500 feet (1100 feet minus 600 feet) in the movement of the two trains during which time he can pick up the classification signal. This is ample, but any decrease in the time represented by passing this 500 feet would be decidedly detrimental to the service. All the tests indicate clearly that for picking up of danger signals, and the correct reading of classification and semaphore signals, the most desirable condition is the absence of any light on the front of the locomotive.

Other Functions of the Headlight: In the foregoing discussion on misreading signals, headlights of an intensity insufficient to be of much value in picking up obstructions on the track only, have been considered. The only four functions remaining for which a headlight is required are as follows: 1, marker to designate the front end of a train; 2, warning to the public and employees of the approach of a train; 3, illumination of numbers on the headlight case, and 4, illumination of the track immediately ahead of the locomotive to allow an engineman to readily perform his duties while operating in and out of terminals, industrial sidings, switching in yard, and to readily pick up whistle posts, crossing and yard limit signs, etc., en route.

After weighing all the results, giving due consideration to the personal equation of the observers, the committee arrived at the conclusion that the intensity of light represented by an apparent beam candle-power of 3000 at the center of the reference plane 500 feet to 1000 feet ahead of the locomotive, is as high as can be used without incurring undue liability of failure to correctly read signal indications and that this intensity of light will not have, in any noticeable degree, a blinding effect when shining in one's eyes. The above described maximum headlight has considerable more intensity than is required to amply fill the four requirements stated, and it was recommended by the committee as the highest intensity which can be safely used. The minimum

headlight, as given in the second part of the conclusion, is a headlight which the committee believes, from observation, gives an intensity which will amply fulfill the four requirements given above, and the range between minimum and maximum is sufficient.

Conclusions and Recommendations: After going over the results of these tests in detail and after thorough discussion, the committee recommended as follows:

1. In order that a headlight shall be of such intensity as not to cause misreading of signals, obscuring of hand signals, fuseses, red lanterns and classification lamps by opposing headlights, and be of such intensity as not to temporarily blind the engineman looking into the same, a headlight must have an apparent beam candle-power, not greater than 3000, referred to the center of the reference plane, from 500 to 1000 feet ahead of the locomotive.

2. In order that the engineman shall have sufficient illumination ahead of the engine to allow him to readily perform his duties while operating in and out of passenger terminals and industrial sidings, while switching in yards, and to readily locate whistle posts, yard limit and crossing signs and such other landmarks en route, a headlight, due to depreciation or to variations in the intensity of the source, must not at any time during service have apparent beam candle power less than the following; the readings to be made in a vertical plane 25 feet ahead of the focal center and referred to points at the various stations in the reference plane.

Readings at Center of Reference Plane.

Reading point ahead of focal center.	Apparent beam candle power.
500 feet.....	Not less than 450 candle power
600 feet.....	Not less than 490 candle power
700 feet.....	Not less than 500 candle power
800 feet.....	Not less than 500 candle power
900 feet.....	Not less than 500 candle power
1000 feet.....	Not less than 500 candle power

Average Side Readings (Average of Readings Taken at Each Station 20 Feet Each Side of the Center).

Reading points ahead of focal center.	Apparent beam candle power.
50 feet.....	Not less than 30 candle power
100 feet.....	Not less than 110 candle power
200 feet.....	Not less than 225 candle power
300 feet.....	Not less than 315 candle power
400 feet.....	Not less than 350 candle power

The above readings are to be considered independent of the location of the headlight, the source and intensity of light, the design of the reflector, etc.

To design a headlight to meet the above requirements, the height of the headlight above the rail must be decided upon; then with a given kind of light, the design of reflector, the relative arrangement of reflector and source of light, and the intensity must be such that the readings will fall below the designated maximum with sufficient margin above the minimum requirements, that they will not at any time, during the depreciation of the source of light, reflector, etc., fall below the minimum requirements.

A tabulation of the center and side readings of the maximum and minimum requirements is given as follows:

Maximum 3000 Candle Power—Headlight 9-feet 7-inch Location.

Center.	Sides.	Sides.
1150 c. p.	50 ft.	180 c. p. plus 45 equals 225 c. p.
2100 c. p.	100 ft.	680 c. p. plus 170 equals 850 c. p.
2650 c. p.	200 ft.	1600 c. p. plus 400 equals 2000 c. p.
2850 c. p.	300 ft.	2450 c. p.
2950 c. p.	400 ft.	2700 c. p.
3000 c. p.	500 ft.	2800 c. p.

3000 c. p.	600 ft.	2800 c. p.
3000 c. p.	700 ft.	2800 c. p.
3000 c. p.	800 ft.	2800 c. p.
3000 c. p.	900 ft.	2800 c. p.
3000 c. p.	1000 ft.	2800 c. p.

Minimum 500 Candle Power—Headlight 9-foot 7-inch Location.

Center.	Station.	Sides.
95 c. p.	50 ft.	30 c. p.
195 c. p.	100 ft.	110 c. p.
295 c. p.	200 ft.	225 c. p.
365 c. p.	300 ft.	315 c. p.
410 c. p.	400 ft.	350 c. p.
445 c. p.	500 ft.	365 c. p.
485 c. p.	600 ft.	380 c. p.
500 c. p.	700 ft.	400 c. p.
500 c. p.	800 ft.	400 c. p.
500 c. p.	900 ft.	400 c. p.
500 c. p.	1000 ft.	400 c. p.

Included in the committee's report, in addition to the foregoing, was a vast amount of information and data pertaining to the methods employed in making the tests, details and results of supplementary road and laboratory tests, plats and charts illustrating the results of observations, reference to other headlight tests made during recent years, extracts from state laws, etc., etc. In the protracted discussion on the foregoing report, several notable instances in which the arc headlight proved a distinct detriment were enumerated, these coming about through interference with the observations of signals and the shortening of the range of vision of the enginemen under certain conditions. On the Chicago, Milwaukee & St. Paul it is being found that train delays are more frequent with the electric than they had formerly been with the oil lamps, the enginemen apparently growing more dependent on the headlights and less on the signals than safe operation will permit. One of the members of the committee who has had considerable experience in educating state railway commissions attributes much of the present agitation on the headlight question to the negligence of the roads in maintaining their old oil headlights, on the basis of which contention, the enginemen's organizations have been able to get a sympathetic audience when introducing unwarranted legislation. Where proper information is placed before the legislative committees, it is his experience that a reasonable attitude on the part of the legislative bodies has been the usual result.

At the suggestion of D. F. Crawford, chairman, the committee was continued for further consideration of the subject and on motion of C. F. Giles, it was decided to publish the committee's report in the form of a separate volume so as to make it the more readily available for study and reference.

LOCOMOTIVE BOILER CONSTRUCTION.

No report was presented by the committee on design, construction and maintenance of locomotive boilers at this year's convention. The executive committee was authorized to continue the subject for next year, determining the personnel of the committee to be held responsible for the report hereon.

STANDARDIZATION OF TINWARE.

During the year 1911, a very complete paper on standardization of tinware was presented to the Railway Storekeepers' Association. The committee which compiled the report collected the data from practically all of the leading railroads, giving the dimensions of the various tinware used in their respective departments, this to include articles manufactured from galvanized iron. The committee of the Master Mechanics' Association, in preparing its report, received some valuable suggestions from the Storekeepers' committee, though the report was necessarily confined to the consideration of tinware which would naturally be included in the locomotive department only. It was not expected by the committee that it would be able to present dimensions that will be adopted by each of the railroads. For the

possible benefit of those railroads that have not adopted a standard, the committee studied the methods of construction and the material to be used in the construction of tinware and also selected the dimensions that in its judgment will be most suitable for the service for which each article is to be used. This is thought to be about as close as the association can be expected to come to a standard on tinware.

Included with the committee's work on recommended design of article, there was given information on the grades, methods of manufacture, and methods of packing tin plates. The detailed drawings of twenty separate articles likely to be used in locomotive operation and maintenance were given, these including two forms of torches, two forms of squirt oil cans, a 3-pint long spout engine oil can, a one-pint signal oil can, a 3-pint valve oil can, a 5-pint valve oil can, a 2-quart oil can, a one-gallon oil can, a 2-gallon oil can, a 3-gallon oil can, a 5-gallon oil can, a 10-gallon oil can, a boiler-inspection card case, a wash-out card case, a 2-gallon tank bucket, two forms of sand bucket, and a sponging bucket for engine house use only.

In the discussion of this report, M. K. Barnum took exception to the attitude of the committee as respects the difficulty of arriving at standards on tinware for the locomotive department. He accordingly made a motion to the effect that the committee be continued and instructed to bring in a report at next year's convention recommending standards for all classes of tinware used in the locomotive department. The motion prevailed.

SUPERHEATER LOCOMOTIVES.

The committee on superheater locomotives had several subjects referred to it for investigation, as follows: Cylinder lubrication in connection with superheat; design of front end appliances, including design of nozzle, of superheater locomotives; piston valves, best types and proportions with superheat; packing rings for pistons and valves in connection with superheat; and graphite cylinder lubrication in connection with superheat. In considering these subjects the committee decided that the questions of lubrication had been discussed so fully at previous conventions that it was unnecessary to again report on it. The design of front end appliances and the proportion of piston valves were not, in its opinion, practical subjects for investigation without exhaustive experiments, which it was not thought desirable to attempt. However, there was made an investigation in connection with packing rings, etc., in view of the widely varying results which are reported in engines using superheated steam, and there was also presented to the association the results of the experiments made by the Pennsylvania R. R. on their testing plant at Altoona, on the tests of a class K 2, a (Pacific type) locomotive and on the effect of various changes in the form, length and extent of heating surface of a Schmidt superheater.

The test on a class K 2, s a locomotive has been printed and issued as bulletin 18, by the Pennsylvania R. R., and the committee recommended that it be reprinted in the proceedings of the Master Mechanics' association, in the same way that the report on the test of a class E 6 s locomotive was reproduced in the 1913 proceedings. The tests on a Schmidt fire tube superheater showing the effect of various changes in its form, length and extent of heating surface were presented as part of the committee's report. This test is valuable as indicating the effect of changing the length of the superheating pipes, and the possibility of obtaining results with the return loop shortened which are equal to those with a full length return loop.

Piston Packing Rings.—There is a wide variation in the life obtained from piston packing rings, information indicating life varying from two or three months or 6,000 miles to as much as 50,000 miles or two years. Roads representing about 25 per cent of the locomotives use special mix-

tures for packing rings, but while most of those who do so report from 50 per cent to 100 per cent longer service from special irons than from ordinary gray iron, the latter is used by those roads reporting the longest life in service. In several cases cylinder iron is used with 1.20 to 1.50 per cent of silicon—the phosphorous also being kept low, not over 0.5 per cent, and with apparently good success. There is, however, considerable variation between different classes of engines, in some cases the life reported in passenger service being double that in freight, while in other cases the reverse occurs. The longest life reported is with the plain $\frac{3}{4}$ -in. square ring which is used by the majority of the roads; but one road using $\frac{3}{8}$ by $\frac{5}{8}$ in. rings reports a decided improvement as against the $\frac{3}{4}$ -in. wide ring, and exceedingly good results are reported by the Leighton balanced ring which is a special design and used by the Illinois Central R. R.

The great variation in the life is peculiar, as there does not appear to be any explanation of the wide differences reported. The average life for all engines represented is five months, and this figure compares very closely with results reported by several roads that have gone into the matter carefully. It is generally suggested that ample lubrication and the use of the drifting throttle are the requirements for long life, but apart from these suggestions there is nothing to explain the variations.

Cylinder Bushings.—Replies to the committee's inquiries indicate that there is no trouble with cylinder walls or bushings in superheater engines, other than the wear common to all locomotives.

Extended Piston Rods.—The majority of the roads have used extended piston rods to some extent with improved results in most cases, especially on large cylinders, 23-in. diameter and over. Indications are that if of proper design, this attachment is undoubtedly an advantage, the only question being one of maintenance.

Piston Valve Rings and Bushings.—The life of piston valve rings also shows a wide variation, from as low as two months to as high as two and even three years. There is no correspondence between the life reported for piston packing rings and valve rings, in many cases roads reporting a long life for piston rings, reporting a short life for valve rings and vice versa. The average life reported is slightly over thirteen months. It is apparently but slightly affected by the material used, but several roads refer to the necessity of boring out the bushing in position to obtain good results. Very little trouble is experienced in the case of piston-valve bushings and there is evidently no serious difficulty in the maintenance of these parts.

Piston Rod Packing.—Most roads use special types of rod packing, and with a good design there seems to be no difficulty in obtaining a life of 10,000 miles or over, with the 80 lead, 20 antimony mixture. Where this has given trouble on account of severe service and on the high pressure cylinders of Mallet engines, a mixture of 50 copper and 50 lead has been used to advantage. In one instance on Mallet engines, a mixture of 33 copper and 67 lead was found satisfactory, but the committee regards the 18-20 mixture of lead and antimony as best adapted to the majority of conditions. The report was read by W. J. Tollerton.

Some very enlightening information as to the maintenance of superheater locomotives was evolved from the discussion of this report, particularly as regards the permanence of piston and piston rod packings and the matter of lubrication of cylinders, piston rods, and valve bushings. On the Lake Shore & Michigan Southern it has been found that the judicious application of additional oil to the piston rod permits vastly greater length of service from the packings making possible also, the use of softer packings than could otherwise be used. O. M. Foster, speaking for this road, regards

the life of piston packing rings as being more dependent on the fit of the rings than on the question of saturated or superheated-steam. Other speakers referring to the use of graphite as a lubricant in the valves and cylinders of superheated steam locomotives, find generally beneficial results, except as where it is used to excess and is permitted to form a paste with quantities of oil under which condition it appears to cause some difficulty from its tendency to choke up the ports and also interfere with the operation of valves, packing in about the rings. The welding of flues appears to be causing no great difficulty.

USE OF SPECIAL ALLOYS AND HEAT-TREATED STEEL IN LOCOMOTIVE CONSTRUCTION.

In continuing the work of the committee of 1912-1913 on the above subject, a circular of inquiry was sent out to the members, outlining a series of eleven questions. Several of these questions are repeated from the previous year, it being the thought that, in this way, a more definite idea could be obtained of the extent to which the use of heat-treated and alloy steels had been developed since the report of 1913. Engineers and manufacturers have quite generally accepted the term "heat-treatment," as applied to forgings, to cover two principal classes: first, forgings which are annealed, that is, heated slightly above the critical temperature, or point of recalcence, and then allowed to cool slowly; and, second, those which are quenched, that is, heated to a temperature slightly above the critical temperature, then cooled rapidly in some medium, and then reheated or tempered. For sizes commonly used in locomotive construction, the cooling medium is generally oil or water, or a mixture of the two, although various other compositions are sometimes used. Tempering, or "drawing back," consists of reheating after quenching, to reduce brittleness, and, at the same time, to retain the desired degree of hardness.

Conclusions: From the information accumulated by the committee, it drew the conclusion that there are to be considered in locomotive construction the following four classes of steel forgings: 1, unannealed plain carbon steel, of about 75,000 lb. per square inch ultimate tensile strength; 2, annealed plain carbon steel, of about 80,000 lb. per square inch ultimate tensile strength; 3, quenched and tempered carbon steel, of about 85,000 lb. per square inch ultimate tensile strength; and 4, alloy steel, of about 100,000 lb. per square inch ultimate tensile strength. In the case of untreated plain carbon steel and annealed plain carbon steel, the elastic limit as determined by the drop of the beam is approximately one-half of the ultimate tensile strength, while in the case of quenched and tempered carbon or alloy steel the elastic limit as determined by the drop of the beam is considerably more than one-half of the ultimate tensile strength. No decided attempt has been made to utilize the higher physical properties of quenched and tempered carbon and alloy steels, due to the lack of sufficient experience in the manufacture of these materials.

Failures attributable to the process of manufacture may be due to, a, material initially defective; b, improper heat-treatment; or to c, a combination of both. Defects which may remain latent in untreated or annealed material may be developed even under proper conditions of quenching and tempering to a point where they are harmful. In cases where failures of piston rods, axles and crank pins have occurred, the fracture has usually been transverse, but there have been a few cases of longitudinal fracture.

There are three essentials to the successful quenching and tempering of steel, viz.: 1, the steel should be chemically homogeneous and free from physical defects, and its chemical composition definitely known; 2, care must be taken that each particular piece is uniformly heated throughout; 3, quenching should be done under conditions that will secure the uniform cooling of all pieces in each quenching

charge. The proper rate of heating and cooling depends upon the size of the piece; small pieces may be rapidly heated or cooled without injury, while large pieces require a relatively slower rate of heating and cooling, to avoid excessive variations in temperature between different parts of the same forging. The medium to be used for cooling depends upon the desired rapidity of cooling. Of the three mediums previously mentioned, water is quickest and oil slowest.

Following up the recommendation of the committee of 1913, this year's committee submitted for consideration two specifications for quenched and tempered steel forgings, one specification covering carbon steel, and the other specification covering alloy steel. The specification for quenched and tempered carbon steel was drawn up in collaboration with a committee of the American Society for Testing Materials, and is practically the same specification that will be submitted to that society in the latter part of June, slight modifications having been made to adapt it to the requirements of locomotive construction. The specification covering alloy steel forgings was drawn up to cover the requirements of any alloy steel, the only changes necessary being to insert a chemical composition suitable to the alloy under consideration. The specification, as submitted, covered the chemical composition of chrome-vanadium steel. The specification for alloy steel includes physical properties which are very similar to those which have been required for about four years by several users of chrome-vanadium steel for locomotive construction, with the exception of the elongation and reduction of area required for axles over 7 inches in diameter.

It has been found that in order to obtain 20 per cent elongation in 2 inches and 50 per cent reduction of area for axles of this size, it is necessary to cool them very rapidly, so that it seemed advisable to the committee to reduce the requirements to 18 per cent elongation and 45 per cent reduction of area, and insist that such axles shall be quenched in oil, in the belief that this treatment will result in less liability of injury to the steel in quenching. This recommendation was made with the approval of several representatives of steelmakers. Both of the above specifications call for drilling forgings over 7 inches in diameter, unless otherwise specified by the purchaser. The committee found a great tendency among users of quenched and tempered steel to require drilling of parts over 7 inches, and this practice is advocated by steelmakers. In the case of axles and crank pins particularly, drilling takes away practically nothing from the strength of the part; it removes the material from the center where defective material is most likely to exist and where it is least subject to the beneficial effects of heat-treatment, and it allows the forging to adapt itself to expansion and contraction due to heating and cooling. The specifications leave the proof test optional with the purchaser, but it was suggested that proof tests should be made on all important parts, as this is the best known method up to the present time for detecting internal cracks, which might later cause failure of the part, and which can not be detected by the ordinary tensile or bending tests of small test pieces.

The committee expressed a belief that the manufacture of plain carbon and alloy steel to be quenched and tempered, will eventually be developed to the point where such material can be used in designs involving much higher unit working stresses than are possible with untreated or annealed plain carbon steel, with a consequent reduction in the weight of parts. In the case of rapidly moving parts, this reduction of weight may also be expected to result in reduction of wear. For this reason there appears to be a wide and important field for the use of quenched and tempered carbon steel and alloy steel in locomotive construction. The importance of making continued and extensive service tests with these materials,

to encourage and assist in their development was urged by the committee. Drafts of the specifications referred to were included in the committee's report.

The above report was accepted without discussion other than to express appreciation of the work of the committee and the proposed specifications were referred to letter ballot as recommended practice.

REVIEW OF THE WORK DONE BY OTHER MECHANICAL ORGANIZATIONS.

Dr. Angus Sinclair at this juncture read an individual paper on the work being done by the lesser railway mechanical organizations. Among those referred to and whose work was commended, are: the Traveling Engineers' Association, the Air Brake Association, the International Railway General Foremans' Association, and the Railway Fuel Association. The report was accepted with the thanks of the convention.

SUBJECTS FOR THE 1915 CONVENTION.

The committee on subjects for the 1915 convention recommended the following subjects for the consideration of the association:

1. Revision of Standards.
2. Mechanical stokers.
3. Recommended method for uniform calculation of stresses in boilers.
4. Locomotive counterbalancing, with possible reduction in the weight of reciprocating parts.
5. Maintenance of electric equipment: Locomotives, cars and shop machinery.
6. Tender trucks: Design, and location of side bearings.
7. Alloy steels.
8. Forgings: Specifications for.
9. Plate springs: Design and heat treatment.
10. Boiler washing: Best method of caring for, at terminals.

Topical Discussion.

11. Improvement in piston valves.
12. Cylinder lubrication with graphite.
13. Electric welding of flues.

The reasons for proposing the above list of subjects were briefly outlined in each case. The report was disposed of by referring it to the executive committee. With this report, the second day's proceedings were concluded.

SMOKE PREVENTION.

At the convention of 1913 the committee on smoke prevention submitted a report embodying a description and the results of certain tests carried on by the Pennsylvania R. R. at the Altoona testing plant. As a result of these tests, certain conclusions were drawn and recommendations made. At the meeting of the committee for 1913-1914, a set of five questions were drawn up, to be submitted to the mechanical officials of the various railways, confronted by the smoke problem, with the intention of bringing out the results of the 1912-1913 recommendations, as well as the results of any further experimentation or application of any other devices than those that had been recommended by the committee. The five questions asked, with a summary of the answers obtained, are given herewith:

Question No. 1.—Give full report of progress covering the application and the efficiency of the smoke-preventing air jets, blower, quick-opening blower valve and arch, recommended in your committee's report to the convention of June, 1913. From the information made available in reply to the above query, it is apparent that the devices and arrangements recommended by last year's committee are effective as agencies in smoke abatement.

Question No. 2.—Have you installed on locomotives any special devices other than those recommended by your committee? Only seven roads, out of the twenty-five, with about 10,000 locomotives, have tried any special devices other than those recommended. Among such devices may be mentioned the Bates baffle fire door and Heffron draft regulator, also a form of ring blower

at the top of the stack by the use of which, claim is made of almost complete elimination of the smoke on the road and the prevention of smoke trailing into the cab. The cost of this arrangement is about \$7.75.

Question No. 3.—Have you installed any special device for handling the smoke from roundhouses? Only one large road has tried any special devices for handling roundhouse smoke. The special device referred to is the smoke-washing plant of the Lake Shore & Michigan Southern at the Englewood roundhouse, Chicago, which device has been fully described and illustrated in the various railway journals.*

Question No. 4.—What influence on smoke prevention has the superheater on passenger, freight and switching locomotives? As bearing on this subject, tests were conducted by the Pennsylvania R. R. at the Altoona testing plant, with both freight and passenger engines equipped with superheaters against the same type of saturated-steam engines. The results show that the superheater in freight service effects an undoubted reduction in smoke under the same working conditions. In passenger service, however, the curves indicate that a superheater produces more smoke at the low burning rates, while there is a reduction in smoke at the high burning rates.

Question No. 5.—Have you investigated various methods of firing-up locomotives in roundhouses, with the special object of preventing smoke? Smoke abatement in firing up appears to have been effected by the use of a ring blower hung inside the stack in a horizontal position by leaving the jets on when firing-up; in a test with fuel oil and shavings, atomized fuel oil, oil and engine wood, the last named produced the least smoke and was cheapest, the cost being about \$1 per engine; in a test with briquettes, cost about \$1.50; soft coal, \$2.09; coke, \$4.26; briquettes gave as little smoke as coke and by putting coal on the grates and wood on top, but it is believed that this method is more injurious to the grates, especially with coal that clinkers badly. One road, after considerable investigation, has adopted the practice of firing-up with scrap waste, crude oil, wood and coal in the following quantities: Waste, 1 lb.; crude oil, $\frac{1}{2}$ pt.; old car siding, $\frac{1}{2}$ cord; coal, 300 lb. The method employed is to saturate the waste with the crude oil and throw it in on the grate, after being ignited. On top of this, in small quantities, is thrown the wood. When the wood gets to burning in good shape, six to eight scoops of coal are added; then in about thirty minutes more coal is added.

Conclusion: From the reports above outlined, the committee concluded that the application of the apparatus recommended by them last year has proven successful in extended practice toward the elimination of smoke in steam locomotives and suggested its more general adoption.

Discussion of the foregoing report was such as to bring out a considerable number of expressions of confidence in and approval of the recommendations made by the committee at last year's convention. Various other methods than those referred to by the committee for the suppression and abatement of smoke were mentioned, one in particular being precipitation by means of high tension electric discharge through the current of gases carrying the smoke. The committee was continued for further investigation of the subject.

EFFICIENCY TESTS OF LOCOMOTIVES.

The committee on the above subject, in accordance with instructions given to it, prepared a code for the testing of locomotives, both upon the road and in the laboratory, and submitted, for approval and adoption, a report, which includes not only the method of conducting the tests, but the manner in which the results should be tabulated and proper formulae for computing all of the items required for the complete test. The proposed code was received by

the convention which voted to submit it to letter ballot as recommended practice.

TRAIN BRAKE AND SIGNAL INSTRUCTIONS.

The committee on "Revision of Train Brake and Signal Instructions" submitted a report in which that portion of the Master Car Builders' and American Railway Master Mechanics' association's air brake and train air signal instructions under the heading "General Instructions," had been revised, the revision being incorporated in the report. That portion comprising the "General Questions and Answers" was not dealt with for the reason that the number of different types of brake equipments now in use is so large, and the fact that local conditions of different roads require special modifications in methods of handling brakes so that it would be practically impossible to formulate a series of questions and answers that would be universally applicable. Moreover, the Air Brake Association has a committee on questions and answers that supplies all the air brake information required in question and answer form, and the committee respectfully referred the convention to the comprehensive list of questions and answers published by that association. The committee recommended, however, that a committee from the Master Mechanics' association be appointed to confer in conjunction with a similar committee from the Master Car Builders' Association, and the Air Brake Association "Questions and Answers" committee, to the end that the questions and answers shall be kept constantly up to date.

New Train Signal: On account of the limited range of action of the present train air signal, the committee brought to the attention of the convention the need of an improved train signal—this with a view of accelerating the development of a signal device which shall be entirely satisfactory in its operation, such signal to permit of easy and prompt communication both between the train crew and engine-man, and the engineman and train crew, under all conditions of service. It was suggested by the committee that if it be the desire of the association that this subject be investigated, the committee would be pleased to do so, and report progress at the next convention.

The report was received and referred to letter ballot.

TRAIN RESISTANCE AND TONNAGE RATING.

In a committee report on the above subject there was given a broad general review of the work of establishing tonnage rating methods, a citation to a long list of references on the subject, a digest of the information made available through a circular of inquiry as to the methods employed on various railroads throughout the country, an explanation of several of the more popular methods in general use, discussion of the effects of weather conditions, etc. The committee also made specific recommendations as to practices to be followed under given conditions, but after some discussion as to the advisability of accepting the proposed recommendations without their having been reduced to a more stable basis than was possible under the conditions governing the proposition of the report, the subject was referred back to the committee for further investigation and report next year.

FUEL ECONOMY.

In the preparation of its report on the above subject, the committee sent out a list of questions and from the replies to these inquiries, the report was largely formulated. The first of these queries sought expressions of opinion as to what economies are attainable from certain devices in conditions as follows, and with respect to which the committee's conclusions are formulated in each case:

Good Boiler Conditions: There is no doubt that clean boilers contribute largely to fuel economy and it is certain that scale formation leads to broken staybolts, leaky tubes, seams and mud rings, with the consequent loss of boiler efficiency and increased fuel consumption for a given amount

*See Railway Review for Feb. 14, 1914, page 250.

of evaporation. The nature of the scale formed has a decided influence on the efficiency of the heating surfaces. In some localities, the water used for locomotive boiler feed contains a certain amount of decayed vegetable matter, and the scale is somewhat soft and porous. The loss of fuel is very much less, with this sort of scale, than with hard scale, the effect of which was the subject of investigation in the experiments just mentioned. Scale prevention and careful boiler maintenance have a very marked bearing on fuel economy, perhaps more than any other item in connection with the locomotive itself.

Good Water Conditions: Good boiler feed-water, together with thorough cleaning of boilers by washing out, keeps the amount of scale formed down to a minimum, and, as previously shown, contributes largely to fuel economy.

Good Machinery Conditions: Keeping the valve gear in good condition, in order to obtain correct steam distribution, and by proper lubrication, to prevent hot bearings, the friction or internal losses in the locomotive will be reduced to a minimum. The effect of this on the amount of fuel burned is self-evident.

Superheaters: Tests of superheater locomotives in both passenger and freight service have shown a saving in fuel, for a unit amount of work done, amounting to as much as 25 per cent. Somewhat less than this must be expected in regular service, because in every-day operation the approach to the results achieved by tests will be governed by the essential factors of good firing, proper handling of the locomotive and maintenance. Superheaters make it possible to get a higher sustained tractive power out of a locomotive. The savings resulting from their use, therefore, would not show upon a locomotive mileage basis, but would appear when figured on a ton-mile basis, which is, to a certain extent, proportional to the work done.

Preheaters and Feed-Water Heaters: Accurate data relative to these devices are so limited, as to be of little value. It can be said, therefore, that experience has not yet justified their application to locomotives generally.

Outside Valve Gear: Outside valve gear has some influence on fuel economy, because it holds its adjustment and consequently gives a better steam distribution. While certain economies are known to result from its use, the percentage is more or less indeterminate.

Brick Arches: It is generally agreed that about 10 per cent fuel economy can be obtained from the use of the brick arch. But there are other advantages which should not be lost sight of. It affords considerable protection to the flues, by keeping them at a nearly constant temperature and thus prevents certain losses due to leaks; also the arch tubes give increased heating surface of the most valuable kind.

Mechanical Stokers: In the ordinary interpretations of the term "fuel economy" it is doubtful whether savings can be claimed for the mechanical stoker. Its chief merit is its capacity for firing larger quantities of coal than can be handled by a fireman. It is believed that the application of the mechanical stoker will be greatly extended in the future. Until then the advantages of the device will be more or less a matter of conjecture.

Special Appliances: Special appliances, such as automatic fire doors, power reverse gears, rectangular and variable exhaust nozzles, and smoke-consuming devices all have a tendency to produce fuel economy, as they make work of the enginemen easier and improve the operation of the locomotive itself. Properly drafted locomotives should steam freely, provided they are correctly proportioned, and therefore a study of each class of locomotive, to the end of giving it an efficient set of draft appliances, will materially assist in producing a saving in fuel. Among special appliances might also be mentioned a recording device attached to the safety valve to show how long the valve has been open during any stated period. The record made by

the instrument is very impressive and admits of no argument. It enables the enginemen to be accurately informed of the amount of waste caused by unnecessary popping, and it goes a long way to assist in making instructions along this line effective. A 3-inch safety valve on a boiler carrying 200 pounds pressure will waste 146.7 pounds of steam and about 20 pounds of coal every minute during which it is open. When it is considered that from 7000 to 20,000 pounds of coal are wasted each month on a single locomotive, it is evident that the matter of loss through safety valves is something worthy of close attention and offers an opportunity to effect a considerable saving.

Other queries pertained to methods of instruction, performance sheets, monetary premiums, preparation of coal, kinds of coal, coal handling facilities and apparatus, etc. Having digested the information accumulated by this method of inquiry, the committee felt justified in the following conclusions:

Conclusions: Care should be exercised always to have fuel furnished according to a rigid specification and this should be further followed by close inspection at the mines. Proper grades of fuel should be maintained for each class of service as far as possible in order to keep the efficiency of both the enginemen and the locomotives as high as possible.

Too much care can not be exercised in keeping accurate coal records, especially at coaling stations. At the same time losses in fuel by overloading tenders and careless handling of locomotives at terminals should be stopped as far as possible. Fuel savings must be made by all concerned and not by the enginemen alone, if the coal bills are to be reduced as much as they can be.

The boiler feed-water should be improved wherever possible, and if necessary good treating plants should be installed. The savings resulting from reduction of scale and decreased boiler maintenance will pay the cost of treating boiler feed-water where necessary. Suitably located blow-off cocks of good design are also a great aid in keeping down boiler scale.

Emphasis should be laid upon the necessity of close co-operation between engineers and firemen, and between these men and their supervising officers; strict adherence to the proper methods of operating locomotives, proper care and adjustment of lubricators to avoid damage to valves, valve seats and piston packing; and the maintenance of standard adjustments of front end arrangements, exhaust nozzles and other parts essential in producing free steaming locomotives. Definite assignment of the most suitable classes of locomotives to each division, and as far as possible, assignment of regular crews to locomotives, are great aids in fuel economy, for reasons too well known to need discussion here.

The recent successful application of powdered fuel to industrial plants points the way to large savings in locomotive fuel consumption, provided the system can be successfully adapted to this kind of service. Although there will be an increase in cost per ton due to pulverizing the coal, the expected savings should more than offset this. Some of the advantages claimed for powdered fuel are: Greater capacity of locomotive, and lightening the work of the fireman; reduced fuel consumption due to more perfect combustion, and elimination of standby losses; reduction of smoke, and ease of handling.

Notwithstanding the mechanical aids to effect economy of fuel, it is a settled fact that a well organized department, invested with full charge of the fuel problem, and nothing else, will accomplish material results. Experience of many roads proves conclusively that the institution of such a department is followed by savings which abundantly justify the expense of the administrative and supervising organization.

The report was read by Wm. Schlafge, chairman of the committee.

In the discussion exception was taken to the conclusion of the committee respecting the purchase of coal under

specification; there being in the railroad field too many considerations respecting expediency, availability, etc., to generally permit of adherence to specifications requiring any high standard as to heat value or chemical content. Objection was also raised to figures quoted from the U. S. geological survey indicating 15 per cent increased cost of fuel for 1-16 inch accretion of boiler scale and 60 per cent increased cost for fuel under conditions where $\frac{1}{4}$ inch of scale had accumulated. No experience, which any of the members present had had, would indicate anything like this degree of loss in locomotive practice. There was no doubt, however, that a foul condition in the boiler is conducive to heat losses to so marked a degree as to warrant diligence in keeping the boiler clean.

The above report was accepted and the committee made a standing one for further development of the subject.

TESTS OF SUPERHEATERS AND BRICK ARCHES, NORFOLK & WESTERN RY.

H. W. Coddington, engineer of tests of the Norfolk & Western Ry., presented the concluding feature of the technical program of the convention in the form of a paper on the above subject, in which three locomotive conditions were employed in hauling the same train over a comparatively short length of track in which conditions were particularly favorable to the production of uniform results. The conditions of locomotive referred to were: A, locomotive equipped with superheater only; B, locomotive equipped with superheater and brick arch; and C, locomotive equipped with arch only. In general it was found that the brick arch and superheater in combination were capable of effecting an increase of 16.1 per cent in the tonnage which the locomotive is capable of hauling, an increase of 30.1 per cent in the speed at which the tonnage is hauled and this with a saving of 26.8 per cent in fuel and 41.8 per cent in water over the locomotive not so equipped.

ELECTION OF OFFICERS.

In the election of officers for the ensuing year, the following were chosen by unanimous vote: President, F. F. Gaines, Central of Georgia R. R.; first vice-president, E. W. Pratt, Chicago & Northwestern Ry.; second vice-president, Wm. Schlafge, Erie R. R.; third vice-president, F. H. Clark, Baltimore & Ohio R. R.; treasurer, Dr. Angus Sinclair; and for executive members, C. F. Giles, Louisville & Nashville R. R., and M. K. Barnum, Baltimore & Ohio R. R.

The smallness of the attendance during the election of officers prompted the convention to suggest to the executive committee that a change in the by-laws be made if necessary whereby the order of business could be so arranged as to permit a larger representation during the election, the executive committee to submit its proposed method of procedure to letter ballot for the approval of the membership at large. After complimentary remarks by several members, including Robert Quayle who presented to Mr. MacBain the past president's badge, the convention adjourned.

Society for Promotion of Engineering Education.

The 22nd annual meeting of the Society for Promotion of Engineering Education will be held at Princeton, N. J., with headquarters at Nassau Hall, June 23 to 26, 1914. Following is the program:

TUESDAY, JUNE 23, 12:00 M., PRELIMINARY MEETING OF COUNCIL.

Opening Session, 2:30 p. m.

Address of Welcome, by President John G. Hibben; Response, by Dean Gardner C. Anthony.

Business Session—Reports of Officers; Reports of Standing Committees.

Committee on Entrance Requirements, Prof. J. J. Flather, University of Minnesota.

Committee on Statistics, Prof. A. J. Wood, Pennsylvania State College.

Report of Joint Committee of Engineering Education, by Mr. Desmond Fitzgerald, Brookline, Mass.

At 4:00 p. m., Meeting of the Delegates of the Institutional Members, Prof. Henry S. Jacoby, presiding.

At 5:00 p. m., Reception by President and Mrs. Hibben at the President's House.

At 8:00 p. m., Informal Get-Together Smoker at the Nassau Club.

WEDNESDAY, JUNE 24, 9:00 A. M., COUNCIL MEETING.

At 9:30 a. m., Address, by Hon. Jas. F. Fielder, Governor of the State of New Jersey; Response, by Dean G. C. Anthony.

Session on College Administration, Dean F. L. B. Bishop, presiding.

Address, "The Financial Department of a School or University," by T. H. B. McKnight, treasurer of the Pennsylvania Lines West of Pittsburgh.

Paper, "The Relation of the Administrative Department to the Teacher," by Dr. C. R. Mann, University of Chicago.

Report of the Committee on College Administration; Discussion.

Adjournment, 12:30 p. m.

At 2:00 p. m., Paper, "Education in Scientific Management" (June Bulletin), by Prof. Hugo Diemer, Pennsylvania State College; Discussion.

At 2:30 p. m., Paper, Academic Efficiency (April Bulletin), by Prof. L. M. Passano, Massachusetts Institute of Technology; Discussion.

At 3:00 p. m., Reports of Committees on Improvement in Laboratory Instruction.

Electrical Engineering, Prof. Chas. F. Scott, Yale University.

Materials, Prof. F. P. McKibben, Lehigh University.

Mechanical Engineering, Prof. A. M. Greene, Rensselaer Polytechnic Institute.

Mining Engineering, Prof. F. W. Sperr, Michigan College of Mines.

Report of Committee on Teaching Mechanics to Engineering Students, Prof. E. R. Maurer, University of Wisconsin.

Report of Committee on Teaching Physics to Engineering Students, Prof. D. C. Miller, Case School of Applied Science.

Adjournment, 4:30 p. m.

At 8:00 p. m., Lecture, "The Meteor Crater in Arizona," by Dean W. F. Magie, Princeton University.

THURSDAY, JUNE 25, 9:00 A. M., COUNCIL MEETING.

At 9:30 a. m., Papers on Fundamentals in Mathematics (June Bulletin).

Paper, "Practical Mathematics," by Prof. W. S. Franklin, Barry MacNutt and R. L. Charles.

Paper, "The Calculus Without Symbols," by Prof. E. R. Hedrick, University of Missouri.

Paper, "The Use of the Differential in Calculus," by Prof. E. V. Huntington, Harvard University.

Discussion.

At 10:45 a. m., Papers on Methods of Study.

Paper, "The Preceptorial System and Electrical Engineering at Union College" (June Bulletin), by Prof. W. L. Upson, Union College.

Paper, "Teaching Engineers How to Study" (May Bulletin), Prof. Geo. L. Sullivan.

Paper, "Giving Instructions in Methods of Study," Prof. W. H. Kenerson, Brown University.

Discussion.

Adjournment, 12:30 p. m.

At 2:00 p. m., Papers on Courses of Instruction (June Bulletin).

Paper, "Co-ordination in Engineering Instruction," Prof. A. B. McDaniel, University of Illinois.

Paper, "Study of Technical College Catalogs with Respect to Descriptions of Courses of Study and of Instruction," Prof. H. S. Jacoby, Cornell University.

Discussion.

At 3:45 p. m., Papers on Fundamental Pedagogical Topics (June Bulletin).

Paper, "Grading of Students by Universities vs. Grading of Technical Graduates by Employers," Prof. C. F. Harding, Purdue University.

Paper, "Better Text-Books," by Prof. F. H. Sibley, University of Kansas.

Paper, "A Report of Progress in Co-operative Education," Prof. A. M. Wilson, University of Cincinnati.

Discussion (including the article by Pres. W. M. Riggs, Student Character Records, printed in the April Bulletin).

Adjournment, 4:30 p. m.

At 7:00 p. m., Annual Dinner in the Graduate College Dining Room, followed by the presidential address of Dean G. C. Anthony. Tickets for the dinner are \$2.00 each and ladies are invited to attend.

FRIDAY, JUNE 26, 9:00 A. M., COUNCIL MEETING.

At 9:30 a. m., Report of the Committee on Co-operation With Secondary Schools, by Prof. H. E. Webb, Central Commercial and Manual Training High School, Newark, N. J.

Report of the Committee on Technical Nomenclature, by Prof. J. T. Faig, University of Cincinnati.

At 10:30 a. m., Papers on New Developments in College Courses (June Bulletin).

Paper, "A Department of Engineering at the Johns Hopkins University," Prof. J. B. Whitehead, Johns Hopkins University.

Paper, "Proposed Courses in Structural Engineering for Civil Engineering Students," by Prof. W. M. Wilson, University of Illinois.

Paper, "The New Mechanical Engineering Course at Columbia University," by Prof. Chas. E. Lucke, Columbia University.

Discussion.

At 12:00 m., Adjournment, followed by a meeting of the institutional delegates.

At 2:00 p. m., Organization meeting of the 1914-1915 Council.

British Railways May Demand Further Rate Advance.

English railways may be forced into applying for further advances in their rates in addition to the 4 per cent increase granted last year. Advices received by the Bureau of Railway News and Statistics state that so far the increases already awarded have fallen short of compensating the companies for higher working expenses due to rising wages and cost of materials, that the carriers are confronted by the alternatives of cutting off the less remunerative facilities now furnished the public or following the example set by eastern railroads of the United States in applying for permission to raise their rates beyond the present maxima.

Relief afforded to the companies by last year's four per cent increase, it has been found, is only partial. Advances were applied only to such rates as could be raised within the parliamentary maxima, many being already up to the maxima. Many of those below the maxima, moreover, could not be raised for one reason or another. Hence the London & North Western estimates that the benefit it has obtained equals not more than one-half its increased expenses; the Midland and the Great Central declare the increases do "not nearly compensate" for the concessions made, and the Lancashire & Yorkshire states that increased labor costs which it must meet are "considerably more than double" any advantage it has gained. Other companies make similar statements.

English railways have shown a uniform reflection of American experience in that although gross revenues were greatly enhanced in 1913 an excessive rise in expenses wiped out the advantages which should have resulted. Wages account for most of this. The London & North Western labor bill in 1913 showed an advance of about \$2,500,000 of which \$1,500,000 was the direct cost of extra wages paid. The Great Western estimates the concessions it has made to its staff since 1911 at \$1,250,000 per annum.

The Railway Supply Man's Point of View

The Mechanical Conventions and Exhibition.

The annual conventions of the Master Car Builders' and Master Mechanics' Associations, at Atlantic City, were highly successful and satisfactory. There was an undercurrent of depression, owing to the general depression of business and uncertainty of the future. Retrenchment is resulting in a considerable number of railway men losing their positions; and some probability of reduction of sales forces in the supply trade. There were more railway men present than usual—over 730—and less supply men, 1484. The total registration of members, guests, ladies and supply people, was 3488, up to Tuesday night of this week.

The entertainment features were somewhat subdued from the exuberance of former times. Rolling chairs, which are a real necessity at Atlantic City, were provided in abundance; and there were the usual band music, informal dances, and social gatherings. Certainly there can no longer be any reasonable criticism of the general tone of the gatherings. The sessions of the convention were well attended and received the first attention of the members.

The exhibition of railway appliances, machinery and supplies of all kinds, has become an important event of the year, constituting as it does an annual exposition of progress.

There were an unusually large number of spaces without other exhibits than printed matter—used for reception rooms. Some lines have nothing which can be displayed; and some have thought best to intermit for a while. We are under the impression that some concerns made a mistake in not showing their appliances, which would have been convenient for reference no matter how well known. The educational value of this opportunity for younger and new men, ought not to be neglected. The railway personnel is constantly changing.

On the whole, exhibitors seemed well pleased with the attention given them by railway men. There has always been and probably always will be some dissatisfaction in this respect. It would be almost impossible for every railway man to visit and study with care every exhibit; although some approximate this. Exhibitors who are thoroughly "on the job," and hustle to get the attention of the railway men they want to interest, generally have little to complain. Of course, those who have been coming for years and have wide acquaintance cultivated in many ways have the advantage of new exhibitors or those who simply dip into the railway game once in awhile.

Nor is the time spent, in what seems to be merely visiting in exhibit spaces, or on the porches or even on the golf

links, wasted. It affords opportunity for comparing experiences, explaining matters of doubt, and correcting misapprehension. It is a good thing for the two branches of the great railway army to rub up against each other, as men interested in the same great game of life.

It is to be regretted that more of the higher railway officials do not take a day or two to visit these exhibitions. There are generally a few—a very few—and they have not been annoyed by undue persistency. There is no one who would not acquire enough valuable knowledge regarding the state of the art to feel well repaid for the time.

On the Pier.

The Railway Supply Men's Association held its annual meeting at Atlantic City, last Saturday. The report stated that 82,434 sq. ft. of exhibit space was sold this year against 87,360 ft. last year.

Officers for 1914-1915 were unanimously elected as follows: President, J. Will Johnson; Vice president, Oscar F. Ostby.

Members of the Executive Committee: Third District, C. E. Postlethwaite and P. J. Mitchell. Fifth District, George H. Porter. Sixth District, Frank E. Beall.

Votes of thanks were given the retiring officers for their efficient service. Later the executive committee organized and the president appointed the following committees:

Exhibit: Joseph H. Kuhns, chairman; J. C. Whitridge, C. E. Postlethwaite.

Finance: F. M. Nellis, chairman; J. C. Currie, C. F. Elliott.

Badge: C. B. Yardley, Jr., chairman; Oscar F. Ostby, George H. Porter.

Hotel: Oscar F. Ostby, chairman; S. M. Dolan, Phillip J. Mitchell.

By-Laws: C. F. Elliott, chairman; F. E. Beall, George H. Porter.

Entertainment: George R. Carr, chairman.

Enrollment: Harold A. Brown, chairman.

Transportation: George T. Cook, chairman.

J. D. Conway was re-elected secretary-treasurer.

California poppies were worn by those favoring holding the convention in San Francisco next year. The exposition people, through A. H. Mortensen, traffic manager, are endeavoring to bring this about.

The so-called Greek Temple on the pier which is used for the convention meetings has become inadequate in size. It is to be enlarged before another convention, and precautions are to be taken to reduce the noise in its neighborhood.

The American Flexible Bolt Co. is another exception to the rule of depressed business. It has been running day and night for several months and is keeping it up through June.

The alumni of Purdue, Cornell and Wisconsin held reunion dinners during the conventions. Employees and former employees of the Chicago & Northwestern R. R. lunched together and formed a club to hold future reunions. Superintendent of Motive Power, Robert Quayle was elected president.

Men from the Pacific Coast strongly urged the choice of San Francisco for the next annual conventions. The determination of location rests with the executive committees. While many favor the idea, on account of the great Exposition, the distance and other obstacles are such that it hardly seems probable that Atlantic City will be deserted even for one year.

A proposed trip to the Eddystone plant of the Baldwin Locomotive Works with the special purpose of examining the new Erie triplex locomotive recently illustrated in these columns, was abandoned on account of taking too much time from the exhibits on the pier. Arrangements were made to take members there from the office in Philadelphia, if they desired to stop over on their way home.

Mr. H. H. Hewitt, in addition to his fine exhibit of articulated trucks on the pier, had on the railway track Lehigh Valley hopper coal car No. 180,000, which has seen considerable service. There are no center plates and no side bearings in this construction, and the wheels show no flange wear.

Iron and Steel Industry.

Fundamental iron and steel conditions are steadily improving. Actual conditions cannot be estimated accurately by the volume of business. The country's necessities are being dammed up. The heaviest business of the week has been in steel plate for cars and in cast pipe. The annual merchant steel order calling for perhaps one million tons may not be accepted at current quotations, six months being as far as makers will care to bind themselves. The requirements for general construction material assumed broader proportions this week, and the dynamic pressure of withheld business is growing.

Supply Trade Notes.

—A Duluth, Minn., press report says that three Eastern car builders are considering locating a \$2,000,000 plant near that city.

—The Chicago Steel Tape Co., 6229-33 Cottage Grove avenue, Chicago, has established a downtown office at 900 Lytton building. Harry D. Nelson is in charge.

—The Westinghouse Electric & Mfg. Co. has created the positions of assistant managers of the railway and lighting department and has appointed E. P. Dillon and M. B. Lambert to these positions. Mr. Dillon will have charge of the commercial activities of the company in connection with the generation and distribution of power, involving power house, substation, transformer stations and similar apparatus. Mr. Lambert will have charge of all sales work pertaining to electric traction, including steam, interurban and city railway propositions. Both have been connected with the railway and lighting department of the Westinghouse company for a number of years and are widely known in the electrical profession.

—The Gun-crete Company has opened new offices in the McCormick building, Chicago. This firm specializes in cement-gun work for railroad engineering, industrial and mining structures. It has at its disposal a large amount of the most modern cement-gun equipment, and a very efficient working organization. The Gun-crete process is extensively used in railroad work for the encasing of steel bridges, etc., as rust and fire protection, for the lining of tanks, reservoirs and for the fireproofing of wooden trestles. The process has also been used for the sealing of fissures in rock cuts and by encasing with Gun-crete temporary frame structures can easily be transformed into permanent, sanitary buildings. Carl Weber, C. E., who is president of the Gun-crete Company, is one of the best known concrete engineers in America.

RAILWAY NEWS.

Chicago, Indianapolis & Louisville.—Directors of the Chi-

ago, Indianapolis & Louisville Ry. have passed the semi-annual dividend on the common stock, which has been on a $3\frac{1}{4}$ per cent basis for several years. The regular semi-annual dividend of 2 per cent was declared on the preferred stock.

Cincinnati, Bluffton & Chicago.—The Indiana public service commission has ordered that the entire roadbed of the Cincinnati, Bluffton & Chicago R. R. be rebalasted; that 60 per cent of the defective ties be replaced; that bridges and culverts be strengthened; that the rolling stock be repaired and other improvements be made in the interest of safety. These improvements were ordered made within 60 days. It also was recommended that the bridge over the Wabash river, near Bluffton, be rebuilt within 90 days.

The Supreme Court of Indiana has reversed the judgment of the Huntington Circuit Court which refused to modify the former order of sale of the Cincinnati, Bluffton & Chicago. The lower tribunal ordered the receiver to sell the property for not less than \$800,000. As no bids for this amount were received, the receiver was obliged to continue the operation of the property, with loss to all concerned. The higher court holds it was an error to refuse a modification of the terms on which the road might be sold.

Jonesboro, Lake City & Eastern.—Attorneys representing minority stockholders filed a petition in chancery court at Jonesboro, Ark., June 5, asking that a receiver be appointed for the Jonesboro, Lake City & Eastern R. R., and an injunction issued to restrain officers of the road from floating bonds. Notice had been given that a loan was to be negotiated to secure funds to repair the property. The petition will be heard June 25.

Kanawha & Michigan.—The Kanawha & Michigan Ry. Company has been authorized by the Ohio public utilities commission to issue \$1,200,000 $4\frac{1}{2}$ per cent equipment trust certificates.

Kansas Southern & Gulf.—The Kansas Southern & Gulf R. R. has been purchased by C. E. Morris, Westmoreland, Kan. It is planned to extend the line.

Kettle Valley.—Press reports state that rail connections between the Okanagan sections of the Kettle Valley Ry., now in course of construction along the entire route from Midway to Hope, B. C., are expected to be made within the next three months. Upon completion of a 15-mile link between Carmi and Penticton the entire line from Midway to Osprey lake will be ready for service. Bridge building is proceeding south of Penticton and steel has been laid to Osprey lake from which point a section of line is being built to Princeton.

Memphis, Dallas & Gulf.—It was announced at the annual meeting of the Memphis, Dallas & Gulf R. R. that the last gap in the line under construction between Hot Springs, Ark., and Ashdown, Ark., will be completed this fall.

New York, New Haven & Hartford.—Press despatches say that the directors of the New Haven & Hartford R. R. are planning to create a large issue of preferred stock to take care of maturing indebtedness and provide in part for future financing. The issue may run up to \$75,000,000, it is said, and carry 6 per cent dividend rate. The management recognizes the fact that the funded debt is growing out of all proportions to stock investment, so that the preferred issue will balance the top-heavy bond capitalization. Some time will probably elapse before official announcement of the issue, as the management is desirous of making a better showing of earnings so as to be able to point out good margin of safety on the preferred dividend.

Pickens Railroad.—The Pickens Railroad, it is reported, has let contract to J. H. Bennett & Co. to fill in eight trestles between Pickens and Easley, S. C. About 90,000 cubic yards of earth will be handled. Trestles over Town creek and Rice's creek will be replaced by bridges.

St. Louis, Iron Mountain & Southern.—The Missouri Pacific-Iron Mountain system, under an agreement entered into with the Texas & Pacific Ry., has completed arrangements whereby it will enter New Orleans. The road leases the Texas & Pacific line from Ferriday, La., to New Orleans. Under the arrangement the Iron Mountain will have an equal interest with the Texas & Pacific in the Transmississippi Terminal Co., which is to operate all of the Texas & Pacific terminals in New Orleans and on the opposite side of the river, including the territory as far as Westwego, the shipping docks of the Texas & Pacific at New Orleans, the grain elevators of that company at Westwego, the shops at Gouldsboro and the yards at Gretna.

In addition to the present terminals the Texas & Pacific has purchased additional property for terminal purposes at a cost of several million dollars. All of this property will become part of the yards and terminals to be operated by the Transmississippi Terminal Co. and new passenger and freight stations, with the necessary yards will be built.

St. Louis Southwestern.—The St. Louis Southwestern Ry. will omit the usual dividend for the current quarter. In October of 1913 the annual dividend rate on the \$19,893,650 5 per cent non-commulative preferred stock was reduced from 5 per cent to 4. On March 30, this year it was reduced from 4 to 2 per cent annually.

Terminal R. R. Association of St. Louis.—The directors of the Terminal Railroad Association of St. Louis have voted to issue \$1,000,000 of bonds to reimburse the treasury for additions and betterments during the year, including the Washington avenue station, additional trackage, etc. The bonds will be issued under authority of the \$50,000,000 general mortgage, there being \$14,500,000 of bonds available for improvements.

Timpson & Henderson.—The stockholders of the Timpson & Henderson Ry. have voted to issue \$100,000 first mortgage bonds for improvements.

Trinity & Brazos Valley.—The Trinity & Brazos Valley Ry. was thrown into receivership June 16 by United States District Judge Edward Heek at Dallas, Tex., on petition of the Old Colony Trust company of Boston. The trust company acted for bondholders who alleged that the road had defaulted on interest on bonds amounting to \$8,760,000 due January 1. J. W. Robins of Houston, president of the road, was named as receiver. The petition alleged that the railroad company owes about \$1,000,000 in addition to the interest in obligations it is unable to pay and that the company is insolvent.

PERSONALS.

Richmond M. Huddleston, general auditor of the New York Central Lines West, on July 1 will remove his headquarters from Chicago to New York.

H. L. Reed has been appointed superintendent of the Kansas division of the Rock Island lines with headquarters at Herington, Kan., vice A. B. Ransdell, transferred. W. A. Sheahan has been appointed superintendent of the Nebraska division, with headquarters at Fairbury, Neb., in place of Mr. Reed, and J. A. McDougal has been appointed superintendent of the Colorado division, with headquarters at Colorado Springs, Colo., succeeding Mr. Sheahan.

George C. Taylor, vice-president of the American Express Co., has been elected president, succeeding James C. Fargo, resigned.

Edmund Lehigh has been appointed general superintendent of police of the Baltimore & Ohio R. R.

T. F. Dunaway, vice-president and general manager of the Nevada-California-Oregon Ry., and the Sierra & Mohawk Ry., having resigned, Charles Hamilton has been made vice-president and Ramsey M. Cox, general manager, both with headquarters at Reno, Nev.

F. M. Woodall, trainmaster of the Atlanta, Birmingham & Atlantic R. R. at Manchester, Ga., has been appointed superintendent of the Birmingham division, with headquarters at Manchester, succeeding D. F. Kirkland, resigned to accept service with another company.

J. G. Sharp has been appointed trainmaster of the Tampa & Gulf Coast Ry., with headquarters at Gary, Fla.

I. K. Dye, hitherto general freight and passenger agent of the Coal & Coke Ry., has been appointed general manager, and H. B. Martin has been appointed purchasing agent, both with headquarters at Elkins, W. Va.

James Flynn has been appointed assistant superintendent of the Third division of the Denver & Rio Grande R. R., with headquarters Gunnison, Colo., effective June 15. Effective same date, R. L. Brown was appointed trainmaster of the Third and Fourth districts of First division, with headquarters Walsenburg, Colo., vice Mr. Flynn, promoted.

George W. Wiley has been elected assistant treasurer of the Lehigh Valley R. R., with office at Philadelphia, Pa.

J. A. MacGregor has been appointed acting superintendent of the Alberta division of the Canadian Pacific Ry., Second district, with headquarters at Calgary, Alta., in place of F. Walker, on leave of absence.

M. D. Miller, whose appointment as superintendent of the Western division of the New York, New Haven & Hartford R. R. has been noted in these columns, was born in eastern Pennsylvania. He was educated in the public schools and was first employed by the Lehigh Coal & Navigation company. He learned telegraphy and for several years acted as operator and agent for that company. In 1889 he went to the New York & New England railroad as telegraph operator at East Hartford, Conn., and served in that capacity at various points for about two years, and as train dispatcher for about one year. He then was employed as train dispatcher for about a year on what is now the Central New England Ry. and in 1893 went to the New York New Haven & Hartford as train dispatcher on the old Stonington division, headquarters at Providence, R. I. Mr. Miller was appointed chief dispatcher in 1899 on the same division and in 1901, when the re-arrangement of the division lines was made, was transferred to New London as chief train dispatcher of the Shore Line division. In 1908 there was another re-arrangement and he was transferred to Providence as chief train dispatcher of the present Providence division. He was appointed assistant trainmaster in December, 1912, and shortly after was appointed trainmaster.

TRAFFIC.

C. W. Pinney, general western freight agent of the Coal & Coke Ry. at Columbus, Ohio, has been appointed assistant



W. H. Finley, Who Has Been Appointed Chief Engineer of the Chicago & North Western Railway.

general freight and passenger agent, with office at Elkins, W. Va., effective June 1.

J. A. Cooley has been appointed immigration agent of the South Dakota Central Ry., with headquarters at Sioux Falls, S. D.

D. L. Rupert has been appointed division freight agent of the Detroit, Toledo & Ironton R. R., with office at Ironton, Ohio. The position of general agent has been abolished.

T. H. Lawrence has been appointed assistant general passenger agent of the St. Louis Southwestern Ry., of Texas, with office at Tyler, Texas, effective July 1.

Arthur B. Hoff has been appointed industrial commissioner of the Erie Railroad, with office at New York. He succeeds Luis Jackson, who resigned recently.

ENGINEERING.

George W. Hand has been appointed valuation engineer of the Chicago & North Western Ry., with office at Chicago.

W. H. Finley, who has been appointed chief engineer of the Chicago & North Western Ry. as announced in a previous issue of the Railway Review, was born in Newcastle, Del., and educated in the public schools. His engineering train-

ing was acquired by private instruction. In 1881 he entered the service of the Edgemoor Iron Co., remaining with that company until 1887 when he entered the service of the Chicago, Milwaukee & St. Paul Ry. in the bridge and building department. He remained with that company until 1892 when he entered the service of the Chicago & North Western Ry. as engineer of bridges. He has filled successively the positions of engineer of bridges, principal assistant engineer, assistant chief engineer and now chief engineer. Mr. Finley is a member of the American Society of Civil Engineers, past president of the Western Society of Civil Engineers and past president of the Chicago Engineers' Club.

MECHANICAL.

D. J. Malon, master mechanic of the Oregon Short Line R. R. at Ogden, Utah, has been transferred to Pocatello, Idaho.

OBITUARY.

James Campbell, former vice-president of the St. Louis & San Francisco R. R., died at Greenwich, Conn., June 12, in his sixty-eighth year. At the time of his death he was chairman of the board of directors of the St. Louis & San Francisco company.

A. C. Sheldon, general agent of the Chicago, Burlington & Quincy R. R. at Portland, Ore., died in that city June 11, aged 68 years.

Alexander Stewart, formerly assistant chief engineer of the Great Northern Ry., with office at Seattle, Wash., died in that city June 6. Mr. Stewart was born April 23, 1854, at Dalhousie, N. B. He was educated at the University of New Brunswick and in 1874 entered railway service with the Prince Edward Island Ry. He was with various Canadian railways until 1895, when he became assistant engineer of the Great Northern. From 1898 to 1903 he was resident engineer of the same road at St. Paul and since 1903 assistant chief engineer at Seattle.

T. H. Goodman, for almost forty years general passenger agent of the Southern Pacific Co., died in San Francisco June 11, in the Southern Pacific general hospital. He was one of the pioneers in California railway developments, having entered Southern Pacific service as general passenger agent in 1868, one year before the last spike was driven at Promontory. Mr. Goodman was born at Mount Morris, N. Y., July 12, 1830. In 1850, he started his railroad career as telegraph operator for the Vermont and Massachusetts railroad, advancing to higher positions with various eastern lines, until 1868, when he came to the Southern Pacific. Here he held the position of general passenger agent until his retirement on a pension in 1903.

M. C. Kimball, district freight agent of the Minneapolis, St. Paul & Sault Ste. Marie Ry., at Grand Rapids, Mich., died in that city June 12, aged 50 years.

D. K. Colburn, assistant general manager of the Sunset Central Lines, Houston, Texas, died at Woodhull, Ill., June 3, aged 68 years.

NEW ROADS AND PROJECTS.

Arizona.—See Southwestern Pacific R. R. under Utah.

California.—The Atchison, Topeka & Santa Fe Ry. is reported as contemplating the construction of a 12-mile line from Falsbrook, Cal., to Temecula.

See Southwestern Pacific R. R. under Utah.

Colorado.—The Missouri Pacific Ry., it is said, plans to construct a 12-mile railroad from its main line at King Center, Colo., to the Cudahy Ranch, near Ordway, Colo.

See Southwestern Pacific R. R. under Utah.

Florida.—A franchise has been voted to allow the Tampa & Gulf R. R. to build into St. Petersburg, Fla. C. H. Lutz of Tampa, general manager of the railroad, has been quoted as saying that construction of the extension will be immediately resumed and pushed to completion within three months.

Idaho.—The Rose Lake Lumber Co., Kellogg, Idaho, is building a 12-mile lumber railroad from a point near Dudley, Idaho, on the line of the Oregon-Washington R. R. & Navigation Co., into Fourth of July canyon. Oil-burning locomotives will be used.

See also New Roads and Projects under Montana.

Kentucky.—The Louisville & Nashville R. R. is reported as preparing to extend its Wasioto & Black Mountain line in eastern Kentucky from Benham, Harlan county, into Letcher

county, a distance of 16 miles. It would be necessary to drive a 1¾-mile tunnel through Pine mountain. The section to be opened up is rich in coal and timber.

The Louisville & Nashville R. R. will build a three-mile branch up Davidson's Creek, from Hazard, Ky., to develop holdings of the Ashland Coal Co.

See also New Roads and Projects under Tennessee.

Louisiana.—The Vicksburg, Alexandria & Southern Ry. is reported to have secured rights of way for a railroad projected in a northwest and southwest direction across the state of Louisiana. John F. Sheepley, vice-president of the Union Trust Co., St. Louis, Mo., is president of the company, which has its principal office at Alexandria, La.

Montana.—It is stated that the Southern Montana R. R., a project formerly known as the Butte, Wisdom & Pacific Ry., will begin construction within 60 days. The main line will extend from Silver Bow in Silver Bow county, Mont., through the Feeley divide and into Beaver Head county, passing through Dewey, Allen and Ralston. It will then run into Deer Lodge county, through Fish Trap and back into Beaver Head county, reaching Squaw Creek, Jones, Wisdom and Jackson. From Allen a 29-mile branch line will be built to the Elkhorn district. A 7-mile branch also will be built from Ralston to French Gulch. The main line will be 74 miles long. Construction involves five miles of heavy canyon work and three tunnels, the longest of which being 675 ft. The maximum grade is 1 per cent and maximum curvature is 8 degrees. The motive power will be steam, with a possibility of gasoline passenger car service. Ex-Lieutenant Governor W. R. Allen of Butte, Mont., is president of the company. J. C. O'Neill, recently with the Chicago, Milwaukee & St. Paul Ry., is chief engineer, and O. A. Ruffner, formerly with the same road, is principal assistant engineer. MacArthur Bros.-Perks Co., 1892 Continental and Commercial Bank building, Chicago, is the general contractor.

Minnesota.—The Minneapolis, Mille Lacs & Northern Ry. is securing rights of way for its proposed line from Anoka, Minn., to Ogilvie, Minn., and expects to begin construction work within a few weeks.

Nevada.—See Southwestern Pacific R. R. under Utah.

North Carolina.—The Maxton, Alma & Southbound R. R., says a report, will extend its line from near Rowland, N. C., to Pages, Mills, S. C., on the Raleigh & Charleston R. R., a distance of about 20 miles.

The Greenville & Knoxville R. R., which was recently sold under receivership proceedings, will extend its line to Brevard, S. C., it is said. Such a plan has been considered for some time.

An election is to be held in Newton Grove and Westbrook townships of Sampson county, N. C., to aid construction of the Central Carolina R. R. from Lillington to Swansboro, N. C., about 110 miles via Dunn, Newton Grove and Mount Olive. W. J. Edwards of Sanford, N. C., and others are interested.

Quebec.—The Canadian Pacific Ry. will apply to the board of railway commissioners of Canada for authority to construct a branch line of the railway known as the Longue Pointe branch, from its main line, west of Moreau street in Montreal easterly and northeasterly through the city of Maisonneuve, through part of the parish of Longue Pointe and the parish of St. Jean de Dieu to Longue Pointe.

South Carolina.—See New Roads and Projects under North Carolina.

Tennessee.—The commercial club of Harlan, Ky., is advocating the construction of a direct line of railway from Harlan to Knoxville, Tenn. The matter has been discussed by the board of commerce of Knoxville. It is proposed to build a 40-mile line from Harlan to a connection with the Southern Railway at Arthur, Tenn.

Utah.—The Southwestern Pacific R. R. filed articles of incorporation June 12, at Salt Lake City, Utah. Papers have also been filed with the secretary of state of California. This company as was previously noted in these columns proposes to construct a railroad from Denver, Colo., through southern Utah, Arizona and Nevada, to San Diego, Cal., and also a branch line to Salt Lake City, Utah. The general line of the railroad will be southwest from Denver for 65 miles into Park county, where the course will be changed and the line will go northwest for approximately 138 miles into Garfield county, Colo., from where the branch line to Salt Lake City will begin. The course of the main line from there will be in a southwesterly direction for approximately 178 miles to the Colorado-Utah line and then 141 miles in about the

same direction through San Juan county in Utah and into Arizona. Thence the line will proceed in a northwesterly direction for 146 miles through Arizona and through Kane county, Utah. The line will again revert to a southwesterly direction and continue approximately in that direction until it crosses Arizona-Nevada state line. After a short distance in Nevada, the road will go back into Arizona and continue in that state to the California line and on to San Diego. The total distance from Denver to San Diego would be approximately 1100 miles. The company is capitalized at \$2,200,000. The officers, directors and stockholders are: D. C. Collier, San Diego, president; Herbert A. Parkyn, Chicago, first vice-president; August H. Bunge, Chicago, second vice-president; Samuel Sherman, Chicago, secretary and treasurer; C. C. Carnahan, Chicago, general counsel; J. E. Carnahan, Canton, Ohio; H. B. Rettie, Chicago; Colonel Ed Fletcher, San Diego, and Thomas Morinaux, Salt Lake City, directors.

West Virginia.—The Parkersburg R. R. & Terminal Co., capital \$10,000, has been chartered. The incorporators are K. B. Stephenson, C. B. Kefauver, E. H. Watson, H. D. Archer and R. C. Stapleton, all of Parkersburg, W. Va. Mr. Stephenson and others are interested in the proposed railroad from Parkersburg to Charleston, W. Va.

Wyoming.—The Oregon Short Line R. R. is reported as planning the construction next year of the proposed extension of the Teton Valley branch to Jackson, Wyo., near Jackson's Hole. Rapid development has been in evidence, it is said, during the past two years in the basin, and the building of the proposed line would be a strategic move, as the branch would follow the only water grade from Idaho into Wyoming.

Electric Railways.

The Berks & Lancaster Ry. has been chartered with \$200,000 capital to construct an electric railway from Lititz, Lancaster county, to Womelsdorf, Berk county, Pa. The incorporators of the road are the same as those of the Ephrata & Lebanon Street Ry. and the proposed road will intersect the latter.

H. H. Mayberry, Nashville, Tenn., has plans to build a branch of the Nashville-Gallatin Interurban Electric Ry., of which he is president, from Edgefield Junction via Goodlettsville, Ridge Top and Greenbrier to Springfield, Tenn., about 20 miles. The main line is about 30 miles long.

The San Antonio, San Jose & Medina Valley Interurban Ry., which proposes building a 38-mile line through Castroville, La Coste, Kirk and San Jose, Tex., has awarded contract for construction of the section between San Jose and Kirk, 13 miles. J. G. Miller, San Antonio, Tex., is general manager.

Work is about to be begun by the Idaho-Pacific Ry. on a line between Twin Falls, Hageman, Tuttle, and Castleford, Idaho. M. J. Sweeley, Twin Falls, is president.

The Kansas City, Kaw Valley & Western Electric Railway, according to report, will begin operation this week. This line, which is 17 miles long, extends from there to Bonner Springs, Kan., and it was built by J. J. Heim and others, of Kansas City. Right of way has been obtained for an extension to Lawrence, Kansas, and it is proposed to ultimately continue it to Topeka.

F. S. Mordaunt, Chicago, is reported interested in a project to build an interurban line from Fulton to Montgomery City, Mo. It is also proposed to extend the line to Columbia, giving that place a city system, and thence to Jefferson City.

The expenditure of \$168,000 by the city council on street railway extensions in Edmonton, Alta., has been authorized. It is stated that the Edmonton Interurban Ry. is considering plans to build a branch line to Ft. Saskatchewan, Alta.

H. L. Misamore, formerly of Toledo, Ohio, now of Fairhope, Ala., is reported planning construction of electric railway from Mobile, Ala., to Pensacola, Fla., about 50 miles. The proposed route is via Zundels, Magnolia Springs, Foley, Elberta and Lillian.

The contract for the construction of the subway in Lexington avenue, New York, between 43d and 53d streets, has been awarded by the New York public service commission, first district, to the Rapid Transit Subway Construction Co., the lowest bidder, at \$1,915,164.50. Bids for the construction of Section 1 of the Eastern Parkway subway in Brooklyn were opened. The section extends from the terminus of the present subway at the Atlantic avenue station of the Long Island Railroad and runs up Flatbush avenue to a point just this side of St. Mark's avenue. There will be four tracks for operation by the Interborough Rapids Transit Co., with a local station at Bergen street, and two tracks for operation by the

Brooklyn Rapid Transit Co., with a station extending north-erly from Atlantic avenue on a connection between this line and the Fourth avenue subway, running between Atlantic avenue and Fulton street. The lowest bidder is the Crandford Company, at \$2,195,000.

Announcement is made that the Ogden, Logan & Idaho Ry. will commence construction work again on its extensions north and south Logan, Utah. The road will be extended north as far as Richmond and south as far as Wellsville.

The Janesville Madison Traction Co. has asked the Wisconsin railway commission for certificates of convenience and necessity to build an electric railway between Janesville and Madison, Wis. G. Pickardt, 409 Washington building, Madison, is president.

Negotiations are pending to extend the Morgantown & Wheeling Ry. from Blacksville, W. Va., 13 miles to Waynesburg, Green county, Pa., and thence to Wheeling, W. Va. The 13 miles has been practically graded, masonry work for bridges nearly done and about half of the bridges on hand. Work was suspended two years ago for lack of funds. Financial arrangements are now being made and work will be continued. George C. Sturgiss, Morgantown, W. Va., is interested.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Newburgh & South Shore Ry. has ordered one (0-6-0) switching locomotive from the Baldwin Locomotive Works.

—The Carolina, Clinchfield & Ohio Ry. has ordered 2 Pacific type (4-6-2) locomotives from the Baldwin Locomotive Works.

—The Grand Trunk Ry. has ordered 4 locomotives for suburban service.

—The Tidewater Southern Ry. has placed in service a 42-ton electric freight locomotive.

—A report with reference to the Kansas City Southern Ry. being in the market for locomotives lacks confirmation and is believed to be incorrect.

—The Western Maryland Ry. has again entered the market for locomotives. An inquiry was issued earlier in the year for 20 consolidation (2-8-0) locomotives, but no orders placed.

—The report that the Chicago & Northwestern Ry. is considering the purchase of about 60 additional locomotives is denied.

Freight Cars.

—The Toledo & Ohio Central Ry. is in the market for 2000 cars.

—The Illinois Central R. R. has increased its recent order for box cars from 3000 to 5000.

—The Pittsburgh & Shawmut R. R. has ordered 750 steel coal cars from the American Car & Foundry Co.

—The Bangor & Aroostook R. R. has ordered 4 steel underframe caboose cars from the American Car & Foundry Co.

—The Lake Champlain & Moriah R. R. has ordered 20 hopper cars from the Pressed Steel Car Co.

—The Havana Central R. R., according to report, has ordered 350 flat, 40 caboose and 20 box cars from the Standard Steel Car Co., and also 50 narrow gage cars from the Magor Car Co.

—Details of the recent equipment order placed by the New York Central Lines are not available. It is stated, however, that the total purchases will exceed 10,000 cars, including 5000 cars for the Cleveland, Cincinnati, Chicago & St. Louis Ry. and 500 coal and 900 box cars for the Boston & Albany R. R.

Passenger Cars.

—The St. Louis, Brownsville & Mexico Ry. has ordered 15 passenger cars from the Pullman Company.

Signals and Interlocking.

—The Atlantic Coast Line R. R. plans to equip its line between Selma and Parkton, N. C., with electric interlocking signals.

—The San Pedro, Los Angeles & Salt Lake R. R. is planning to equip about 50 miles of line near Salt Lake City, Utah, with automatic signals.

—An automatic electric block signal system has just been complete and placed in service by the Southern Railway on

the line between Seminary, Va., and Orange, Va., a distance of 80 miles, all double track, providing continuous automatic signal protection for trains from Orange into the Washington terminal station. This system is now in use on other portions of the line in Virginia and North Carolina, giving in all a total of 198 miles of double track so protected, while arrangements have been made for equipping 120 miles more. At intervals of about two miles, 106 automatic signals have been erected with interlocking plants controlling switches. The signals are the three-position upper quadrant type, using red, green and white lights at night for the "stop," "caution," and "proceed" indications. The interlocking plants controlling switches are equipped with power signals and electric lights in the towers and on the signals. Annunciators have been provided to announce the approach of trains in both directions at each of these towers. The current used to operate the system also furnishes lights for stations.

Iron and Steel.

—The Chicago, Milwaukee & St. Paul Ry. has ordered 30,000 tons of rails.

—The Chicago, Indianapolis & Louisville Ry. has ordered 3000 tons of rails from the Illinois Steel Co.

—The Seaboard Air Line Ry. has ordered 8000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

—The Canadian Northern Ry. has ordered 45,000 tons of rails from the Dominion Steel Corporation.

—The Boston & Main R. R., it is said, has ordered 10,000 tons of steel rails for immediate delivery.

Bridges.

—The Lehigh Valley R. R. has ordered 1500 tons of steel for a bridge at Bethlehem, Pa., from the McClintic-Marshall Co.

—The Louisville & Nashville R. R. will reconstruct the bridge over the Kentucky river at Worthville, Ky.

—The Chicago & Western Indiana R. R. has ordered 800 tons of bridge material from the Lackawanna Bridge Co. for viaducts at Crawford and Cicero avenues, Chicago.

—The Pennsylvania Railroad has prepared plans for a bridge at Warren street, Trenton, N. J.

—The Boston & Maine R. R. has ordered 3500 tons of steel from the Pennsylvania Steel Co. for the proposed bridge at Mechanicsville, N. Y.

—See Railway News under Pickens Railroad.

—The Delaware, Lackawanna & Western R. R. and the city of Scranton, Pa., plan to eliminate grade crossings at McHale court, Court, Theodore and Myrtle streets, at an estimated cost of \$100,000.

—The Denver & Rio Grande R. R. plans to start work soon on the proposed underpass to eliminate the grade crossing at South Nevada avenue, Colorado Springs, Colo.

—Bids will be opened June 22 in Chicago by the Chicago, Burlington & Quincy R. R. for the piers of the proposed bridge at Metropolis, Ill. The preliminary work for this new structure over the Ohio river already is under way.

—An ordinance ordering the Chicago, Burlington & Quincy R. R. to construct a viaduct over William street, Omaha, Neb., will be considered by the city commissioners June 22.

—The Pennsylvania Railroad proposes to build a new bridge at the mouth of the Beaver river at Pittsburgh, Pa.

Buildings, Terminals, Etc.

—The Louisville & Nashville R. R. is reported to have plans for the establishment of car repair shops at Hazard, Ky.

—Plans are being prepared for the city of Minneapolis, Minn., for a union depot. The new Great Northern Ry. terminal would be enlarged to twice its present size, with a minimum of 24 tracks and with provision for future enlargements. Extensive changes in trackage connections and freight house facilities would be involved. F. W. Cappelen, city engineer, has the matter in charge.

—The contract for the passenger station to be erected at San Diego, Cal., for the Atchison, Topeka & Santa Fe Ry. has been awarded to the William Simpson Construction Co., Timkin building, San Diego. The total cost is about \$250,000.

—The Boston & Maine R. R., according to report, will improve its yards at Fitchburg, Mass.

—The Atlantic Coast Line R. R. will build a new passenger station at St. Petersburg, Fla., at an estimated cost of \$70,000.

—The Illinois Central R. R. has begun work on its new yards at Paducah, Ky.

—The El Paso & Southwestern Ry., it is said, will enlarge its shops and terminals at El Paso, Tex.

—The Minneapolis, St. Paul & Sault Ste. Marie Ry. is reported as about to rebuild its roundhouse and make other improvements at Portage, Wis.

—The Chicago & North Western Ry. is preparing to make improvements to its division headquarters at Kaukauna, Wis., including enlarging the roundhouse, new turntable, boilers and installation of some new shop equipment.

—The Lehigh & New England R. R., it is said, will erect repair shops at Pen Argyl, Pa.

—The Southern Ry., Norfolk & Western Ry., and Winston-Salem Southbound Ry. Co., E. B. Pleasants, Ch. Engr., Wilmington, N. C., are reported as planning to erect a union passenger station.

—Common Pleas Judge Stevens at Cleveland, Ohio, on June 17 denied an injunction asked by the State of Ohio ordering the Lake Shore & Michigan Southern and Pennsylvania railroads to discontinue filling in the lake front at Cleveland west of the Cuyahoga river and restoring to the state the land already filled. An appeal will be taken. The filled land would be used by the roads for their proposed terminal improvements.

—The Macon Terminal Co., Macon, Ga., capital stock \$100,000, has been incorporated by officers of the Central of Georgia Ry., Southern Railway, and Georgia, Southern & Florida Ry. It is stated that plans for the proposed new terminal at Macon are now being prepared and actual work will be started about September 1.

—Contracts have been let for the construction of a \$3,500,000 building in St. Paul, Minn., to house the general offices of the Great Northern Ry. and the Northern Pacific Ry.

—Controversy between the city of Buffalo, N. Y., and the Delaware, Lackawanna & Western R. R. in connection with the closing of streets, etc., threatened to seriously delay progress of the railroad company's passenger terminal improvements. These are now to be litigated for adjustment and the work is to proceed without further hindrance.

—See Railway News under St. Louis, Iron Mountain & Southern Ry. and reference to new terminals at New Orleans, La.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, JUNE 9, 1914.

Mechanism of a mail crane in use by railways, 1,099,162—Franklin H. Burr, Atlantic, Ia.
 Railway tie, 1,099,179—Charles W. Israel, Paris, Ill.
 Draw bar and yoke connection for railway cars, 1,099,197—John F. O'Connor, Chicago, Ill., assignor to William H. Miner, Chicago, Ill.
 Rail joint, 1,099,202—George E. Pellissier, Jersey City, N. J., assignor to Louis D. Pellissier, Holyoke, Mass.
 Railroad switch stand, 1,099,231—Charles A. Alden, Steelton, Pa.
 Railway switch mechanism, 1,099,232—Charles A. Alden, Steelton, Pa.
 Clasp brake, 1,099,234—Thomas L. Burton, Pittsburgh, Pa., assignor, by mesne assignments, to the American Brake Company, St. Louis, Mo.
 Electric traffic controlling system for railroads, 1,099,259—William H. Lane, Westfield, N. J., and Albert V. T. Day, New Rochelle, N. Y., assignors, by mesne assignments, to Hall Switch & Signal Co., New York, N. Y.
 Metallic tie and rail fastener, 1,099,265—Edwin J. Myers, Toppenish, Wash.
 Railway signaling system, 1,099,283—Albert V. T. Day, New Rochelle, N. Y., assignor, by mesne assignments, to Hall Switch & Signal Co., New York, N. Y.
 Triple valve, 1,099,286—Frank H. Dukessmith, Pittsburgh, Pa., assignor to the Dukessmith Air Brake Co., Pittsburgh, Pa.
 Control valve for triple valves, 1,099,287—Frank H. Dukessmith, Pittsburgh, Pa., assignor to the Dukessmith Air Brake Co., Pittsburgh, Pa.
 Safety lock shoe for rails, 1,099,288—William Edwards, Winnipeg, Man., Can.
 Mower attachment for cars, 1,099,296—Emil Henry Habick, Euclid, Minn.
 Rail joint and chair, 1,099,302—Fred E. Hult, Jamestown, N. Y.

Rail tie, 1,099,305—John G. MacRae, Aspen, Colo., assignor of one-fourth to George Runtz and one-fourth to Godfrey F. Anderson, Aspen, Colo.
 Railroad spike, 1,099,323—Paul Szydlowski, Boston, Mass.
 Radial trailing truck, 1,099,333—William A. Austin, Lima, O., assignor to Lima Locomotive Corporation, Lima, O.
 Box car with movable top, 1,099,361—Samuel Hartland, Youngstown, O.
 Trailer truck frame for locomotives, 1,099,376—Boone V. H. Johnson and Charles T. Westlake, St. Louis, Mo., assignors to Double Body Bolster Co., St. Louis, Mo.
 Extensible platforms for railway cars, 1,099,402—Ellwood H. Sickels, Philadelphia, Pa.
 Rail, 1,099,428—John Corgiat, Gillespie, Ill., assignor of one-fourth to Felix Ronchetti, Budd, Ill.
 Railway car buffer, 1,099,429—Nicodemus Dargaczewski, Omaha, Neb.
 Underbody for tank cars, 1,099,434—John Franklin Ewell, Chicago, Ill., assignor to Barrett Mfg. Co., Chicago, Ill.
 Railroad screw spike driving hand tool, 1,099,442—Henry L. Hollis, Chicago, and Frank O. Melcher, deceased, Winnetka, Ill., by Edna Lane Melcher, Cossackie, N. Y., administratrix of said Melcher.
 Railway traffic controlling apparatus, 1,099,469—Wade H. Reichard, Troy, N. Y., assignor to Federal Signal Co., Albany, N. Y.
 Emergency knuckle for car couplings, 1,099,506—Michael H. Long, Chicago, Ill., assignor of one-half to Morgan K. Barnum, La Grange, Ill.
 Anticreeper for railroad rails, 1,099,524—David F. Vaughan and David L. Vaughan, Riverton, N. J.
 Anticreeper for railroad rails, 1,099,525—David F. Vaughan, Riverton, N. J.
 Hand brake mechanism, 1,099,528—William E. Wine, Toledo, O.
 Switch stand, 1,099,566—Daniel C. Mulvihill, Hannibal, Mo.
 Guard rail fastener, 1,099,569—Walter S. Newhall, Cleveland, and Archer W. Richards, East Cleveland, O., assignors to the Cleveland Railway Supply Co., Cleveland, O.
 Automatic car and air coupling, 1,099,585—Harry F. Woernley, Pittsburgh, Pa., assignor to the Westinghouse Air Brake Co., Wilmerding, Pa.
 Rail tie, 1,099,616—Wellington Randall, Marysville, Wash.
 Trolley, 1,099,618—Wilhelm Rohkohl, Potsdam, Germany, assignor to General Electric Co.
 Switch stand, 1,099,627—John William Straughan, Pratt, W. Va., assignor of one-third to James Walter Morgan and one-third to Louis Albert Casci, Pratt, W. Va.
 Rail joint chair, 1,099,628—Charles C. Williams, Bogata, Tex., assignor, by direct and mesne assignments, to the Williams Rail Joint & Chair Co., Deport, Tex.
 Curved track oiler and greaser, 1,099,631—Charles F. Alexander, San Jose, Cal.
 Combined classification signal and marker, 1,099,633—Clifton L. Anway, Parsons, Kan.
 System of plates of reinforced concrete for improving and solidifying railroad tracks, 1,099,656—Gaston Victor Leibeaux, Nantes, France.
 Composition road bed, 1,099,697—Franklin Peter Gilbert, Palmerton, Pa., assignor of one-half to Jacob A. Mooney, Palmerton, Pa.
 Machine for exterminating weeds, 1,099,712—Arthur Miller, Kiester, Minn.
 Railway block signal system, 1,099,795—Andrew S. Gross, Fremont, Neb.
 Automatic railway switch, 1,099,807—Mark Knox Marlow, Block, Tenn.
 Railroad tie, 1,099,809—Octer Mayfield, Granite, Okla.
 Tie, 1,099,826—Walter R. Springer, Youngstown, O.
 Car ventilator, 1,099,838—George C. Breidert, Chicago, Ill., assignor to Auto Utilities Mfg. Co., Chicago, Ill.
 Automatic air brake for railway cars, 1,099,841—William G. Canion, El Paso, Tex., assignor to Arizona Automatic Air Association, Bisbee, Ariz.
 Railway construction, 1,099,844—William C. Crosby, Orange Springs, Fla.
 Car coupling, 1,099,853 and 1,099,854—Harry T. Krakau, Cleveland, O., assignor to the National Malleable Castings Co., Cleveland, O.
 Door, 1,099,878—Frank H. Hopkins, Montreal, Que., Can., assignor to National Dump Car Co., Chicago, Ill.
 Lateral motion device for railway trucks, 1,099,890 and 1,099,891—Henry H. Vaughan, Montreal, Que., Can.
 Emergency valve device, 1,099,905—Walter V. Turner, Edgewood, Pa., assignor to the Westinghouse Air Brake Co., Wilmerding, Pa.
 Friction mechanism for resisting strains. (Draft gear), 13,744 (re-issued)—Robert E. L. Janney, Chicago, Ill.

RAILWAY REVIEW

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Formal Opening of the Transcona Yard.

A large party of business and professional men of Winnipeg, and the city council, with the Canadian Pacific Ry. for host, inspected the new freight yards of that company at North Transcona, near Winnipeg, on June 18. The yards have been in operation for several weeks, and inspection referred to was in the nature of a formal official opening. In the layout there are over 120 miles of tracks with a capacity for 12,000 cars. One of the demonstrations made for the benefit of the visitors was the distribution of a train of 40 freight cars from the hump, which was done in less than six minutes, so the reporter stated.

Fine for Discrimination in "Jim Crow" Service.

A jury in the Circuit court at Hopkinsville, Ky., June 17, assessed a fine of \$500 against the Louisville & Nashville R. R., on an indictment charging them with discrimination against negro passengers in not furnishing them with accommodations equal to those furnished to white passengers. A broad application of the principle at issue may have a wide effect upon the railroads of Kentucky and possibly other southern states where the separate coach law is in effect. The prosecution is against the Louisville & Nashville, the Illinois Central and the Tennessee Central, the charges in each instance being of the same nature. The indictments were secured on evidence worked up by a number of negro citizens. The jury which rendered the verdict was composed entirely of white men.

International Association for Testing Materials.

The seventh congress of the International Association for Testing Materials will be held under the patronage of H. M. the Czar of Russia, in St. Petersburg, August 12-17, 1915. Four days will be devoted to the discussion of the most important problems on testing materials. After the congress extensive excursions in the interior of Russia will be made.

Must Wash Car Windows in New Jersey.

The Board of Public Utility Commissioners of New Jersey is watchful of the aesthetic sensibilities of the public. It has issued an order, effective July 6, requiring the New York, Susquehanna & Western and the Erie railroads to "clean and maintain in reasonably clean condition the outside of each passenger car, including windows." Formal complaint, on which the commissioners based their order, was brought by H. P. Dilliston, of Ogdensburg, who set forth, that, on a number of trips, he and other passengers found the windows of the cars were very dirty. The board declared that the defendant roads had produced no evidence of financial condition which would prevent compliance with the order.

Safety Medal for Electric Railways.

The American Museum of Safety has organized a competition for the Anthony N. Brady memorial medals, open to electric railways of the United States. These medals, of gold, with replicas in silver and bronze, are to be awarded annually by the Museum of Safety to the American electric

railway company, which for the year of award has done most to conserve the safety and health of the public and its employees. The gold medal is awarded to the company, the replica in silver to the member of the operating staff who has most contributed to the successful record of his company, and the bronze medal to the employee of the company whose services have been of the greatest value in the promotion of health and safety. The first award will be made the latter part of this year and will be based on the records of electric railways for the year ending June 30, 1914. Every company entering the competition must file with the American Museum of Safety, by the 31st day of August each year, the record upon which it found its claim to the award. An accident report form has been supplied to every electric railway in the United States. The award will also be based on the protective and health measures adopted by the company, such as block signals, protective devices at railroad and highway crossings and other points of danger, automatic stops, safety devices in cars, shops, power houses, sub-stations, and in connection with the system in general. The care and education of employees and measures to promote the health both of employees and the public, such as lighting, ventilation, cleanliness, sanitary conveniences will also enter into the award. This is the sixth of the series of medals which are now awarded annually by the American Museum of Safety, and mean to electric railways what the E. H. Harriman memorial medals mean to the steam railways.

Mrs. George Westinghouse.

Mrs. Marguerite Erskine Walker Westinghouse, widow of the late George Westinghouse, inventor and manufacturer, died this week, at her home, Erskine Park, near Lenox, Mass. She was born in Roxbury, Delaware County, New York, the daughter of Capt. Daniel Lynch and Eliza Burhans Walker. She was married to Mr. Westinghouse in Brooklyn, on August 8, 1867.

L. J. Spence on the Intermountain Rate Decision.

In discussing the decision by the Supreme court in the intermountain rate case, L. J. Spence, director of traffic of the Southern Pacific, said: "The decision handed down by the Supreme court in what is popularly known as the intermountain case has sustained the Interstate Commerce Commission in the broad power which it exercised in dealing with the application that the transcontinental lines were required to make under the fourth section, known as the long-and-short-haul clause, of the law as amended June 18, 1910, for authority to continue in effect lower rates from Missouri river and points east thereof to Pacific coast terminals than to intermediate destinations. Prior to the amendment of the law, the carriers enjoyed the privilege of making rates to Pacific coast terminals to meet the competition of the sea without affecting rates to intermediate points, and asked for authority of the commission to continue to do so; but in granting this application the commission stipulated that the rates from Missouri River to Pacific Coast terminals should not be exceeded to intermediate destination, and formulated a system of zones from which specified percentages of the rates to Pacific Coast terminals were required to be made the maximum rates to intermediate points. For example, the rates from Chicago to intermediate points may be 107 per cent, from Pittsburgh 115 per cent, and from Atlantic Seaboard territory 125 per cent of the rates contemporaneously in effect to Pacific Coast terminals. The immediate effect of the decision is largely within the control of the carriers, because the commission is expected to recognize the propriety of the transcontinental lines advancing the rates to Pacific Coast terminals which are less than reasonable, wherever they desire to do so, to a basis that will preserve the rates to in-

intermediate points, the majority of which have been prescribed or found reasonable by the commission."

Decisions of the United States Supreme Court.

The United States Supreme court handed down, June 22, decisions in a number of cases relating to railroads and railroad interests. Of these the most important was in the intermountain rate case, upon which we comment editorially elsewhere in this issue of the Railway Review, and present extracts from the decision in another column. The decisions in other important cases upheld the pipe line amendment to the Hepburn rate law of 1906, confirming these facilities as common carriers; upheld the Southern Pacific Co.'s title to valuable oil lands in California; declared that the safety appliance act extends to locomotives as well as freight cars, and held that the reservation on employees' passes disclaiming liability for personal injuries is valid.

PIPE LINES ARE COMMON CARRIERS.

The pipe line amendment to the Hepburn act was passed during President Roosevelt's administration following a report by the bureau of corporations that the monopoly of the Standard Oil Co. was maintained principally through the instrumentality of its pipe lines. The amendment defined as common carriers "any corporation or any person or persons engaged in the transportation of oil or other commodity, except water and except natural or artificial gas, by means of pipe lines, or partly by pipe lines and partly by railroad or partly by pipe lines and partly by water" in interstate business. When the Interstate Commerce Commission undertook to enforce the law it called upon the pipe line companies to file rates. Six of the 28 principal pipe lines in the United States, refused to comply. These six were the Ohio Oil Co., the Standard Oil Co. of Louisiana, the Prairie Oil & Gas Co., the Uncle Sam Oil Co., and the Tidewater Pipe Co., limited. These concerns were located, respectively, in the Appalachian field, covering New York, Pennsylvania, West Virginia, Kentucky, and Tennessee; the Illinois-Indiana-Ohio field; the mid-continent field, covering Kansas and Oklahoma, and the gulf field, covering Louisiana and Texas.

The six hostile companies went into the Commerce court and secured an injunction against the Interstate Commerce Commission enforcing its order regulating the pipe lines, basing their petition upon the contention that the pipe line owners were being deprived of their property without due process of law. The government carried the case to the Supreme court, and that body has had it under advisement for a long time.

The majority opinion in the present instance is brief. Justice Holmes, who wrote it, declares that congress has the power to "require those who are common carriers in substance to become so in form." He says there is no question whatever as to the right of congress to regulate lines built in the future. As to those in existence at the time the pipe line law was passed he observed: "Those lines are common carriers now in everything but form. They carry everybody's oil to a market although they compel outsiders to sell it before taking it into their pipes. The answer to their objection is not that they may give up business, but that as applied to them the statute practically means more than that they must give up a sale to themselves before carrying the oil they now receive. The whole case is that the pipe line companies, if they carry, must do it in a way that they do not like. There is no taking of private property and it does not become necessary to consider how far congress could subject them to pecuniary loss without compensation in order to achieve the end in view."

Justice Holmes admitted that the pipe line amendment to the interstate commerce act was undoubtedly passed to meet a situation created by the Standard Oil Co.'s monopolization of pipe line facilities. He said the circumstances under which the amendment was passed were known to everybody. Then he

traced the gradual monopolization by the Standard Oil Co., of pipe line facilities from all oil bearing territory east of California to tidewater. He added: "Before the recent dissolution of the New York and Pennsylvania companies had extended their lines into New Jersey and Maryland to the refineries and the laws of those states did not require them to be common carriers. To meet the present amendment the Standard Oil Co. took a conveyance in New Jersey and Maryland line and the common carrier lines now end at insignificant places where there are neither markets or appliances except those of the Standard Oil Co. by which it would seem the whole transport of the carrier lines is received. There is what seems to be merely a formal break of continuity where the carriers' pipes stop. The change is not material to our view of the case."

The decision exempts from the law a pipe line owned by the Uncle Sam Oil Co., which runs from the company's oil well in Oklahoma to its refinery in Kansas, because it carries no oil but that of the owning company. The decision will not exempt the pipe lines of the Uncle Sam company from regulation by the commission if that company should at some future time enter the field as a purchaser of oil for transportation in interstate commerce. Justice McKenna entered a vigorous dissenting opinion in which he intimated that the opinion of the majority of the court verged on the theories of the socialists, in its disregard of the principles of private ownership. Chief Justice White dissented from so much of the opinion as exempted the pipe lines of the Uncle Sam Oil Co., Justice McKenna joining him also in this dissent.

OIL LAND TITLES VALID.

The most important feature of the decision regarding the Southern Pacific Co.'s title to oil lands in southern California consists in the denial by the court of the validity of the clause originally inserted in the government's patents for land, reserving the rights to minerals which might be discovered later. The Southern Pacific took title to the land in question, comprising five sections, under a grant of congress which gave the company the right to take any lands not containing minerals. At the time the railroad filed on the five sections through an agent, it stated that the lands were chiefly valuable for agriculture and so far as it knew were non-mineral. Prior to the filing on the lands by the Southern Pacific private locators filed on the lands as placer mineral entries; but these entrymen voluntarily abandoned their claims. After the railroads had taken the lands under patents from the government other claimants relocated them as placer mineral entries and it was these entries that formed a basis for the present suit to dispossess the railroad company. The value of the lands has been estimated at from \$20,000,000 to \$70,000,000, although the claimants to the land placed its value at \$500,000,000.

The claimants' contention was that the discovery of oil on the lands covered by the patents voided such patents and put an end to the Southern Pacific's title to the land. One of the grounds for this contention was that oil was a mineral within the meaning of the statutes. The court, speaking through Justice Van De Vanter, upheld this point and quoted decisions of the Pennsylvania Supreme court uttered at about the time of the oil development in Pennsylvania and opinions of the United States Supreme court in support of the definition.

The other main points upon which the suit to void the title was based were: That the patents contained a reservation that they should not cover mineral lands; and that by accepting patents with such mineral reservation clause therein the Southern Pacific was estopped from questioning the validity or effect of such reservation. In passing upon these questions the court laid down some very important rules in connection with the public lands laws and railway land grants. "In every case before this court," said Justice Van de Vanter, "we have held that where the law says that only mineral or homestead lands are to be granted by the land officials, the officials must do their duty of ascertaining whether that land came within the law and

that they could not perform their duty by inserting exceptions that the land should not pass if found later not to be within the law.

This was precisely the contention of the attorneys for the railroads. Justice Van de Vanter pointed out that all the land patents granted to railroads since 1866 contained a clause declaring the land should not pass from the government, if later it was found to contain minerals. "Let us see what this would mean in the case of the Northern Pacific," said he. "The Northern Pacific got every alternate section of land in a forty-mile wide strip from Duluth to the Pacific. Should these clauses be held valid, the question would arise as to whether those who long ago purchased from the railroad and created farms, ranches, and towns upon them, had any rights."

The company contended that evidence could not be presented at this day to show that the lands were mineral, and that the issuance of the patents was conclusive proof that they were not. It was argued and so upheld by the court, that the exception was void.

SAFETY APPLIANCES AND LIABILITY ON PASSES.

The Supreme court in an opinion by Justice Pitney decided

that the federal safety appliance act fixing a standard height of drawbars applies not only to freight trains but to locomotive engines and all other agencies of interstate commerce. The case involving the construction of the statute arose in Tennessee where D. Crockett obtained a judgment against the Southern Railway on account of personal injuries due to defective couplings. The Supreme court of Tennessee affirmed the judgment and the appeal was taken to the railroad. Justice Pitney in announcing the decision of the court said that even if the original safety appliance act did not cover all locomotive engines the amendment made to it in 1903 so extended its scope as to make it beyond question.

In another decision, which reversed the ruling of the Georgia court, the Supreme court held that railroads are not liable for injury to interstate employees or members of their families riding on passes, which contain stipulations that the passenger assumes all risks, while being so transported. The court so decided and held that a pass is not to be regarded as part of the compensation for which the employee works, but is in reality free and subject to any conditions the railroad may impose.

Milwaukee Avenue and Desplaines Street Viaducts in Chicago—II

By J. H. PRIOR.

(Continued from page 792.)

The bent shown in Fig. 9 is typical of the bents carrying the fixed end of the girders. A construction joint was made along the line j-1, j-2, j-3, j-4, j-5, j-6, between the columns and the beam c-0, which was built as a monolith with the columns. Figure 12 and Fig. 19 show the details of a bent similar to the one last described, but located on the Desplaines street arm of the viaduct.

With the depth of floor and long spans required on Milwaukee avenue it was not possible to use ties and ballast with the 9 in. Trilby rail ordinarily used by the Chicago Railways Company, whose tracks cross the viaduct. A special rail chair was, therefore, provided for a 7 in. Trilby rail, which the Chicago Railways Company consented to use. This reduced the available floor depth from 4 ft. 1 in. to 3 ft. 6 in. only, whereas, if ties and ballast had been used, the available depth would have been

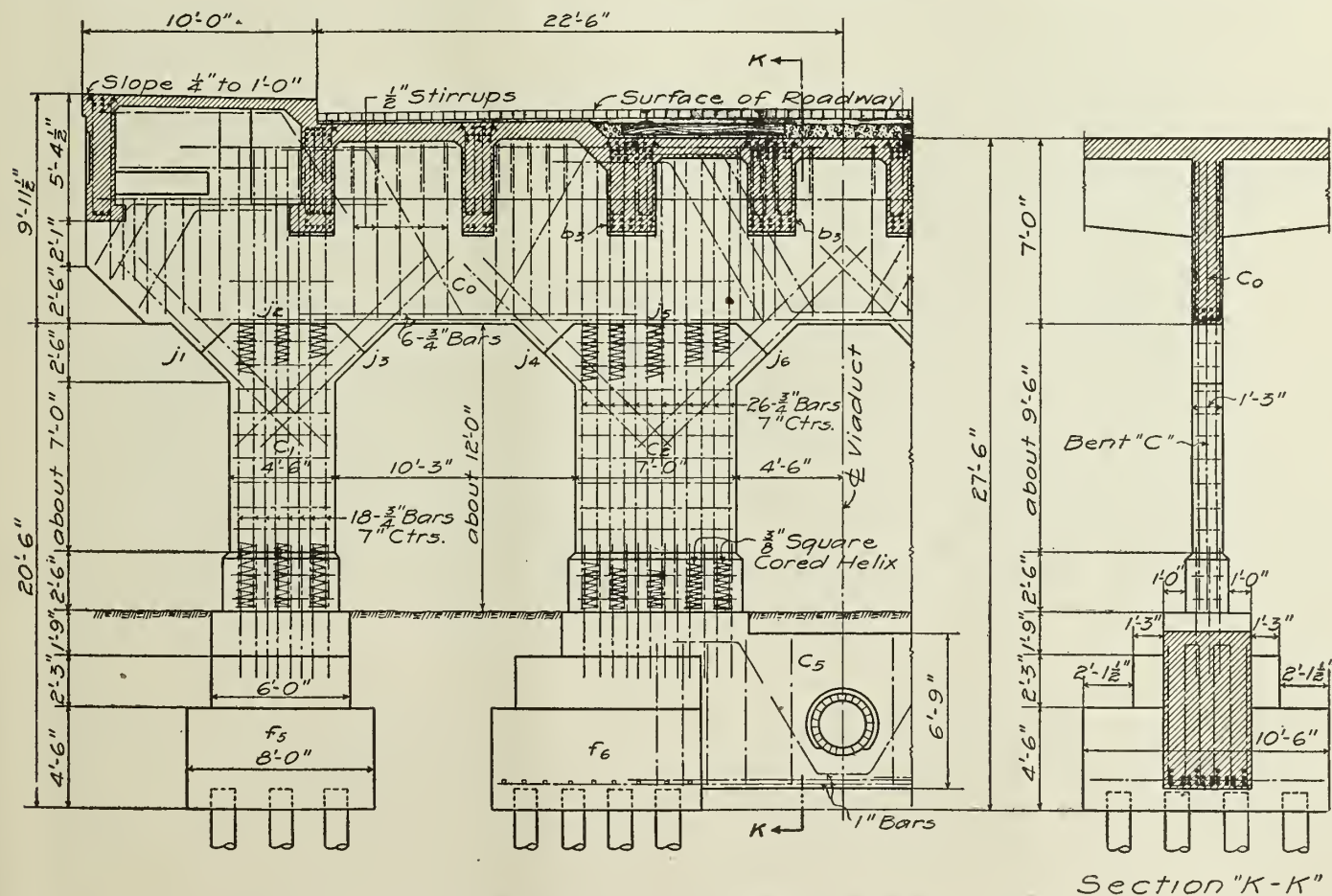


Fig. 12—Typical Section Showing Reinforcement in Bents, Desplaines St. Viaduct.

is a casting with a lower bar running transversely to the rail. There are two upright projections, K, each of which terminates in a socket for receiving the head of a T-bolt. The anchor plate H is placed in the floor between the upper and lower slab reinforcement, thus insuring a good anchorage when entirely surrounded with concrete. The rail is held in position by means of T-bolts and clamps F and E, the T-bolts extending down through the holes in the bed plate to the sockets in the

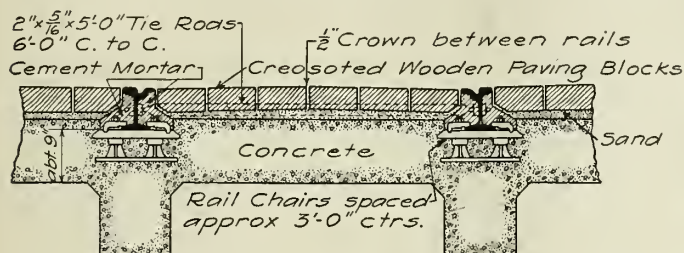


Fig. 13—Cross Section Through Track, Viaduct Construction.

top of the anchor plate. A $\frac{1}{4}$ in. wearing plate was provided between the bed plate and the rail and screw-bolted to the bed plate. This wearing plate can be renewed by removing the screw bolts, clamps and T-bolts.

In construction, the chairs were clamped to the rail at 3 ft. centers and the rail aligned and placed at its proper elevation before concreting. The $\frac{1}{4}$ in. wooden washers shown in the accompanying illustration were for the purpose of erection, their object being to act as a temporary filler and allow the anchor plate to be drawn tight against the wearing plate. The clamps F and E, pressing down on the rail base and bed plate, while the heads of the T-bolts pulled up on the anchor plate, held the chair in place until after concrete was poured. These washers, however, did not prove satisfactory, as the tendency



Fig. 16—View Looking East from Des Plaines St. Viaduct, Showing Contractor's Tower and Forms and Falsework Partly Removed.

bridges be constructed with only a reasonable interference with the properties of the public and municipal utilities at present occupying the surface or sub-surface space. These properties were as follows, and are shown in Fig. 15. The track and wires of the Chicago Railways Co.; the tunnel of the Illinois Tunnel Co.; the lighting and power conduits of the Commonwealth-Edison Co.; the telephone conduits of the Chicago Telephone Co.; the water pipes and sewers of the municipality of Chicago; and the electric light wires and poles of the municipality of Chicago.

The method of providing for the tracks of the Chicago Railways Co. has already been described. Their wires were strung overhead from reinforced concrete trolley poles placed over

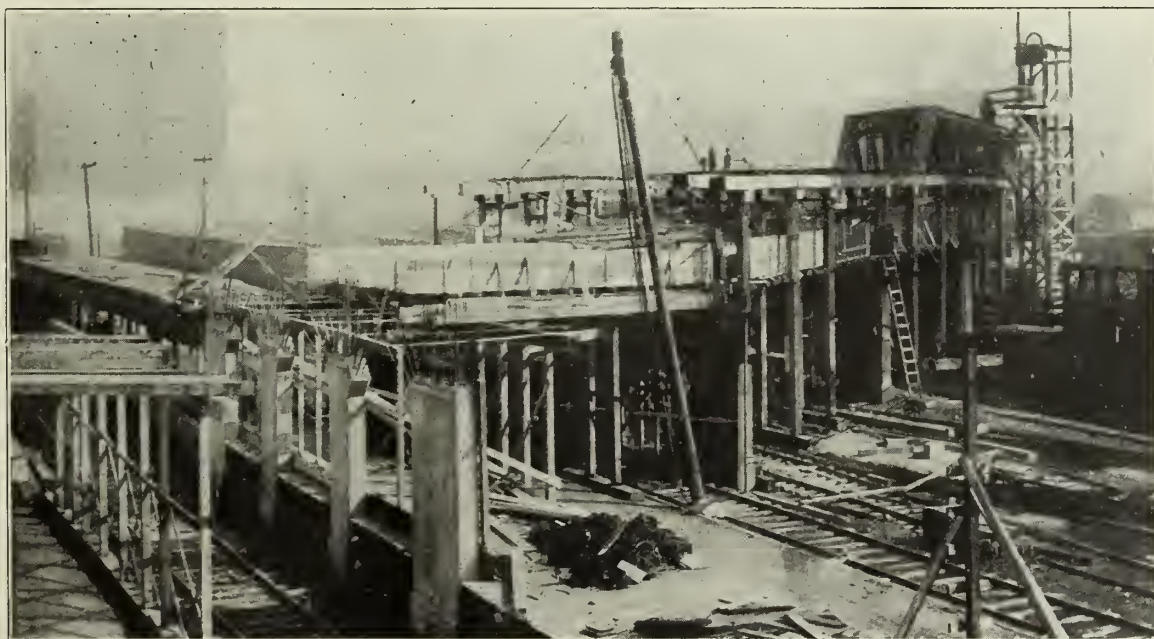


Fig. 17—View of Milwaukee Ave. Viaduct, Looking Southeast from Desplaines St., Showing Concrete Bents Finished and Falsework and Forms Under Construction.

was to tighten the bolts too much, causing the wearing plate to bend, which caused a gap between it and the base plate. This was remedied in the field by placing small wooden blocks between the outer ends of the anchor plate and bed plate and omitting the wooden washers. On Desplaines Street viaduct, owing to the increased thickness of the floor, it was not necessary to use special rail chairs, but ties and ballast were used, as shown in Fig. 12.

The second condition imposed on the design was that the

each bent. On Milwaukee avenue provision for the lighting and power conduits of the Commonwealth-Edison Co. and the telephone conduits of the Chicago Telephone Co. were made by embedding $3\frac{1}{2}$ in. Orangeburg fiber conduits in concrete in the space directly beneath the sidewalks on each side of the viaduct. On Desplaines street these conduits were placed in wrought iron pipes supported on ledges on the stems of the sidewalk T-beams.

The tunnel of the Illinois Tunnel Co. occupies a position in

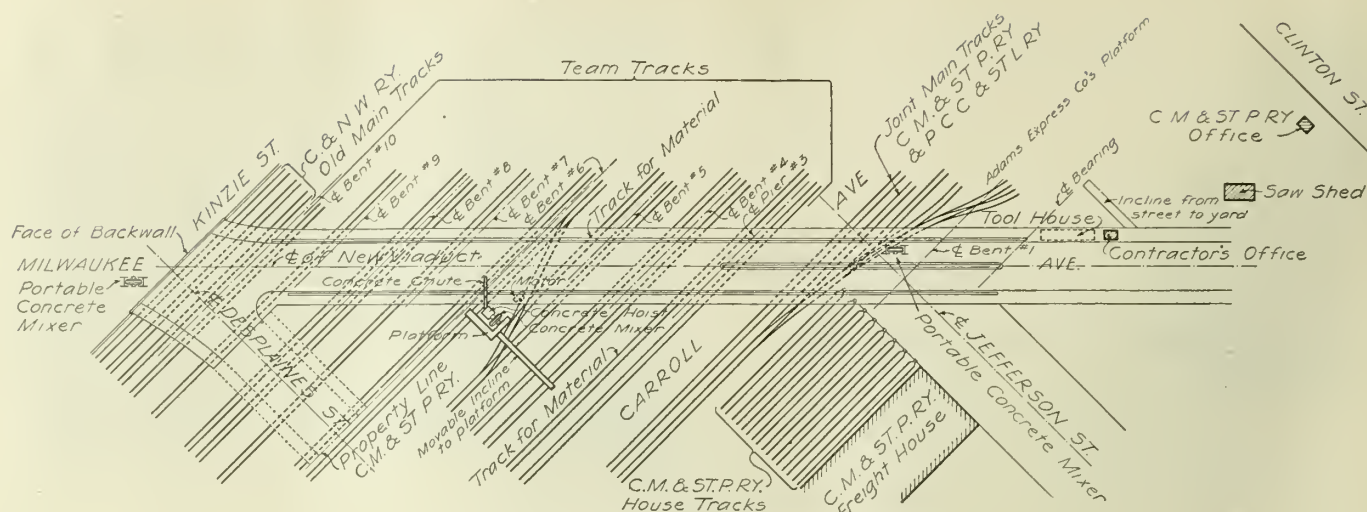


Fig. 18—Tracks Under Milwaukee Ave. Viaduct.

Milwaukee avenue approximately beneath the center line of the street, at an elevation of about 38 ft. below city datum. It was not found possible to secure any support for the viaduct within the space directly above the tunnel. Accordingly, as shown in Figs. 9 and 15, and as previously stated, the column c-2, which is located over the tunnel, is supported on a beam c-5 which spans the tunnel and is supported on the pile foundations f-2 and f-3.

The third condition imposed on the design was that the new structures should be built practically without interference with the present railroad tracks and without infringing on their lateral or vertical clearance. This was necessary, as the tracks on the lower level were busy terminals of importance to the railroad companies concerned.

To meet this requirement falsework, designed as in Fig. 10, was used on Milwaukee avenue. Section B shows that the distance from the lowest point of form work to the bottom of the permanent concrete floor was only 8 in. This unusually small projection of falsework below the concrete was obtained in the following manner: The 8x16 in. stringers a were placed as shown in Section A, between the stems of the T-beams b which support the roadway floor. The ends of the stringers a rest on falsework bents, as shown in Section B. To the under side of a stringers a are bolted 4x6 in. pieces c, which support the bottom and side forms of the T-beams b, as shown in Section A.

The forms for the main girders were supported as follows: 8x16 in. stringers d, Section A, D and C, rest on the posts f which pass through temporary openings in the concrete slab. These main stringers d support the 6x8 in. pieces e and the 4x6 in. pieces g by $\frac{3}{4}$ in. bolts. The pieces e support the bottom and sides of the lower portion of the forms for the main

girder G. The forms i, for that part of the main girder g above the floor slab, are supported directly from the main stringers d and are independent of the lower portion of the forms j. This arrangement permitted the main girders to be concreted practically as a monolith with the sidewalk and roadway slabs by means of the openings k. The beams b-1, b-2, etc., Fig. 4, were also concreted as a monolith with the main girders g by maintaining similar openings at the ends of those beams.

Some of the posts f, the main stringers d, together with the vertical $\frac{3}{4}$ in. bolts, and the 4x6 in. pieces g are shown in Figs. 16 and 17, which are reproductions from photographs of finished concrete work with the forms partly removed. Similar falsework was used for Desplaines Street viaduct.

In order to interfere as little as possible with traffic across the viaducts during their reconstruction Milwaukee Avenue viaduct was rebuilt first, traffic being carried over the old Desplaines Street viaduct. After Milwaukee Avenue viaduct was completed, traffic was turned over it, and Desplaines Street viaduct was rebuilt. Plans for Milwaukee Avenue were completed and the structure 75 per cent completed before plans for Desplaines Street viaduct were started. The work was done by contract. Separate bids for each viaduct were invited, and the work was done by two different contractors, using different methods in the placing of concrete.

Certain conditions were imposed upon the contractors, the main one being that there should be no interference in any manner with the operation of trains on the joint main tracks of the C., M. & St. P. Ry., and the Pennsylvania Co., the old main tracks of the C. & N. W. Ry., nor on the tracks serving the Adams Express Co.'s platform, nor the tracks serving the C., M. & St. P. Ry. Co.'s freight house. All other tracks under the viaducts are used as team tracks, the cars being spotted at night. Therefore, any of these tracks could be



Fig. 20—View of New Milwaukee Ave. Viaduct Looking Southeast from Desplaines St. Viaduct.



Fig. 21—View Looking North on Milwaukee Ave. Viaduct.

blocked under the viaduct during the day between the hours of 7:00 a. m. and 6:00 p. m., but had to be left open for switching at night. An overhead clearance of 15 ft. 6 in. above top of rail was required.

In the construction of Milwaukee Avenue viaduct the concrete in the footings, with the exception of the bent between the truss span and the three girder spans, was placed by means of a mixer mounted on a flat car. The car was placed on the tracks adjacent to the footings and concrete deposited through a chute. Material was taken from cars on adjacent tracks and delivered to the mixer in wheelbarrows. Figure 18 shows the general arrangement that was used by the contractor in placing the concrete in the superstructure. A tower about 50 ft. high was erected near the material tracks between Bents Nos. 5 and 6. A $\frac{1}{2}$ -yard cube mixer was located on the ground adjacent to the tower and discharged directly into an elevator or bucket. The concrete was hoisted to the top of the tower, dumped into a chute, and distributed by means of push carts of 6 cu. ft. capacity. A large part of the mate-

crete for both the substructure and superstructure was placed by means of a tower and chute, as shown in Fig. 19, the chute being long enough to deliver concrete to any portion of the structure. Figure 19 also shows the thin columns, the reinforcing in the cross girder and the completed Milwaukee Avenue viaduct in the background. Figure 20 shows several views of the structure after it has been opened to traffic.

In the Milwaukee Avenue viaduct there are approximately 4000 cu. yds. of concrete, and 600,000 lbs. of reinforcing steel. In the Desplaines Street viaduct there are approximately 2100 cu. yds. of concrete, and 315,000 lbs. of reinforcing steel.

The concrete, in general, was a 1:2:4 mix, using crushed limestone, but the columns were 1:4, and some of the footings were 1:3:6. Tests of the concrete at 28 days showed the following results for cylinders 8 in. in diameter and 16 in. long: for 1:4 concrete, 2500 lbs. per sq. in.; for 1:2:4 concrete, 2000 lbs. per sq. in. The cement gun was used for pointing after the forms were removed.

By agreement with the other railway companies involved

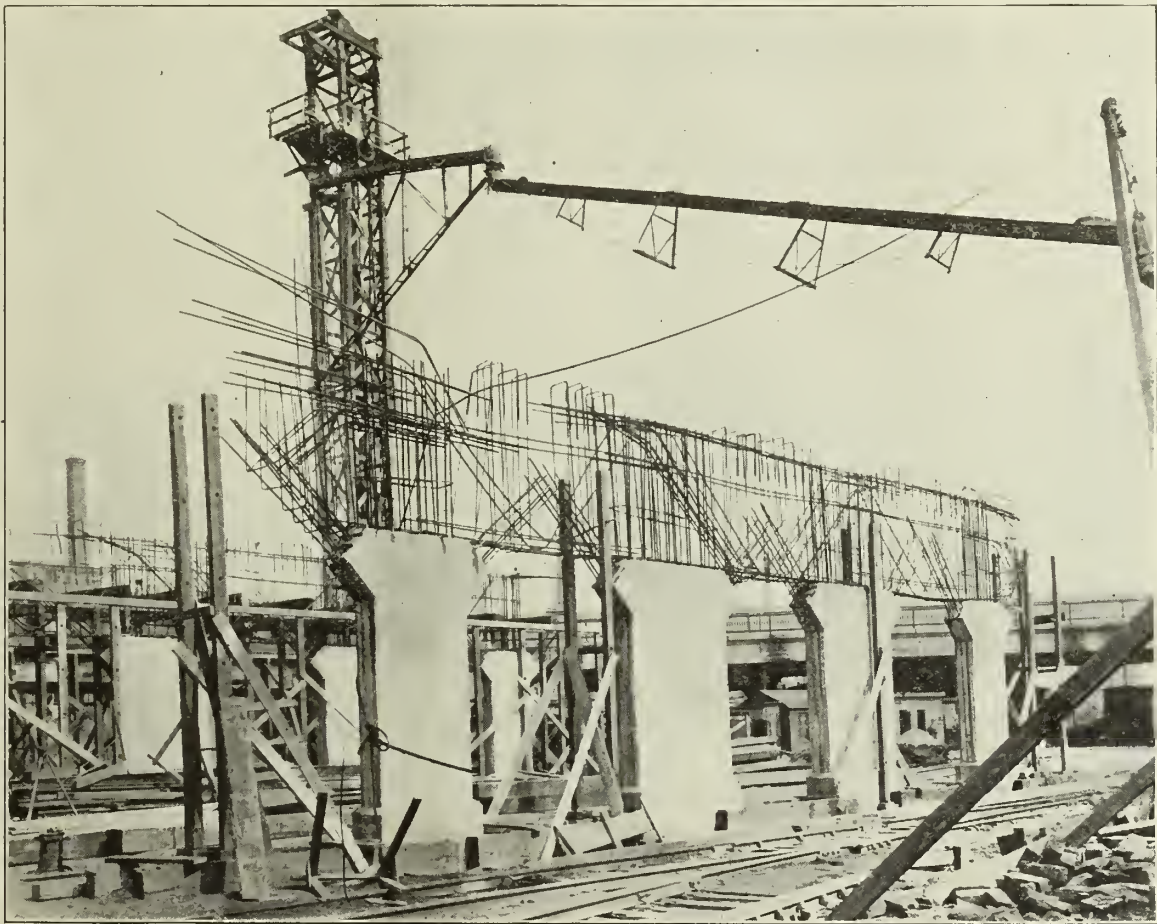


Fig. 19—Tower and Chute Used in Construction of Desplaines St. Viaduct.

rial was delivered to the mixer in wheelbarrows from cars located on tracks marked, "Material Tracks," but a portion was brought to the vicinity of the mixer by teams and then taken to the mixer in wheelbarrows.

For work at the north abutment and the two north spans a mixer was placed on the north approach and concrete was discharged directly into place or distributed in push carts. In concreting the sidewalks and curbs on the steel spans a $\frac{1}{4}$ -yard mixer mounted on wheels was used, and the concrete was distributed in wheelbarrows. Materials were delivered to these mixers in wheelbarrows from storage piles in the street at each end of the viaduct. Near the south approach, a portable sawmill was erected. Electric power was used in operating the mixers, elevator and sawmill.

In the construction of Desplaines Street viaduct the con-

the work was designed by the C., M. & St. P. Ry., C. F. Loweth, chief engineer, and J. H. Prior, engineer of design. The concrete work in Milwaukee Avenue viaduct was built by L. K. Sherman & Co., of Chicago, and in the Desplaines Street viaduct by Brennen Construction Co., of Chicago. The steel work on both viaducts was erected by the railway company's forces. The field engineering, superintendence, and inspection for the railroad company, of both the steel and concrete, were under the direction of R. J. Middleton, engineer of track elevation for the C., M. & St. P. Ry.

A paper on "Transportation," by J. F. Townsend, traffic manager of the National Tube Co., Frick building, Pittsburgh, Pa., has been published in pamphlet form, with a dis-

cussion by Delos W. Cooke, vice-president of the Erie R. R., included under the same cover. The paper was read and the discussion contributed at the sixth general meeting of the American Iron & Steel Institute, New York city, May 22, 1914. Mr. Townsend's argument is for a car of 150 tons capacity for the iron and steel industry, and for a system of graduated rates ranging between present carload and less than carload rates, and amounting to a premium to secure the loading of cars nearer to capacity than is generally secured in present practice. Mr. Cooke calls attention to the probability that the scaled rate would encourage the scalper or forwarder, and the railroads would have no redress against that practice under the recent ruling of the United States Supreme court.

Rail Sawing on the Baltimore & Ohio R. R.

A number of years ago the Baltimore & Ohio R. R. put into service a considerable mileage of 60-foot rails. Whatever the history may be of the service which these rails have given, it has been considered desirable, lately, to subject them to a trimming process, by which each 60-foot rail is sawed into one 30-foot and one 27-foot rail. At the same time the ends are cropped 18 inches, which accounts for the remaining three feet of length. A portable rail-sawing machine was purchased from the Industrial Works, Bay City, Mich., and but recently put into operation in a plant temporarily located at Lodi, Ind.

The rail-sawing machine is of the same general type as one which has been furnished by this builder to several railroads, including the Intercolonial, the Canadian Pacific, the Chicago, Burlington & Quincy, etc., at various times within the last

matic and actuated by compressed air. As the rail is put onto them they grip it tightly, and then move it bodily over against the saw.

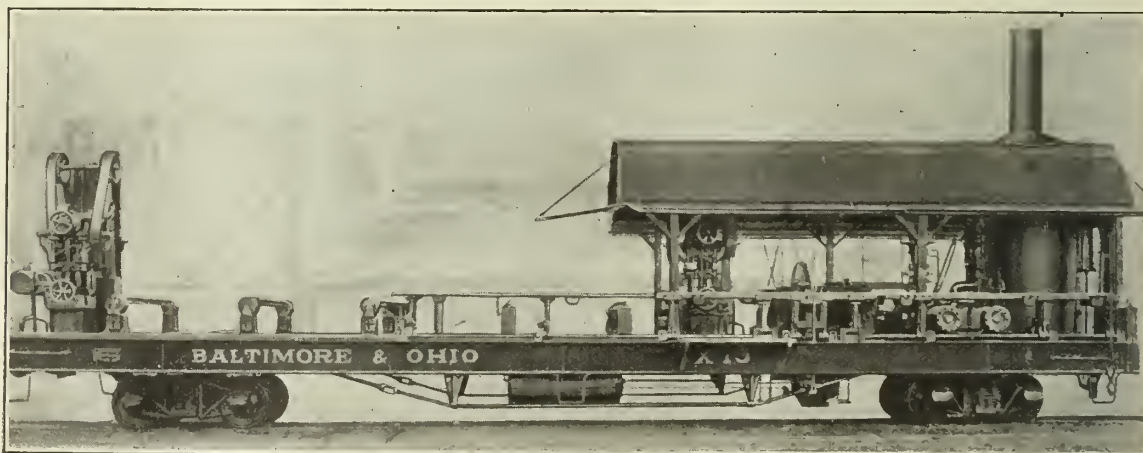
The saw is of the toothless or friction type, consisting of a water-cooled disk revolving at high speed, and the rail is severed in from 10 to 20 seconds. The two halves of the rail are next moved along lengthwise, so that its other ends may be sawed. They are then passed down along the rollers, and the ends successively presented to the two drilling machines, each of which drills its three holes in the web of the rail simultaneously. The drilling operations do not obstruct the movement of the rails at the saw, so that the capacity of the machine is one rail every thirty seconds, although, in practice, it does not often work actually to capacity on account of inability to furnish a constant supply of rails to the saw.

The housing of the principal part of the mechanism has hinged sides which may be let down to completely enclose the machinery, when not in use.

Analysis of the Railroad Situation by Howard Elliott.

Plea for justice to the railroads, by Mr. Howard Elliott, president New York, New Haven & Hartford R. R., in a letter to the Chicago Herald. Reduction of rates, with higher wages, higher cost of materials, increased taxes, etc., held to be unfair. The transportation business must grow, and more revenue is needed. Railroad managements are losing control of the properties. The "three R's" of the railroad school. Published by special permission of the Chicago Herald, owner of the copyright.

If there is any one feature offering encouragement in the existing railroad situation I think it lies in the increasing recog-



Rail Sawing Car, Baltimore & Ohio R. R.

few years. There have been improvements in the details of this machine, and some variations in the rail-handling mechanism have been adapted to the particular requirements of the roads concerned; but speaking in general the machine remains substantially without change.

The accompanying illustration gives a view of the machine now working on the Baltimore & Ohio R. R. It is set on a temporary timber foundation, and the trucks removed from under. On what is the near side in the illustration, a skidway is arranged, at a height somewhat above the floor of the car. This was done to afford storage space for the rails as they are unloaded from the cars which bring them in, and at the same time by keeping them at the height at which they are unloaded, subsequent hoisting is eliminated. A rail tongs suspended by a chain from a traveler on an overhead rail is shown in the illustration, but this is not used in the present plant. The rail to be sawed is laid over onto the set of carrier clamps, shown in the illustration, ranged along the side of the car, from the rear or boiler end, forward. These clamps are auto-

nition of the important relation the prosperity of the railroads bears to the welfare of the country as a whole and of the very grave danger there is in the failure of the governmental agencies to help out. The narrowing of the margin between railroad income and outgo, reflected in the many published statements of earnings, and the effect this has had of stopping railroad improvements, upon which the country's growth depends, has been very generally observed.

That something must be done to increase the net revenues of the railroads has lately been conceded even by Mr. Brandeis. In his brief presented to the commerce commission at the close of the recent rate hearings he said: "On the whole, the net income and net operating revenue of the railroads in official classification territory are smaller than is consistent with their assured prosperity and the welfare of the community, and this is notably true of the General Freight Association and other eastern lines. In view of this fact it is desirable that steps should be taken as promptly as reasonably may be to increase that net revenue."

It may be of interest to refer to a very recent utterance of

Arthur von Gwinner, managing director of the Deutsche Bank. Herr von Gwinner says: "American railway rates should not be 3, 4 or 5 per cent higher. They ought to be 25, 35 or 50 per cent higher. Such a state of affairs as exists in American railroads is a deliberate menace to the prosperity of the republic, and because the prosperity of the rest of the world is bound up with that of America it is a danger to all of us."

The duties of American railroads today, except paying the bills, are practically directed by governmental authority. The railroad owners and railroad managers have, to a very large extent, lost control of some of the very important elements of their business. The railroads cannot fix the selling price of their goods, their rates are all fixed for them by state or federal laws or by municipal organizations, they cannot control their taxes any more; they have little control over rates of pay, and they cannot any more get capital for improvements at 4 per cent, as they used to.

The American people, we all know, are big enough to have any kind of railroads they want. If they want good railroads and good railroad management they can have them, but they will have to pay a reasonable price. If they want poor railroads and poor management they can have them. Likewise if they want government ownership they can have it.

About government ownership a great deal is being said pro and con today. Personally, I am of the opinion that the governmental business management of enterprise in this country is an experiment that is doubtful, and that the government has not yet given that evidence of thoroughness and economic management that will justify government-owned and government-managed railroads.

It will be better for the country to help the railroads a little by more reasonable regulation and to insist upon less elaborate service, higher rates for certain classes of service and honest, efficient management from both employees and officers, so that the results of the properties will attract the needed capital.

The transportation business in the United States is a very big one. It is second to agriculture, the biggest of all. The last census showed that there were something over \$41,000,000,000 in agriculture, about \$19,000,000,000 in manufactures and somewhere between \$18,000,000,000 and \$20,000,000,000 in transportation. These three great interests are interwoven together. They must go up or go down together. The transportation business must grow and must develop and must be reasonably protected and regulated or it will not be in a position to serve the country and the millions whose daily livelihood depends upon this great business.

The railroad is never finished, and it cannot stand still. It must go forward or backward; and to go forward means a constant investment every day in the year. In round figures, for every dollar increase of gross earnings for the railroads of the United States, as a whole, at least \$6 of new capital is required. In New England, where there is a dense population, for every dollar increase in gross earnings the new capital investment must be more than \$6.

Where are the railroads going to get this money? Are they going to save it, earn it or borrow it? It is very difficult now for any railroad to save much money out of its earnings, because of the very great increase in the cost of labor and materials, and the more luxurious facilities now demanded by the public, and the fact that thus far the public, through its lawgivers, has shown little tendency to give any help in the way of increasing the prices that the railroads are allowed to charge for their service.

For the last four or five years the railroads have been struggling with the higher cost of living, as have individuals. For the year ending June 30, 1914, the New Haven will pay \$2,500,000 more than for the year ending June 30, 1910, for the same amount of labor. This is 5 per cent on \$50,000,000. That could be used to pay the return on bonds or other forms of indebtedness or for improvements, but it can't be used for both. If

the New Haven could have paid the same rates in 1913 as it did in 1903 its pay roll would have been \$7,200,000 less.

Coincident with these increasing expenses there has been a fall in freight rates. For example, if the New Haven had received the same average freight rates in 1913 as it received in 1903 it would have had for the same service \$1,800,000 more. Here in these two items, the increase in the unit price for wages and the increase in the average unit price of freight, there is a difference of \$9,000,000. In other words, the average physical energy expended by the railroad today is paid for at a less price than ten years ago, while it costs very much more. In twenty years railroad taxes have increased 225 per cent, or from \$34,000,000 to nearly \$125,000,000, with no increase in freight rates.

Then, too, in addition, there are the demands from governmental bodies, involving expense on the part of the railroad and at the same time taking a great deal of time and physical and mental energy of the officials, which is thus diverted from constructive and operative work. The conflict of laws in the states has naturally been an embarrassment to the great public service corporations. Laws are different in some states than in others, and different from federal laws. Ultimately the situation in this respect no doubt will be clarified and with great advantage to the railroads. Encouragement has been afforded here in the recent decision of the supreme court in the Shreveport case, which would seem to point to less conflict in the future between state and federal laws.

In the attempts we are making to solve this very important problem of the railroads for the best interests of all, it is a very serious question whether there is not on the part of some perhaps, too great a worship of the word "competition" at the expense of a failure to consider efficiency, the elimination of waste and the avoidance of duplication of capital.

The character of service is an element to be considered along with cost. The railroad men of the United States today, to the very best of their ability, are trying so to manage the great properties within their charge as to eliminate waste, to make a dollar go as far as it can, to avoid duplication of capital and to produce for the people they are trying to serve a character of transportation that will help the country to go on with its growth and its onward march. The railroads have gone pretty nearly to the limit in their efforts to increase their efficiency, although there is always a chance to improve: they are getting heavier engines, engines capable of drawing heavier trains, and heavier rails; managers are trying each year to make a dollar go further than the preceding year, but there is something of a limit to what they can do, and in my own judgment that limit is very nearly reached.

The cost of producing new railroads connecting important communities is so great that none are likely to be built, and the country must depend upon those now in existence and permit them to expand to meet the increase in business. The railroads of the United States have done a wonderful piece of work since the civil war in practically rebuilding the transportation machine of this country, so that to-day it is the wonder of foreign nations. They have so done it that the capital invested represents but \$60,000 per mile, while in England it represents \$275,000 per mile and in Germany \$114,000 per mile. The average pay of the employees of the railroads is \$733 per year, compared with \$270 per year in England and \$388 per year in Germany. The average charge against the people of the United States for hauling 2000 pounds one mile is only 3-4 of a cent. It is 2 1-3 cents in England and 1 1-2 cents in Germany.

In other words, the railroads have succeeded here in producing a piece of machinery at a capitalization of \$60,000 per mile, upon which labor is employed at the rate of \$733 per year, and the freight rate is much cheaper than in foreign countries. Not only that, but the best appliances, the latest inventions for the safety and comfort of employees are found on the rail-

roads of this country. Our people demand, and our railroads supply, better facilities for safe and luxurious travel than in any other country.

There have been "three R's" in the railroad business in the last twenty years—raising wages, raising taxes and reducing rates. It looks now as if we had reached very nearly the parting of the ways, and that if the nation wants continued expansion and a development of its railroads those "three R's"

cannot go on, because there will not be money enough to foot the bills.

We put up at a railroad crossing a sign and we letter it "Stop, Look and Listen." Has not the time come when the nation should stop and see whether it is not putting a greater burden on its transportation agencies than they can bear, and look ahead and see what is needed in order to let the business of this country go on and grow?

Rail Creeping and Its Prevention on European Railways

Creeping rails, in this country, give trackmen so much trouble, and so many devices have been contrived to prevent the movement, that it may be of interest to learn something of the same thing on European railways. We give below a paper on the subject by Mr. Biedermann, of Charlottenburg, Prussia, published in Zeitung der Vereins deutscher Eisenbahnverwaltungen, and translated and reprinted in the Bulletin of the International Railway Congress.

It is intended to draw the attention of quick-transit line engineers to the creeping of rails. The subject has lately received a stimulus through the excellent work of Mr. W. Klutmann, Regierungsrat and Baurat, who has been investigating the subject, and the following remarks are based upon his work.

Klutmann, who was formerly a member of the Cologne directorate, has made long experimental investigations in the Aix-la-Chapelle district, relating to permanent way.* Their great and permanent value does not depend merely upon the photographs of a large number of peculiar instances of disturbance and destruction of the proper arrangement of the track, which are given to elucidate matters. These investigations were also intended to test the efficiency of the different anti-creeping devices used; but their scope extends far beyond the examination of local phenomena. They are, as regards permanent-way maintenance, of quite as much importance as the well known Schubert experiments relating to the behavior of ballast under sleepers of the different kinds used in track construction.

Klutmann shows that the creeping of rails in the direction of the traffic is the cause, not only of the direct displacement of the track, but also of a large number of other objectionable phenomena. It is well known that the rails acted on by rolling loads become displaced, in the direction in which the trains run; the creeping is extraordinarily irregular, and takes place not only on curves but also on straights. Formerly it was thought that creeping was caused partly by the friction between rail and wheel, partly by that between rail and sleeper; but

*Ueber Schienenwandern und ein neues Mittel gegen dasselbe (Dorpmüllers selbsttätige Gleisklemme), by W. Klutmann, permanent-way and traffic inspector, head of the traffic department Aix-la-Chapelle I., published by Druckerei La Ruelle, Aix-la-Chapelle.



Fig. 1—Track Creeping Up Hill on the Line from Aix-la-Chapelle to Welkenraedt.

the general opinion now is that creeping is caused chiefly by the percussive action of the wheels at the joints, when the wheels leave the trailing rail end and strike the facing rail end. The blow given to the rail produces a force tending to drive the rail forward in the longitudinal direction. The result is that the rail heads become battered, and this battering increases the more the fish plate seats become worn. From this point of view it is instructive that for instance the creeping of tramway rails, which made itself very evident by disturbing the pavement in the direction of running, wholly disappeared when it became the practice to join the butt ends of the rails by welding. The creeping on railways is evidenced by the opening and closing of the gaps at the joints, by the altering of the distance between sleepers, by the altering of their position so that they are no longer at right angles to the center line of the track (see Fig. 1); and rather frequently also by compressive forces produced at the joints, causing buckling and



Fig. 2—Fracture of Metal Ties and Cutting of Joint Bars by Creeping.

lateral displacement, so that the track becomes warped and endangers the safety of the traffic.

It is shown in Klutmann's paper that the deleterious effect which creeping exercises on the track and on the ballast causes much trouble and is responsible for a large proportion of the total cost of maintenance of the track. It is proved, or at least made tolerably evident, that the irregularities in the track which make ordinary maintenance work necessary are largely caused by the deleterious action of creeping. Much of the injury done, particularly to the rolling stock, which only becomes apparent after years, but is thine all the more serious, is simply the result of the continual tendency of the rails to move forward in the direction of running. This is shown by a large number of objectionable phenomena observed in the track, and the author gives photographic reproductions of many of them. Figs. 1 to 5 show some of them. The joints lose their normal position and become depressed; the two rails do not creep at the same rate; on double-track railways the sleepers on the trailing side of the joint are driven apart, while those on the facing side are forced closer together, often very much so, as Fig. 1 shows. In the case of a track laid with wooden sleepers the fastenings in the fish plate notches become bent; but in the case of the lighter iron sleepers, their lower front edges are thrust forward, the clip-plates are turned (see Fig.

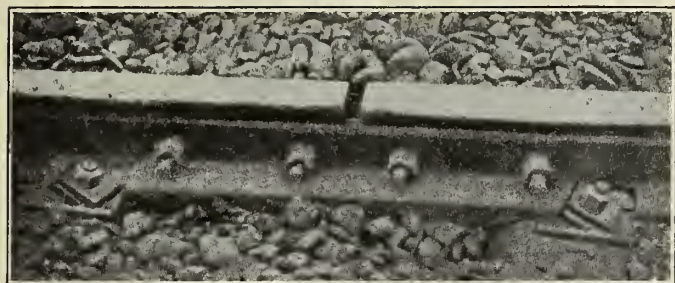


Fig. 3—Climbing of Clip Plates Produced by Rail Creeping.

2) and even try to climb up on the facing side of the joint, as is clearly shown in Fig. 3. The continuous friction and wear and tear reduce, in course of time, the thickness of the sole-plates and of the iron sleepers till it hardly exceeds that of a thick card, and then fracture ensues, either longitudinally or transversely.

The forcible twisting of the sleepers produced by the creeping is in many cases the cause of very frequent fractures observed in sleepers at the holes (Fig. 4). The forward thrust of the rails displaces the sleepers and forces them into an oblique position, with the result that the gage becomes too narrow. When the sleepers become displaced and twisted, those at the joint are no longer properly supported by the ballast. In the case of iron sleepers hollows are formed in the direction of creeping, and the sleepers cant and become depressed in an objectionable way. In consequence the resistance to the vertical forces become changed; the joint sleepers begin to hammer the ballast and to destroy it; and the result is the well known pumping and sucking action observed at joints when water is present.

The chief original cause of this phenomenon is the creeping of the track, and the age of the track and its defective maintenance are contributory causes. Creeping takes place not only on horizontal parts of the track; it also takes place on down-gradients (where the brakes are used) and, as Klutmann has shown, also on up-gradients. The disappearance of the expansion gaps at the joints may result, in a hot summer, in dangerous warping. If the gaps become too large, there is a tendency for the fish plates to break, for the fish plate seats to become worn, and for the joint bolts to be sheared off.

The most objectionable effects of creeping are found at switches and crossings, where the different parts become displaced relatively to each other; a very instructive instance of which is shown in Fig. 5. The investigations Klutmann has made have convinced him that creeping is the hidden cause of very many different disturbances in the permanent way, and that a considerable saving could be effected in the mean annual cost of maintenance of the track (statistics show this amounts to about 650 marks per kilometer [\$225 per mile]) if it proved possible to keep the track in its original position.

In spite of the many measures which have been proposed for this purpose it has unfortunately as yet not been possible wholly to counteract this evil. The number of anti-creeping devices tried has been very large. Flat bars, connecting together a large number of sleepers, either between the rails or outside, are often tried. On Austrian lines and also on other lines, one occasionally sees flat bars or knees fixed diagonally on the sleepers. These devices are only partly successful. They prevent or hamper the proper maintenance of the ballast during tamping, adjusting and raising operations, and the introduction of new fastenings between the anti-creeping devices and the sleepers leads to increased cost of maintenance. A large number of suggestions, based on the erroneous assumption that attempts should be made to fix the joints, proved to be entire failures, as the joints are already the weakest part of the track, and hence must not be utilized to resist the great creeping forces. The technical committee of the German Verein ac-

cordingly strongly recommended, in a report issued in 1899, that the joints should be kept separate from the anti-creeping devices, as the joints, which are the weakest part of the track, are already subjected to so much fatigue by the rolling loads that they are unable to oppose any effective resistance to the creeping forces. The "Eisenbahntechnik der Gegenwart"[†] states that all appliances for resisting creeping should be designed in such a way as to transmit the thrust from the rails to the sleepers, in order to utilize the friction of the latter on the ballast, and mentions, after enumerating numerous more or less unsuccessful or inefficient devices, that the two most effective anti-creeping devices at present known are the following:

1. Butting plates and angle stops.—A number of these, varying with local conditions and with amount of traffic, are fixed

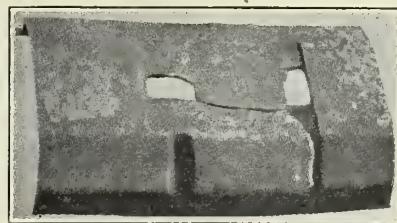


Fig. 4—Cutting of Metal Ties by Joint Bars Through Rail Creeping Action.

tightly to the rails, and are intended to transmit the creeping forces to the intermediate sleepers. These butting plates, as shown in Fig. 6, can be fixed on one side or on both sides of the rail. It is convenient to make them of such a length that they act on two sleepers simultaneously. The force can be transmitted by part of the sole-plate (for instance, the hook) taking into notches of the horizontal flange of the butting plate, or, as shown in Fig. 7, by an angle stop. Many other arrangements have been tried. Figure 8 shows one tried on the Alsace-Lorraine Ry., in which a flange extends down vertically from the plate sufficiently far to take against the side of the

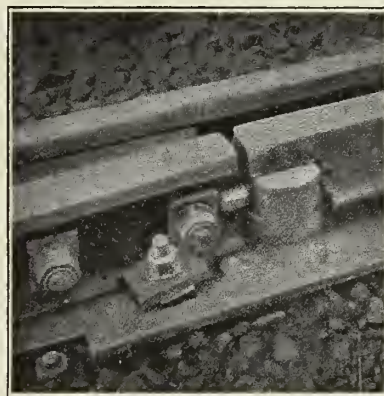


Fig. 5—Rail Creeping at the Heel of a Switch; Clip Plate Lifted out of Notch.

sleeper. In other arrangements the drilling of holes in the rails has been avoided, screws being used to make the devices grip the rails.

2. The Dorpmüller stop wedge clip, shown in Fig. 9, which, according to the statements published in the technical press, has proved very effective in trials made on a large scale on the Prussian State Ry. and abroad.[‡] In this arrangement, which, according to Klutmann's experiments, has proved the simplest and most effective means for preventing creeping, a clip of special shape, is placed on the base of the rail. In the space between the clip and the bottom of the rail, a pack-

[†]Second edition of 1908, vol. II, Part 2, p. 165.

[‡]Details concerning this invention, which was brought out in 1906, are given in the *Organ für die Fortschritte des Eisenbahnwesens*, 1906, p. 194.

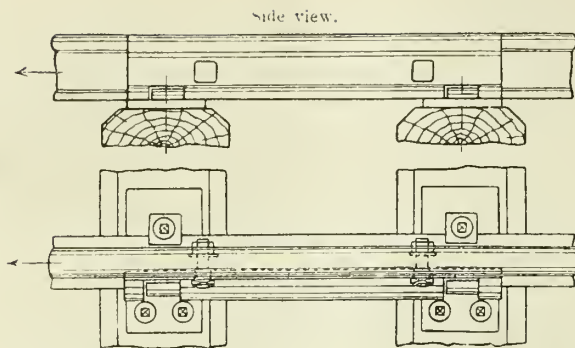


Fig. 6—Butting Plate of Prussian-Hessian State Ry.

ing piece being added to protect the latter, two pieces SS are introduced, and between them wedge K. When this is driven in by pressure against the wedges, the two wedges are driven apart laterally, and the clip is consequently pressed very tightly against the base of the rail. Klutmann gives detailed particulars about these wedges. With the packing piece in question, the clip can be fixed at any desired point of the rail without trouble.

Klutmann, in his paper, enumerates the different qualities which a proper anti-creeping device of this kind must have: (a) it must act not at the joint, but at any desired point, on the intermediate sleepers, in number to suit the amount of traffic; (b) it must not weaken the rails and sleepers by making holes or notches in them necessary; nor must it increase the number of fastenings of the bolt and nut kind, as these require special attention; (c) it must be easy to fix and easy to maintain, weigh little and cost little; (d) the stop must act in the direction of the center line of the track, not as a lever, in order that no rotary moment may be produced by the unequal thrusts of the two rails; (e) it must be possible to fix the appliance without trouble at every part of the track, independently of the arrangement and dimensions of the joints, the sleepers and the ballast, that is of the form and size of the ballast itself; (f) the equality of the flexure of the rails must not be disturbed by the stop; (g) it must also be possible to

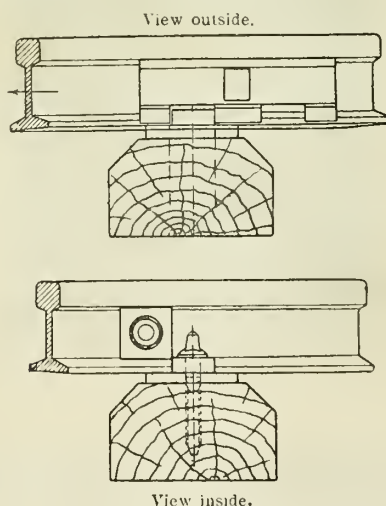


Fig. 7—Angle Stop of Austrian State Ry.

use the stop at points and crossings, where it must be as effective as on the open line; (h) it must not make the maintenance of the track more difficult; (i) besides the cost of the stop and of fixing it, it must not involve any appreciable increase in the cost of maintenance.

The Dorpmüller self-acting stop wedge clip has these properties to a considerable degree, as is shown by the careful experiments made, for instance on the express lines from Cologne to Herbesthal and from Aix-la-Chapelle to Düsseldorf, at the Aix-la-Chapelle and Herzogenrat stations, and on sundry

branch lines. There is no screw in this clip, so that the cost of maintenance which the presence of about a thousand screws per kilometer (1600 screws per mile) of track would involve, is absent. It is stated, among other things, in the report: "The excellent effect exercised on the rigidity of the track by the clip is best shown on the Ronheider gradient, on which many heavy corridor trains and goods trains run. In running down this gradient, fragments of iron up to 10 millimeters ($\frac{5}{8}$ inch) thick and 10 centimeters (4 inches) long were sometimes torn out of the brake blocks. In spite of the great forces consumed in this work, that part of the track which was fitted with these stops showed no signs of creeping, and the joints remained as placed; but beyond the experimental section, the track was so much affected by this brake action that after three to four weeks of use after it had been readjusted, it once more began to get into bad condition and maintenance work had to be

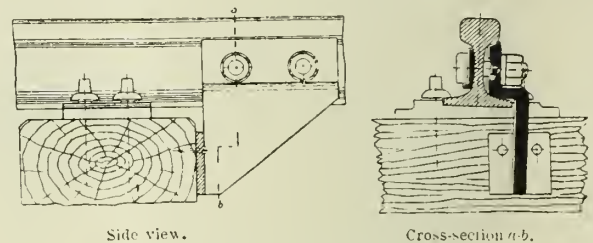


Fig. 8—Stop of Alsace-Lorraine Ry.

restarted, while the section fitted with clips required no further work." The device proved particularly successful on sections terminating in switches which are very deleteriously affected by the thrust caused by creeping rails. It is expensive to put again into good condition the points of switches disturbed in this way. The sections on which brakes were used, before and behind these switches, remained unaffected. Among similar applications it may be mentioned that the tracks on Brooklyn bridge, which have to do very heavy work, formerly always became displaced again, so that heavy expenditure was incurred. They have at length been fixed by means of the stop wedge clip.

From the economic point of view it has to be noted that a stop of the type shown in Fig. 9 and weighing 2 kilograms (4.4 lb.) costs 1 mark (25 cents); a butting plate of the type shown in Fig. 6 (including the bolts and cost of drilling) costs 2 marks (50 cents). Hence, as two clips replace one butting plate, the cost is the same in the case of small orders, while in the case of large orders the cost of the clips is reduced by 30 per cent. But according to the statements made in the paper, the decisive factor is the saving in cost of maintenance, which amounts on the experimental sections Cologne to Herbesthal and Aix-la-Chapelle to Düsseldorf to 480 marks (\$120); at Aix-la-hapelle and Herzogenrat stations to 540 marks

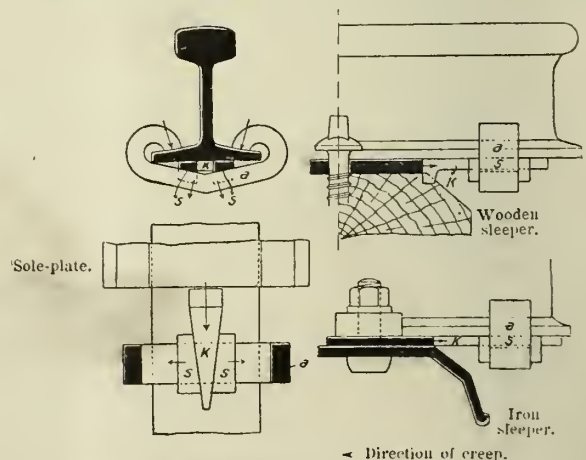


Fig. 9—Dorpmüller Stop Wedge Clip.

(\$135); and on an experimental section before an entrance switch to 300 marks (\$75). It would be very desirable that these figures, details of which are given in the paper in question, should be supplemented by other series of observations, in order to obtain comparative means values for the average cost of maintenance.

In any case the careful and scientific observations made by Klutmann have the great merit that they have cast new light on the important question of rail creeping and on reliable methods of checking it, and on the destructive effects which creeping produces. This circumstance makes the paper in question far more valuable than any casual reports and experiments with some anti-creeping device or other.

Tractor Trucks and Additional Locomotives for Butte, Anaconda & Pacific Electric Railway.

Description of an ingenious scheme by which an auxiliary tractor truck is coupled to the 2400-volt direct current electric freight locomotives of the Butte, Anaconda & Pacific Ry. and operated in unison with them, effecting an increase of 50 per cent in tractive effort. The expedient is necessitated by the increase in the heavy ore traffic of the road.

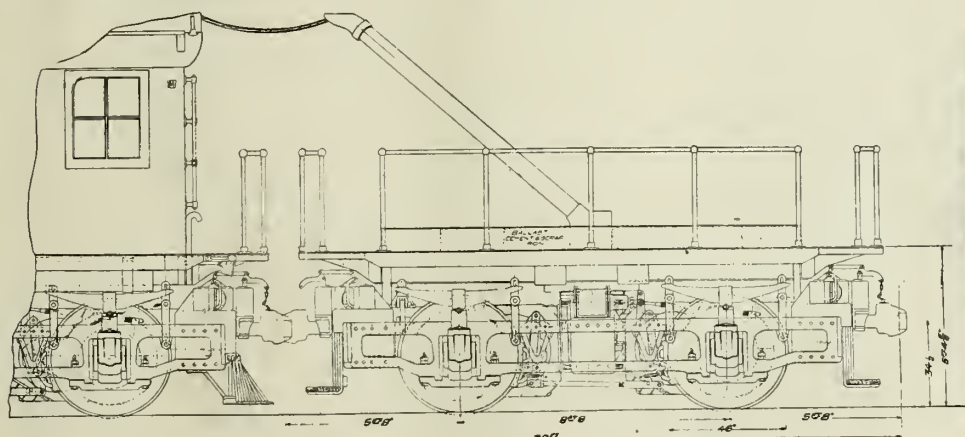
The Butte, Anaconda & Pacific Ry. recently ordered from the General Electric Co. four additional freight locomotives which will be duplicates of the seventeen 80-ton units put in service about a year ago. In order to make these locomotives suitable for very slow speed spotting service, there have also been or-

the truck motors will be operated with the other motors from the same controller without change in the main control. The number of stops in the control will therefore be the same as on the locomotive; ten points with six motors in series and seven with two sets in multiple, each set consisting of three motors arranged in series. In operation, each of the tractor truck motors is connected in series with one pair of motors on the locomotive, making a six axle, six-motor unit which will furnish 50 per cent more tractive effort than the 80-ton locomotive alone, at about two-thirds speed, without increase in current input. The characteristics of the 120-ton unit are as follows:

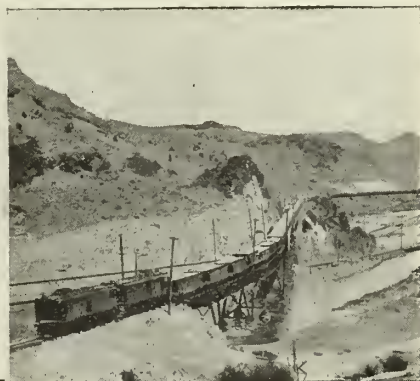
Total weight on drivers.....	240,000 lbs.
Starting tractive effort at 30 per cent coefficient.....	72,000 lbs.
Tractive effort at one hour rating of motors.....	43,200 lbs.
Speed at one hour rating, motors in series.....	4.8 m. p. hr.
Speed at one hour rating, motors in series parallel.....	10.3 m. p. hr.

Mechanically these trucks are similar in construction to the trucks on the 80-ton locomotives. Instead of a locomotive body, however, a platform is supplied, built up of channels, angles and plates which are supported on the truck transom. Struts are provided at the corners to secure the platform to the side frame. Ballast, consisting of cement and iron punchings of sufficient quantity to bring up the weight of the truck to 40 tons, is placed between the center channels of the platform in a box-like structure built for this purpose. A passageway protected by a hand rail extends along each side of the platform.

In the center of the platform there is a crane which extends



Tractor Truck Used as Auxiliary to 2400-Volt Direct Current Electric Freight Locomotive of the Butte, Anaconda & Pacific Ry.



Two-Unit Electric Freight Locomotive Hauling Ore Train of 65 Cars, 4700 Tons, on B. A. & P. Ry.

dered three additional tractor trucks which can be used in combination with the standard locomotive units. These trucks are an ingenious adaptation of standard parts of the freight locomotives, increasing the tractive effort of the standard unit to the equivalent of a 120-ton locomotive. These units will be used especially for spotting cars at the smelter and also for low speed switching in the yards at Butte, Mont.

While the new locomotives are adapted especially to switching service, they are also capable of operating in combination with any of the electric freight locomotives now in service, and have the same electrical and mechanical equipment.

During the present year it is expected that approximately 25 per cent more ore will be transported from Butte to Anaconda than was hauled last year. This increase arises from the transfer of ore which was previously hauled to smelters at Great Falls. The additional haulage will bring the total annual traffic on the road up to about 6,250,000 tons.

The three two-axle tractor trucks, referred to above, will each be equipped with two GE-229 motors insulated for 2400 volts, similar to those on the locomotive. Cable and connecting plugs will also be provided for operation with the locomotives, so that

at an angle from the platform floor, suitable for supporting the eight cables necessary for connecting the motors of the tractor to those on the locomotive. This crane can be revolved 180 degrees so as to permit the coupling of the locomotive to either end of the track. When in operation, this crane is rigidly locked in position. Air brake equipment with the necessary triple valve, auxiliary reservoir, etc., is also installed on the truck.

Each of the four locomotives now under construction is provided with a junction box placed near the roof above the front window. This is designed so as to permit the removal of couplers with a small amount of labor and time, so that the tractor may be connected to any one of the freight locomotives which is provided with this junction box.

The report of the Chicago, Burlington & Quincy R. R. relief department for the year ended Dec. 31, 1913, shows net contributions from members totaled \$580,388.88 and total receipts from all sources, \$619,958.86. During the year benefits paid were in excess of contributions and the association was forced to borrow funds. The organization now reports a membership of 25,692 persons.

RAILWAY REVIEW

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JOHN M. LAMMEDEE	
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SATURDAY, JUNE 27, 1914.

Would a steak from the rump of a megatherium mined from the Pleistocene strata of Patagonia, be a mineral? Is fossil ivory and wool from the Arctic regions mineral? Is wheat, excavated from ancient Egyptian tombs, still edible and capable of germination, vegetable or mineral?

Are amber and ambergris minerals; or do they belong to the vegetable and animal kingdom, respectively? The U. S. Supreme Court has decided that as a matter of law, the scientific question of origin does not govern. Petroleum means rock oil; and is popularly classed among mineral oils and hence is legally a mineral; and oil bearing lands are "mineral lands," notwithstanding the vegetable origin of coal and "coal oil."

John Wanamaker has been generally considered a man of business acumen, but his testimony before the Commission on Industrial Relations, on Tuesday, shows him to be badly informed and drawing his conclusions from very weak premises. He said that "John D. Rockefeller, Jr., made a great mistake when he put President Wilson in the position of sending troops into Colorado." Mr. Rockefeller did no such thing,

and Mr. Wanamaker displays an ignorance which is criminal, in making such statements. He also said that he believed in government ownership of railways because "it would prevent conditions that have existed in the New Haven road and in the Rock Island system" and would bring one cent postage. Hogwash!

In view of the failure of H. B. Claflin & Co., with liabilities of \$35,000,000, it is pertinent to inquire whether Mr. Wanamaker considers this an argument for government ownership of the dry goods and department store business. Claflin & Co. were controlled by another concern, which in turn was controlled by still another—a situation very similar to that of the Rock Island System.

Track Work in Season.

For a long time it has been the habit of roadmasters, section foremen and others connected with the track department to classify the bulk of the maintenance work according to the seasons. Thus, it is common experience to hear one speak of the spring track work, summer work or fall work, as applying to track maintenance. The character of certain kinds of track work is such that it can most advantageously be performed in the spring, owing to the desirability of giving the roadbed time to consolidate itself and enable smooth surface to be maintained before the ground freezes up the following winter. Thus, in renewing ties, the ballast or roadbed is necessarily dug up to some extent, and the longer the time that can be given the ballast or roadbed to be subjected to load, with resurfacing, wherever necessary, before the winter starts in, the better will be the result, so far as track surface is concerned.

The same rule applies also to reballasting of track, and to a considerable extent also to renewing or relaying rail; for it is quite common practice to respace the joint ties when rails are renewed, and with certain types of joint splices the respacing of the ties which support them is an actual necessity. Notwithstanding the seasonableness of these and other kinds of work, the plans of the track department are frequently set aside for reasons of accounting, and the supply of ties for renewals, new ballast or rails for relaying is not forthcoming until after the end of the fiscal year; and frequently several weeks or months thereafter, so that this important work of the track department is delayed until well along in the summer season or early fall, and sometimes even until late in the fall.

The disadvantages of such delayed operations have been frequently set forth in reports and discussions of the Roadmasters' Association, all, perhaps, with but little, if any, effect on the financial control of the railroads; and yet the facts and principles involved in the question should not be lost sight of by railroad managements. In a recent meeting of the roadmasters of the Chicago, Milwaukee & St. Paul

Ry. this question was quite ably discussed, and while the points brought out are not new, yet, when presented together, they constitute a good line of argument. The physical effect on the track of performing stated kinds of work during the most favorable season has been commented upon above and will not be repeated here, for an attempt to rush matters by renewing ties and picking up rough spots in a "hop, skip and jump" manner in the fall can not make what the roadmasters call "lasting" track. It is also shown that by doing such kinds of work in season the section crews can be increased in the spring, the time of the year when a better quality of labor can be obtained than is possible later on, when able-bodied and enterprising men will forsake public works for the harvest fields. The farm labor that is available for two months or longer in the spring is considered the most efficient class of labor that can be obtained for track work.

The postponement of the work considered until the heat of summer has well set in, also works depreciatingly on the general result achieved, no matter what class of labor is obtained. It is also found that after the farmers and contractors have covered the employment field, for their needs, it is difficult to obtain any kind of labor for the track and frequently the track suffers from neglect, for sheer lack of laborers of any description.

Some Important Principles Settled.

The decision of the intermountain rates case fixes another milestone in national regulation of railways. Its chief importance is in this, that it establishes the constitutional right of Congress to delegate its regulatory powers to the Interstate Commerce Commission, and that in so delegating them it includes the means for making regulations effective. The Commission is not confined to the narrow proposition that it can pass only on one individual rate at a time. It may and must take a broad view of things and lay down general principles. The purpose of the law is to facilitate regulation, not to hamper and nullify it by limitations which would make it unworkable. The method, therefore, of approving or refusing a horizontal or general increase for decrease in a given territory, is legal; and it does not involve similar action in other territory, except by similar process. Technicalities have their place and their importance; but they cannot be allowed to defeat the real purpose of the law making power.

It is interesting to note that the decision holds that in the enactment of the original long and short haul clause, Congress delegated power to the railways. They were permitted to decide what were the differing conditions which made it proper to charge more for the short haul than for the long haul in the same direction. Subsequently Congress took away their delegated power from the railways and placed it with

the Commission. The power of Congress may thus be delegated by law practically as it may see fit.

Another interesting point is that in approving the action of the Commission in establishing zones of competitive influence, the action of the railways heretofore in giving consideration to "these competitive influences" is approved. The court says that the Commission followed the action of the railways in principle, "though somewhat modified." What becomes of distance theories of rates, and cost of service as basis for rate making, under this decision of Commission and Court? In regulating things the government is forced time and time again to acknowledge that the rate structure which the railways have established is a fair and proper development and wonderfully close to what it ought to be.

The "cost of service" is not the controlling influence on rates and never has been, and never can be. Under this decision freight must be hauled from zones hundreds of miles wide on the same percentage rate. This is approved as legal regulation and similar rate making practices have been approved by Commission and Court, time and again. Blanket rates have been approved and ordered. Now the U. S. Supreme Court approves of the basis of the influence of competition in establishing rate zones and basing points.

What becomes of "railway valuation as a basis of rate making," of which we are having much just now? Valuation has and can have no controlling influence on rates. We have always maintained this and now, as it seems to us, the highest legal authority agrees with this position by inference at least. The theory that valuation is or can be a basis of rate making, reduces itself to an absurdity as far as railways are concerned; or any public utility which is competitive. The very action of the Government in the matter of long and short haul rates establishes this. Cost of service is influenced by distance; distance coincides with values of the property—and neither distance or cost can govern absolutely the rates to be charged. In other words there are certain laws of trade and commerce, not made by any human law-making body which are immutable and controlling. They can no more be beaten than the law of gravitation. It is interesting to note that the highest authority recognizes this fact and settles the futile contentions of amateur agitators who would run the universe by their own little tape lines.

The effect of this decision upon the revenues of the carriers, cannot be predicted with certainty. Large claims for reparation have already been filed and will have to be adjudicated by the Commission, which may allow reparation or refuse it. Adjustments made in rates since this suit was entered have modified the results. Increased traffic resulting from lower rates and the development of the country will doubtless offset some of the loss. The railways have the option of increasing rates to coast points, ignoring water competition. They may decide to do this and rely upon such through business as they can get at higher

rates than those charged by the water lines. The water lines are not to have the advantage of exemption from Panama Canal tolls, which the law had provided for them. Most rail rates to the coast cities are unreasonably low, considered independently of water competition. As they directly control the rates to and from the intermountain points, it is for the railways to decide whether it is not better to sacrifice some business to the water lines than to compete in rates at such loss.

Decision in the Pipe Line Case.

The case which the United States Supreme court decided, on Monday of this week, by holding that oil pipe lines are common carriers, was one of that interesting series of cases measuring the power of congress to regulate commerce between the states. The decision has the appearance of being influenced by the aspect of the case in relation to the fact that the pipe lines were the principal instrumentality by which the Standard Oil Co. maintained its monopoly in certain fields. Indeed Justice Holmes, who read the opinion from the bench, admitted that the pipe line amendment to the interstate commerce act undoubtedly was passed to meet a situation created by the Standard Oil Co.'s monopolization of pipe line facilities. Yet there is, if one reviews the briefs filed in the case, perfectly good logic in the proposition that pipe lines are common carriers. Justice Holmes declared that congress has the power to "require those who are common carriers in substance to become so in form." He said: "Those lines are common carriers now in everything but form. They carry everybody's oil to a market, although they compel outsiders to sell it before taking it into their pipes." The circumstances and practices fit in

exactly with the broad principles upon which corporations of certain other classes are held to be public utilities and answerable to public regulation. A pipe line connecting a given field with the refineries necessarily partakes of monopoly. Its facilities can not well be duplicated, nor would it be to anybody's advantage to have them duplicated. As with the grain elevator in the small town, the producer must sell to this one interest if he sells at all; and for reasons as logical in one case as in the other, it is reasonable to subject them to some regulation.

The contention of the pipe line owners was that they were being deprived of their property without due process of law. With this view Justice McKenna agreed, in a dissenting opinion. In this he said: "They have never held themselves out as common carriers. The conception of property is exclusiveness—the rights of exclusive possession, enjoyment and disposition. Take away these rights and you take away all there is of property." Justice McKenna suggested that under such a decision as this a Washington business man who had provided exceptional facilities for the conduct of his business might be compelled to share them with a competitor. He took a fling at socialistic theories, saying: "There is quite a body of opinion which considers the individual ownership of property economically and politically wrong and insists upon a common ownership of all that is profit-bearing. This opinion of the socialists has its cause among other causes in the power, may I say, the duress, of wealth. If it accumulates 51 per cent of power, may it put its convictions into law and justify the law by the advancement of the public welfare, by destroying the monopoly and mastery of separate rate ownership?"

United States Supreme Court Sustains Intermountain Rate Order of Interstate Commerce Commission

The U. S. Supreme Court handed down its decision of the important intermountain rate case. It reversed the decree of the Commerce Court which held that the Commission had exceeded its power in ordering a zone system of rates and that Congress could not delegate such powers to the Commission. The justice of the zone percentages was not attacked, and the question at issue was one of power.

Rates from the east to Pacific Coast cities had for years been fixed by water competition. Rates to intermountain or interior Pacific slope points were made by adding to the through coast rates, the return rates to the interior points. That is the rates from the east were blanket rates, being the same from all eastern points; and were on the theory of competing with water and rail rates from the east. Spokane for instance paid the water rate from the Atlantic seaboard to, say, Seattle, and the rail rate from Seattle to Spokane. The railways under the long and short haul clause of the laws were permitted to allow the coast cities the competitive value of their location, and still protect their revenue from the east to points between the Rocky and the Sierra mountains. The act of June 18th, 1910, gave

power to regulate long and short haul rates as affected by water competition, into the hands of the Commission. The railways had held that they could make competitive rates to the coast points, and that their rates to the interior intermediate points could only be attacked as to their reasonableness, independent of what the through rate might be.

The Commission after long investigation with a view to equalizing conditions between manufacturers in the east and making lower rates for the intermountain cities, made an order establishing a zone system of percentages. From points west of the meridian of St. Paul, intermountain rates could not exceed coast rates; between the meridian of St. Paul and that of Chicago, intermountain rates could be seven per cent greater than coast rates; between Chicago and Pittsburg, 15 per cent, and east of Pittsburgh 25 per cent. This order amounted to a considerable reduction from the revenue from existing rates, and the railways applied to the Commerce Court which sustained their contention as above. The Supreme Court upholds the power of the Commission as delegated to it by Congress; and incidentally not only establishes its power to establish zone

systems but to act on rates en bloc in a given territory, as it is asked to do in granting a five per cent increase in the official classification territory. The contention of lawyers opposing that increase that rates could only be passed upon individually, one at a time, and after thorough investigation of each case (an impossibility) is thus finally disposed of. Chief Justice White delivered the opinion of the court.

"The provisions of section 4 of the act to regulate commerce, dealing with what is known as the long and short haul clause, the power of carriers because of dissimilarity of circumstances and conditions to deviate from the exactions of such clause and the authority of the Interstate Commerce Commission in relation to such subjects were materially amended by the act of June 18, 1910. Following the form prescribed by the commission after the amendment in question, the seventeen carriers who are appellees on this record made the Interstate Commerce Commission their application for relief from provisions of fourth section of amended commerce act in connection with the following tariffs.

"The tariffs annexed to the applications covered the whole territory from the Atlantic seaboard to the Pacific coast and the Gulf of Mexico, including all interior points, and embracing practically the entire country, and the petition asked the Interstate Commerce Commission for authority to continue all rates shown on the tariffs from the Atlantic seaboard to the Pacific coast, and from the Pacific coast to the Atlantic seaboard, and to and from interior points, lower than rates concurrently in effect, from and to intermediate points.

"It was stated in the petition: This application is based upon the desire of the interested carriers to continue the present method of making rates lower at the more distant points than at intermediate points; such lower rates being necessary by reason of competition of various water carriers and of carriers partly of water and partly by rail operating from Pacific coast ports to Atlantic seaboard ports; competition of various water carriers operating to foreign countries from Pacific coast ports and competition of the products of foreign countries with the products of the Pacific coast; competition of the products of Pacific coast territory with the products of other sections of the country; competition of Canadian rail carriers not subject to the Interstate Commerce Act; competition of the products of Canada moving by Canadian carriers with the products of the United States; rates established via the shorter or more direct routes, but applied also via the longer or more circuitous routes.

"After full hearing the commission refused to grant unqualifiedly the prayer of the petition, but entered an order permitting in some respects a charge of a lower rate for the longer haul to the Pacific coast than was asked for intermediate points, provided a proportionate relation was maintained between the lower rate for the longer haul to the Pacific coast, and the higher rate to the intermediate points, the proportion to be upon the basis of percentages which were fixed.

"For the purposes of the order in question, the commission in substance adopted a division of the entire territory into separate zones, which division had been resorted to be the carriers for the purpose of the establishment of the rates in relation to which the petition was filed. Refusing to comply with this order, the carriers commenced proceedings in the Commerce Court, praying a decree enjoining the enforcement of the fourth section as amended, on the ground of its repugnancy to the constitution of the United States, and of the order as being in any event violative of the amended section as properly construed. An interlocutory injunction was ordered.

"The defendants moved to dismiss, and on the overruling of the motions appealed from the interlocutory order, the case being No. 136. Subsequently upon the election of the defendants to plead no further, a final decree was entered and appealed from. It suffices at this moment to say that all the contentions which the assignments of error involve, and every argument advanced to refute such contentions, including every argument urged to uphold on the one hand or to overthrow on the other

the action of the commission, as well as every reason relied upon to challenge the action of the court, or to sustain its judgment, are all reducible to the following propositions:

"(a) The absolute want of power of the court below to deal with the subject involved in the complaint because controversies concerning the fourth section of the act to regulate commerce of the nature here presented were by an express statutory provision excluded from the cognizance of the court below. (b) That even if this be not the case the action of the commission which was complained of was purely negative and therefore not within the cognizance of the court because not inherently justifiable. (c) That, correctly interpreting the fourth section, the order made by the commission was absolutely void because wholly beyond the scope of any power conferred by the fourth section as amended. (d) That even if in some respects the order of the commission was within the reach of its statutory power there was intermingled in the order such an exertion of authority not delegated as to cause the whole order to be void. (e) That the order of the commission was void even if the fourth section be interpreted as conferring the authority which the commission exerted, since under that assumption the fourth section as amended was repugnant to the constitution.

"All the propositions, even including the jurisdictional ones, are concerned with and depend upon the construction of the fourth section as amended, and we proceed to consider and pass upon that subject and every other question in the case under four separate headings: 1. The meaning of the statute. 2. Its constitutionality. 3. The jurisdiction of the court. 4. The validity of the order in the light of the statute as interpreted.

"1. The meaning of the statute:

"We reproduce the section as originally adopted and as amended, printing in parenthesis the words omitted by the amendment and printing in italics those which were added by the amendment, thus at a glance enabling the section to be read as it was before and as it now stands after amendment:

"Sec. 4. That it shall be unlawful for any common carrier subject to the provisions of this act to charge or receive any greater compensation in the aggregate for the transportation of passengers, or of like kind of property, under substantially similar circumstances and conditions, for a shorter than for a longer distance over the same line *or route* in the same direction, the shorter being included within the longer distance, *or to charge any greater compensation as a through route than the aggregate of the intermediate rates subject to the provisions of this act:* but this shall not be construed as authorizing any common carrier within the terms of this act to charge (and) to receive as great compensation for a shorter as for a longer distance; provided, however, that upon application to the *Interstate Commerce Commission* (appointed under the provisions of this act) such common carrier may in special cases, after investigation (by the Commission), be authorized by the *Commission* to charge less for longer than for shorter distances for the transportation of passengers or property; and the Commission may from time to time prescribe the extent to which such designated common carriers may be relieved from the operation of this section (of this act):

"*Provided further that no rates or charges lawfully existing at the time of the passage of this amendatory act shall be required to be changed by reason of the provisions of this section prior to the expiration of six months after the passage of this act, nor in any case where application shall have been filed before the Commission, in accordance with the provisions of this section, until a determination of such application by the Commission.*

"*Whenever a carrier by railroad shall in competition with a water route or routes reduce the rates on the carriage of any species of freight to or from competitive points, it shall not be permitted to increase such rates unless after hearing by the Interstate Commerce Commission it shall be found that such*

proposed increase rests upon changed conditions other than the elimination of water competition.'

"Almost immediately after the adoption of the act to regulate commerce in 1887, the Interstate Commerce Commission in considering the meaning of the law and the scope of the duties imposed on the Commission in enforcing it, reached the conclusion that the words 'under substantially similar circumstances and conditions' of the fourth section dominated the long and short haul clause and empowered carriers to primarily determine the existence of the required dissimilarity of circumstances and conditions and consequently to exact in the event of such difference a lesser charge for the longer than was exacted for the shorter haul and that competition which materially affected the rate of carriage to a particular point was a similar circumstance and condition within the meaning of the act. We say primarily because, of course, it was further recognized that the authority existing in carriers to the end just stated was subject to the supervision and control of the Interstate Commerce Commission in the exertion of the power conferred upon it by the statute and especially in view of the authority stated in the fourth section.

"In considering the act comprehensively it was pointed out that the generic provisions against preference and discrimination expressed in the second and third sections of the act were all-embracing, and were therefore operative upon the fourth as well as upon all other provisions of the act. But it was pointed out that where within the purview of the fourth section it had lawfully resulted that the lesser rate was charged for a longer than was exacted for a shorter haul, such exaction being authorized could not be a preference or discrimination, and therefore illegal. In *re Louisville & Nashville R. R. Co. v. I. C. C.* re 631. These comprehensive views announced at the inception as a matter of administrative construction were subsequently sustained by many decisions of this court. We observe, moreover, that in addition, it came to be settled that where competitive conditions authorized carriers to lower their rates to a particular place, the right to meet the competition by lowering rates to such place was not confined to shipments made from the point of origin of the competition, but empowered all carriers in the interest of freedom of commerce and to afford enlarged opportunity to shippers to accept, if they chose to do so, shipments to such competitive points at lower rates than their general tariff rates; a right which came aptly to be described as 'market competition,' because the practice served to enlarge markets and develop the freedom of traffic and intercourse. It is to be observed, however, that the right thus conceded was not absolute, because its exercise was only permitted provided the rates were not so lowered as to be non-remunerative, and thereby cast an unnecessary burden upon other shippers.

"As the statute as thus construed imposed no obligation to carry to the competitive point at a rate which was less than a reasonable one, it is obvious that the statute regarded the rights of private ownership and sought to impose no duty conflicting therewith. It is, also, equally clear that in permitting the carrier to judge primarily of the competitive conditions and to meet them at election, the statute lodged in the carrier the right to exercise a primary judgment concerning a matter of public concern broader than the mere question of the duty of a carrier to carry for a reasonable rate on the one hand and of the right of the shipper on the other to compel carriage at such rate, since the power of primary judgment which the statute conferred concerned in a broad sense the general public interest with reference to both persons and places, considerations all of which, therefore, in their ultimate aspects came within the competency of the legislative regulation.

"It was apparent the power thus conferred was primary, not absolute, since its exertion by the carrier was made by the statute the subject both as administrative control and ultimate judicial review. And the establishment of such control in and of itself serves to make manifest the public nature of the at-

tribute conferred upon the carrier by the original fourth section. Indeed, that insofar as the statute empowered the carrier to judge as to the dissimilarity of circumstances and conditions for the purpose of relief from the long and short haul clause it but gave the carrier the power to exert a judgment as to things public was long since pointed out by this court. *Texas & Pacific Railway vs. Interstate Commerce Commission*, 162 U. S. 197, 218.

"With the light afforded by the statements just made we come to consider the amendment. It is certain that the fundamental charge which it makes is the omission of the substantially similar circumstances and conditions clause, thereby leaving the long and short haul clause in a sense unqualified except in so far as the section gives the right to the carrier to apply to the commission for authority 'to charge less for longer than for shorter distances for the transportation of persons or property,' and gives the commission authority from time to time 'to prescribe the extent to which such designated common carrier may be relieved from the operation of this section.'

"From the failure to insert any word in the amendment tending to exclude the operation of competition as adequate under proper circumstances to justify the awarding of relief from the long and short haul clause and there being nothing which minimizes or changes the application of the preference and discrimination clauses of the second and third sections, it follows that in substance the amendment intrinsically states no new rule or principle, but simply shifts the powers conferred by the section as it originally stood; that is, it takes from the carriers the deposit of public power previously lodged in them and vests it in the commission as a primary instead of a reviewing function.

"In other words, the elements of judgment or so to speak the system of law by which judgment is to be controlled remains unchanged, but a different tribunal is created for the enforcement of the existing law. This being true, as we think it plainly is, the situation under the amendment is this: Power in the carrier primarily to meet competitive conditions in any point of view by charging a lesser rate for a longer than a shorter haul has ceased to exist because to do so in the absence of some authority would not only be inimical to the provision of the fourth section, but would be in conflict with the preference and discrimination clauses of the second and third sections.

"But while the public power, so to speak, previously lodged in the carrier, is thus withdrawn and reposed in the commission, the right of carriers to seek and obtain under authorized circumstances the sanction of the commission to charge a higher rate for a longer than for a shorter haul, because of competition or for other adequate reasons, is expressly preserved, and if not, is in any event by necessary implication granted. And as a correlative the authority of the commission to grant on request the right sought is made by the statute to depend upon the facts established and the judgment of that body in the exercise of a sound legal discretion as to whether no request should be granted compatibly with a due consideration of the private and public interests concerned, and in view of the preference and discrimination of the act.

"2. The alleged repugnancy of the section as amended to the Constitution. But if the amendment has this meaning it is insisted that it is repugnant to the constitution for various reasons which superficially considered seem to be distinct, but which really are all so interwoven that we consider and dispose of them as one. The argument is that the statute as correctly construed is but a delegation to the commission of legislative power which Congress was incompetent to make. But the contention is without merit. *Field vs. Clark*, 143 U. S., 649; *Butfield vs. Stranahan*, 192 U. S., 470; *Union Bridge Co. vs. United States*, 206 U. S., 364; *United States vs. Heinszen*, 206 U. S., 370; *St. Louis & San Francisco Railway Co. vs. Taylor*, 210 U. S., 281; *Monongahela Bridge Co. vs. United States*, 216 U. S., 177.

"We do not stop to review these cases because the mere statement of the contention in the light of its environment suffices

to destroy it. How can it otherwise be since the argument as applied to the case before us is this: That the authority in question was validly delegated so long as it was lodged in carriers but ceased to be susceptible of delegation the instant it was taken from the carriers for the purpose of being lodged in a public administrative body? Indeed, when it is considered that in last analysis the argument is advanced to sustain the right of carriers to exert the public power which it is insisted is not susceptible of delegation, it is apparent that the contention is self-contradictory since it reduces itself to an effort to sustain the right to delegate a power by contending that the power is not capable of being delegated.

"In addition, however, before passing from the proposition we observe that when rightly appreciated the contention but challenges every decided case since the passage of the act to regulate commerce in 1887, involving the rightfulness of the exertion by a carrier of the power to meet competition as a means of being relieved from the long and short clause of the fourth section before its amendment.

"While what we have already said answers it, because of its importance we notice another contention. As the power of carriers to meet competition and the relation of that right to one-competitive places may concern the fortunes of numberless individuals and the progress and development of many communities, it is said, to permit authority to be exerted concerning the subject without definite rules for its exercise will be to destroy the rights of persons and communities.

"This danger, the argument proceeds, is not obviated by declaring that the provisions of the second and third sections as to undue preference and discrimination apply to the fourth section, since without a definition of what constitutes undue preference and discrimination, no definite rule of law is established, but whim, caprice, or favor will in the nature of things control the power exerted. And it is argued that this view is not here urged as the mere result of conjecture, since in the report of the commission in this case it was declared in unequivocal terms as the basis of the order entered that the statute vested in the commission a wide and undefined discretion by virtue of which it became its duty to see to it that communities and individuals obtained fair opportunities, that discord was allayed, and commercial justice everywhere given full play.

"Let it be conceded that the language relied upon would have the far reaching significance attributed to it if separated from its context, we think when it is read in connection with the report of which it but forms a part, and moreover when it is elucidated by the action taken by the commission, there is no substantial ground for holding that by the language referred to it was entitled to declare that the fourth section as amended conferred the uncontrolled exuberance of vague and destructive powers which it is now insisted was intended to be claimed.

"In any event, however, we must be governed by the statute and its plain meaning. After all has been said the provisions as to undue preference and discrimination, while involving, of course, a certain latitude of judgment and discretion, are no more undefined or uncertain in the section as amended than they have been from the beginning, and therefore the argument comes once more to the complaint that because public powers have been transferred from the carriers to the commission, the wrongs suggested will arise. Accurately test this final result of the argument, and it is clear that it exclusively rests upon convictions concerning the impolicy of having taken from carriers, intimately and practically acquainted as they are with the complex factors entering into rate making, and moreover impelled to equality of treatment as they must be by the law of self-interest, operating upon them as a necessary result of the economic forces to which they are subjected, and having lodged the power in an official administrative body, which in the nature of things must act, however, conscientiously, from conceptions based upon a more theoretical and less practical point of view.

"But this does not involve a grievance based upon the construction or application of the fourth section as amended, but upon the wisdom of the legislative judgment which is brought into play in adopting the amendment, a subject with which we have nothing in the world to do. It is said in the argument on behalf of one of the carriers that as in substance and effect the duty is imposed upon the commission in a proper case to refuse an application, therefore, the law is void, because in such a contingency the statute would amount to an imperative enforcement of the long and short haul clause, and would be repugnant to the Constitution.

"It is conceded in the argument that it has been directly decided by this court that a general enforcement of the long and short haul clause would not be repugnant to the constitution (*Louisville & N. R. Co. vs. Kentucky*, 183 U. S. 503), but we are asked to reconsider and overrule the case and thus correct the error which was manifested in deciding it. But we are not in the remotest degree inclined to enter into this inquiry not only because of the reasons which were stated in the case itself, but also because of those already expounded in this opinion and for an additional reason which is that the contention by necessary implication assails the numerous cases which from the enactment of the act to regulate commerce down to the present time have involved the adequacy of the conditions advanced by carriers for justifying their departure from the long and short haul clause.

"We say this because the controversies which the many cases referred to, considered and decided by a necessary postulate involved an assertion of the validity of the legislative power to apply and enforce the long and short haul clause. How can it be otherwise since if this were not the case all the issues presented in the numerous cases would have been merely but moot, affording, therefore, no basis for judicial action since they would have had back of them no sanction of lawful power whatever.

"3. The jurisdiction of the court.

"The argument on this subject is twofold: (a) That as by the act creating the commerce court, that court was endowed only with the jurisdiction now possessed by the circuit courts of the United States and the judges thereof and provided that nothing contained in this chapter shall be construed as enlarging the jurisdiction now possessed by the circuit courts of the United States or the judges thereof, that is hereby transferred to and vested in the commerce court, and as new powers were created by the subsequent amendment of the fourth section therefore the commerce court had no jurisdiction.

"But we pass any extended discussion of the proposition because it is completely disposed of by the construction which we have given to the amended section since that construction makes it clear that the effect of the amended fourth section was not to create new powers theretofore non-existing, but simply to re-distribute the powers already existing, and which were then subject to review. The argument affords another manifestation of the tendency to which we have already directed attention in this case to seek to maintain and aggrandize a power by insisting upon propositions which, if they were accepted, would raise the gravest question as to the constitutional validity of the asserted power, a question which we need not at all consider in view of the want of foundation for the exercise of the power claimed in the light of the plain meaning of the act to the contrary which we have already pointed out.

"(B) The second contention as to jurisdiction yet further affords an illustration of the same mental attitude, since it rests upon the assumption that the order of the commission refusing to grant the request of the carrier made under the fourth section was purely negative, and hence was not subject to judicial inquiry. The contention, therefore, presupposes that the power which from the beginning has been the subject of judicial review by the mere fact of its transfer to the commission was made arbitrary. Besides, the proposition disregards

the fact that the right to petition the commission conferred by the statute is positive, and while the refusal to grant it may be in one sense negative, in another and broader view it is affirmative since it refuses that which the statute in affirmative terms declares shall be granted if only the conditions which the statute provides are found to exist.

"It is, of course, true as pointed out in *Interstate Commerce Commission vs. Illinois Central Railroad*, 215 U. S., 452, 470, and since repeatedly applied that findings of fact made by the commission within the scope of its administrative duties must be accepted in case of judicial review, but that doctrine, as was also pointed out, does not relieve the courts in a proper case from determining whether the constitution has been violated or whether statutory powers conferred have been transcended or have been exercised in such an arbitrary way as to amount to the exertion of authority not given, doctrines which but express the elementary principle that an investiture of a public body with discretion does not imply the right to abuse, but on the contrary, carries with it as a necessary incident the command that the limits of a sound discretion be not transcended, which by necessary implication carries with it the existence of judicial power to correct wrongs done by such excess.

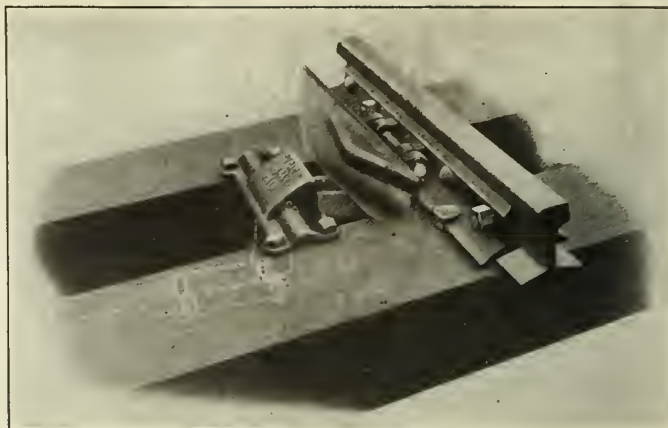
"And without pausing to particularly notice it we observe, in passing, that what has just been said is adequate to meet the contention that as violations of the fourth section were made criminal, no power existed to enjoin an order of the commission made under that section because the consequence would be to enjoin criminal prosecution. The right which, as we have seen, the act gives to test the validity of orders rendered under the fourth section is not to be destroyed by a reference to a provision of that section. The two must be harmoniously enforced.

"4. The validity of the order in the light of the statute as interpreted.

"The main insistence is that there was no power after recognizing the existence of competition and the right to charge a lesser rate to the competitive point than to intermediate points, to do more than fix a reasonable rate to the intermediate points, that is to say, that under the power transferred to it by the section as amended the Commission was limited to ascertaining the existence of competition and to authorizing the carrier to meet it without any authority to do more than exercise its general powers concerning the reasonableness of rates at all points. But this proposition is directly in conflict with the statute as we have construed it, and with the plain purpose and intent manifested by its enactment. To uphold the proposition it would be necessary to say that the powers which were essential to the vivification and beneficial realization of the authority transferred had evaporated in the process of transfer, and hence that the power perished as a result of the act by which it was conferred.

"As the prime object of the transfer was to vest the commission within the scope of the discretion imposed and subject in the nature of things to the limitations arising from the character of the duty enacted and flowing from the other provisions of the act with authority to consider competitive conditions and their relation to persons and places, necessarily there went with the power the right to do that by which alone it could be exerted, and therefore a consideration of the one and the other, and the establishment of the basis by percentages was within the power granted.

"As will be seen by the order, and as we have already said for the purpose of the percentages, established zones of influence were adopted and the percentages fixed as to such zones varied or fluctuated upon the basis of the influence of the competition in the designated areas. As we have pointed out, though somewhat modified, the zones as thus selected by the commission, were in substance the same as those previously fixed by the carriers as the basis of the rate making which was included in the tariffs which were under investigation, and therefore we may put that subject out of view.



The Q. & C. \$5.00 Derail, Fig. 1.—Rail Clear.

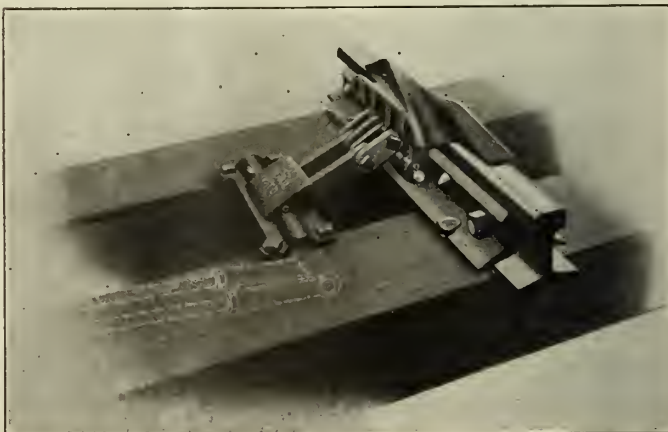
"Indeed, except as to questions of power, there is no contention in the argument as to the inequality of the zones or percentages or as to any undue preference or discrimination resulting from the action taken. But be this as it may, in view of the findings of the commission as to the system of rates prevailing in the tariffs which were before it, of the inequalities and burdens engendered by such system, of the possible aggrandizement, unnaturally beyond the limits produced by competition in favor of the competitive points, and against other points by the tariff in question, facts which we accept and which indeed are unchallenged, we see no ground for saying that the order was not sustained by the facts upon which it was based, or that it exceeded the powers which the statute conferred or transcended the limits of sound legal discretion which it lodged in the commission when acting upon the subject before it.

"It results that the commerce court, in enjoining the order of the commission, was wrong; and its decree to that end must, therefore, be reversed and the case be remanded to the proper district court, with directions to dismiss the bill for want of equity."

The Q. & C. \$5.00 Derail.

A movement that has done a good deal to promote the so-called "safety first" idea is the increased amount of attention that has been given to the placing of derails on side tracks, to prevent cars from running out and fouling the main line. There are a number of devices for this purpose, some of which are worked by hand, others are interlocked with hand thrown switch stands, and still others are connected up with regular interlocking systems.

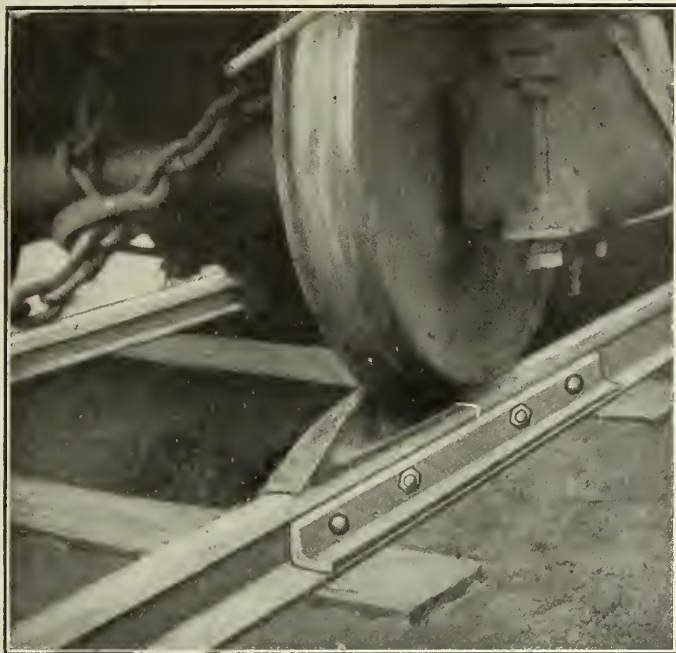
The number of places where such a device is really necessary makes it desirable, for sake of saving in expense, to use a simple appliance in lieu of the ordinary split rail or point



The Q. & C. \$5.00 Derail, Fig. 2—Set for Derailing.

switch. A notable design of derail in this respect, lately placed on the market by the Q & C company, of New York and Chicago, is the so-called "\$5.00" derail, shown in the accompanying illustrations. It may be connected with interlocking, as shown in Figs. 1 and 2, or it may be connected up with wires or pipes, so as to be thrown by the movement of the switch stand; or it may be thrown by hand.

The device itself consists simply of one steel casting and two eye-bolts, the latter being adapted to be used in place of two bolts at a joint splice. The casting can be made to order, to fit the spacing of existing joint bolts. It can be applied, therefore, very easily, and without drilling of the rail, by sub-



The Q. & C. \$5.00 Derail, Fig. 3.—In the Act of Derailing a Wheel.

stituting the two eye-bolts for two track bolts, and without the use of spikes. The height of rail and size and spacing of the joint bolts are all the data required for making the device to order; and it can be made in lefts and rights. It is operative under all weather conditions and lies so low that it does not interfere with snow flangers.

Materials of Engineering Construction at the International Engineering Congress in 1915.

Among the general subjects to be reported upon before the International Engineering Congress, to be held in San Francisco, Sept. 20-25, 1915, is that of materials of engineering construction. The list of topics which will be treated in this section is as follows:

- (1) Timber.
- (2) Preservative Treatment of Timber.
- (3) Substitutes for Timber in Engineering Construction.
- (4) Brick in Engineering Structures.
- (5) Clay Products in Engineering Structures.
- (6) Probable and Presumptive Life of Concrete Structures made from Modern Cements.
- (7) Aggregates for Concrete.
- (8) Slag Cement.
- (9) Waterproof Concrete.
- (10) Cements containing Additions of Finely Ground Foreign Material.
- (11) Economics of the World's Supply of Iron.
- (12) The Life of Iron and Steel Structures.
- (13) The Employment of Special Steel in Engineering Construction.

(14) The Place of Copper in the Present Engineering Field, and the Economics of the World's Supply Thereof.

(15) Alloys and Their Use in Engineering Construction.

(16) Aluminum in Engineering Construction.

(17) The Influence of the Testing of Materials upon Advances in the Designing of Engineering Structures and Machines.

(18) Cement Testing.

(19) Testing of Metals.

(20) Testing Full-Sized Members.

(21) Proof Testing of Structures.

The papers to be presented from the United States have already been arranged for from recognized leading authorities on the various topics. Arrangements for the papers from foreign authors are being made, and the aggregation of papers which will be presented will constitute a broad review of the field. Information concerning the congress, the price of subscription, and the arrangement for purchase of volumes of the proceedings, may be obtained by addressing the International Engineering Congress, Foxcroft Building, San Francisco, Cal.

The Engineering Manual, published by the American Electric Railway Engineering Association is now being distributed. This publication is a compilation of the standards and recommendations adopted by this association and covers practically the entire field of electric railway engineering. The book is in loose leaf form, and consists of 82 sections, fully illustrated with diagrams and working drawings. The loose leaf form of the manual has been adopted in order that the standards and recommendations may keep pace with such additions and alterations as are made at the yearly conventions of the associations. Separate sections may be obtained. The price of the manual to non-members of the association is \$3.00, binders \$1.00 extra. Members of the association receive the Manual (without the binder) free. Association dues are \$5.00, no initiation fee. The secretary is E. B. Burritt, 29 West 39th Street, New York City.

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The Chicago Pneumatic Tool Co., Fisher Building, Chicago, has issued the second edition of its bulletin No. 34 C, on class H-SG and N-SO Chicago Pneumatic gasoline and fuel oil engine driven compressors. A leaflet has also been issued on "Giant" fuel oil and gas engines.

* * *

The Cambria Steel Co., Johnstown, Pa., has issued the 1914 edition of "Cambria Steel," a handbook of information relating to structural steel manufactured by this company, containing useful tables, rules, data and formulae for the use of engineers, architects, builders and mechanics. The book is prepared and compiled by George E. Thackray, C. E., special engineer, Cambria Steel Co. It is the eleventh edition of the work. It contains most of the matter of the previous edition, which, however, has been revised to conform to the present practice, and considerable new matter has been added. The price of the book is \$1.25.

* * *

"The Management of Public Service," is a pamphlet issued by the J. G. White Management Corporation, 43 Exchange Place, New York city. It outlines the service offered by this company, which is associated with J. G. White & Co., Inc., and the J. G. White Engineering Corporation, in the management of public utility properties of various kinds.

Railway Mail Pay.

We gave an account in an editorial in these columns last week, of the manner in which the United States postoffice department and the house committee on postoffices and post roads is urging upon congress the passage of the Moon bill, which takes its name from the chairman of the committee mentioned. This bill allows the railroads a scale of compensation for carrying mail, lower in amount and on a different basis from that recommended by the joint congressional commission headed by ex-Senator Jonathan Bourne, of Oregon, which has just reported after an ex-

haustive investigation of the subject of railway mail pay. The commission's bill was sidetracked in committee in order that the Moon bill might have precedence over it.

Concerning this state of affairs, Mr. Bourne said, in Washington, last Friday: "In its insistent efforts to reduce railway mail pay, the postoffice department has attempted to dictate to congress rates which, if adopted, would be confiscatory. House Bill 17042, introduced by Mr. Moon, chairman of the house committee on postoffice and post roads, was, I am informed, prepared by officials of the postoffice department and introduced by Mr. Moon at the request of the postmaster general. Under that bill, the average revenue to the railroads would be less than 21.8 cents for hauling a 60-foot mail car one mile. I assert that this rate is confiscatory. I realize the responsibility of making such an assertion, but its justification lies in the postoffice department's own figures."

Continuing, Mr. Bourne made the following statement: "The department spent several years in an attempted elaborate investigation of railroad expenses and car space. It propounded over 140 interrogatories to the 796 railroads carrying mail. The railroads spent over \$250,000 in securing the information asked for, and it cost the government \$19,500 to compile, tabulate and present such information in

what is known as house document No. 105, 62d Congress, 1st Session. According to table 7 of that document the operating expenses and taxes alone amounted to 3.08 mills per mail car-foot mile, or 18.48 cents for hauling a 60-foot mail car one mile. This excludes the advertising and other traffic expenses with which the department claimed the mail should not be burdened. The margin between this 18.48 cents and the less than 21.8 cents allowed in the department bill, is so small that is similarly unprofitable rates were made on all railroad traffic, the roads must necessarily go into bankruptcy, because there must be a sufficient allowance for capital charges. According to the statistics of railways in the United States for 1911 published by the Interstate Commerce Commission, operating expenses and taxes were 72.53 per cent of the operating revenues. At the same ratio, 7 cents instead of the 3.32 cents allowed under the department rates, would have to be added to the 18.48 cents to allow for capital charges as the 18.48 cents covers only operating expenses and taxes. In other words, 25.48 cents would have to be paid the railroads for hauling a 60-foot car one mile to yield the railroads from the mail business the average rate of profit now realized on all railroad traffic, both freight and passenger taken together."

Opinion on Railway Subjects

Rate Making, Government Ownership, Capitalization, Valuation, Depressive Regulation, Etc.

While the Interstate Commerce Commission Delays the Railroads and the Country Suffer.

"The Interstate Commerce Commission evidently has no respect for the adage, 'He gives twice who gives quickly.' The railroads have been reduced to a state of semi-starvation by the repressive appeals for a year past from investors and producers, and even from shippers, for fairer treatment of the common carriers. Transportation is a basic industry, and prosperity for the railroads means prosperity for many other interests. If the railroads are underpaid for service and are driven to unnatural retrenchments, everybody who has anything to sell to the railroads or to their employees must also suffer.

"The public has long recognized that the starvation program of the commission is an economic blunder. It favors quick relief. But the commission, influenced by a false pride of opinion, has treated the question of relief as if it were a question of correcting some abstruse calculation in celestial mechanics. The patient is suffering from paucity of nourishment, but the commission treats him as if he were a prosperous offender out on bail enjoying all the comforts of home while waiting for a reversal of sentence.

"The railroads are getting deeper in the hole every day the commission ponders over their case. Their dividends are threatened and their allowances for maintenance and operation have to be cut. It was announced from Cincinnati yesterday that the New York Central lines had arranged to give their employees enforced vacations without pay of four days each month. The Pennsylvania Railroad has been compelled to do the same thing. These two roads have laid off tens of thousands of men since January 1 because they could not afford to employ them on full time on a non-remunerative basis of operation.

"Yet the commission tediously debates whether or not it will give relief to a great industry, put on short rations by governmental regulation, and views with distrust the business community's openly expressed sympathy with the carriers, much as President Wilson views with distrust the

protest which the business world is making against confusing amendments of the Sherman anti-trust law and real or pretended exemptions of labor unions from prosecution for conspiracies in restraint of commerce.

"There is nothing 'psychological' in the hardships which the carriers have endured under the harsh sway of the Interstate Commerce Commission. They have been obliged to improve their equipment, to put in expensive safety devices, pay heavier taxes, state and federal, increase wages as the result of arbitrations, and meet the general increased cost of railroad materials. Yet the regulators in Washington have ignored all these forced additions to expenditure account and vehemently refused to allow one penny to be added through higher freight rates to income account.

"It is time to call a halt on this travesty of fair play. If the commission is going to be just to the railroads it ought to bestir itself. It has already lagged too much in the performance of a plain public duty."—New York Tribune.

Railroading in Texas.

"We have several times expressed the opinion that unless something were done to relieve the railroads of Texas of their embarrassments we should be hearing of railroad receiverships in this state. We get no satisfaction out of such verification as may be given to that prophecy by the fact that the Trinity & Brazos Valley has been forced into receivership. We should much prefer a refutation of the prophecy to the consequences that must come of its verification. It must have an exceedingly bad influence at a moment when neither the country nor the state can well withstand pessimistic portents. It must confirm fears that, more than anything else, are holding the state and the country in check. Men will wonder if there are not other railroads in the state that are on the verge of the misfortune that has overtaken the Trinity & Brazos Valley. Moreover, men at a distance will accept the bankruptcy of the Trinity & Brazos Valley as proof that the railroad commission of Texas is definitely committed to the policy of starving the transportation companies of this state, and the prevalence

of that belief will merely operate as a warning to capital to stay out of Texas.

"At this time little can be known, of course, as to the particular causes which have forced the Trinity & Brazos Valley into bankruptcy. Doubtless it is attributable in some measure to the inadequacy of prevailing freight rates. It is worth remarking that this road was built at a time when our stock and bond law was in full working order, so that its misfortune cannot be attributed to overcapitalization, unless one is ready to charge that the railroad commission permitted it to issue stocks and bonds in excess of its value. That overworked argument which charges all railroad misfortunes to frenzied financing cannot be made in this case without also charging delinquency to the railroad commission. Doubtless the railroad commission will say, if it says anything, that there was no economic need of the Trinity & Brazos Valley; that it was built through territory already sufficiently supplied with transportation facilities. That may be so, and, indeed, that view is not without the support of facts. Nevertheless it is true that if this state had had no railroads until there was a traffic sufficient to support them, then it might still be without railroads."—Galveston News.

Running a Railroad.

"If you own a house you may borrow \$500 to build a porch without asking permission from anybody. If you need new fixtures in your store you may borrow \$1000 and your rival cannot prevent it. But if you as one of 10,000 persons who own a railroad wish to borrow \$1,000,000 to construct a new siding, you will, if congress has its way, have to ask leave of seven men in Washington. A rival railroad owner may, and doubtless will, try to prevent your managaging your own property and put spokes in your own railroad's

wheels by presenting arguments to those seven men. The whole world is clamoring for a vote, and yet at this hour there is afoot in the national capital a plan whereby the votes of seven million Americans owning billions of property can be nullified by officeholders."—Philadelphia Ledger.

Mr. Vanderlip on Psychology.

Frank A. Vanderlip, president of the National City Bank of New York, addressed a gathering of bankers, manufacturers and business men at a banquet given by the New Jersey Chamber of Commerce June 22, on "Constructive Public Opinion." The banquet was held to form a special department "to counter-act present-day forces which have poisoned the minds of many voters, labelled business success a crime and called all combinations of wealth evil." "I firmly believe," said Mr. Vanderlip, "that if this nation is to avoid disaster a general awakening is necessary to the probable effect of present day political tendencies upon business, upon property and upon property rights and upon the course of industrial and commercial development." Great as is the stake of business in such a disastrous tendency, even greater is that of the humblest worker. It will encompass in disaster the whole social body." Mr. Vanderlip believed it only too true that the main reasons for the present business depression are psychological. "I wish," he continued, "there could be a clearer comprehension of what a disheartened business community really means; what it means to the whole people. If the directing forces of business life are to lose heart; if their courage for new enterprise is to ebb; if their willingness to take risks, to test chances of the future, to venture present possession upon prospective development is to fail, then the psychology of the business mind becomes a matter of the greatest import."

The Railway Supply Man's Point of View

The governor of New York is quoted as saying in Chicago, that the business depression is a "mere matter of talk." "Whom the gods would destroy they first make mad." "None so blind as those who won't see." Doubtless the thousands upon thousands of idle cars and locomotives standing in yards and on spurs and side tracks, are there for scenic effect. The smoke of industry has been abolished for esthetic reasons while industry is really humming. The political leeches who live on the production of other people's industry know that everything is all right, because their salaries are safe. The public official who is so blind and deaf as to claim that business conditions are good or even fair, should be relegated to the idiot asylum or to the prison for the criminal insane.

Are the government officials, legislators and commissioners at Washington the bosses or the servants of the people? Doubtless if asked they would say they are servants. Then what reason or propriety is there in their objection to receiving letters from the people? The right of citizens to express their opinion to their public servants is indefeasible. The public servant who whines and complains at the letters addressed to him by business men, has a wrong idea of his position. He ought to be marked for retirement for his egotism; and any class or party which sympathises with his dictatorial policy should be dropped from public favor.

President Wilson said this week that his objection was to form letters and special campaigns intended to influence legislators and other public servants. He is wrong in this. The citizen has the perfect right to sign a petition—or what is the same, use the same form of letter which other citizens

use. When he signs it, he adopts and subscribes to its sentiments. Congressmen and their delegates—commerce commissioners who are passing on matters of fact and opinion—ought to want to learn public sentiment. To resent it is little short of assinine. The worst of it is that these men at Washington who have taken this attitude are playing politics. They are trying to make one section of the public believe that another section is trying to influence them unfairly and unduly. They are establishing a very bad precedent for themselves, which will come home to roost. Whether they are mere pedants, or are so inflated that they believe themselves hedged with the same divinity as royalty, there is no place for them in a republican form of government. Huerta is a liberal, high-minded ruler compared with La Follette and the ilk who gave him his cue.

There is no business depression—that is all talk. But at the same time President Wilson sees an immediate and great "revival" of business impending. The depression is psychological and unreal; but the recovery is to be real and tremendous. "And they lived happily ever afterward," is to be the sequel and result of the bleeding and purging administered by doctors of psychology.

Iron and Steel Industry.

The daily awaited freight rate announcement accounts for a comparatively quiet week in railroad orders. Structural steel for general construction was ordered in greatly increased amount. Comparative quiet prevails in all other directions. Steel car and locomotive orders were light; steel bars more active, iron dull, pig iron inactive, sheets improving, tin plates

temporarily quiet with mills crowded to capacity. Prices all along the line resist all hammering, manufacturers feeling they have more to gain by waiting than by shading.

Supply Trade Notes.

—The Titanium Alloy Manufacturing Co. announces that it has organized a bronze department for the manufacture of titanium-bronze specialties under its various patents, and that Wm. M. Corse, formerly works manager of the Lumen Bearing Co., Buffalo, N. Y., and lately general manager of the Empire Smelting Co., Depew, N. Y., will be associated with the company as manager of this department.

—George C. Isbester, for the past three years attached to the New York office of the Rail Joint Co., has been given charge of their Chicago office, 215 Railway Exchange.

—Earnings of the American Car & Foundry Co. for the year ended April 30, 1914, were \$5,810,889, an increase of \$271,061 over those of the previous year. The balance for dividends, after liberal maintenance charges, was \$3,057,971, a decrease of \$20,621. Regular disbursements on the preferred stock left a balance equal to 5.52 per cent on \$30,000,000 common stock outstanding, comparing with 4.09 per cent on a similar amount of stock in the year preceding. The income account for the year, compared with that of the previous year, follows:

	1914.	Increase.
Gross	\$ 5,810,889	\$271,061
Rentals	2,052,918	*158,318
Net	3,757,957	429,379
Maintenance, etc.	700,000	450,000
Balance	3,057,971	*20,621
Preferred dividends	2,100,000	.....
Balance	957,971	*20,621
Common dividends	600,000	.....
Surplus	357,971	*20,621
Previous surplus	25,255,168	378,592
Total surplus	25,613,139	357,971

*Decrease.

RAILWAY NEWS.

Alabama Great Southern.—The Alabama Great Southern R. R., it is said, will award contracts within a month for second track from Birmingham to Mobile Junction, Ala., 14 miles; also from York, Ala., to Meridian, Miss., 28 miles.

Beaumont & Great Northern.—The charter of the Beaumont & Great Northern R. R. has been amended and Trinity, Tex., will be headquarters hereafter instead of Onalaska. A press report says that the road likely will begin the extension west from Weldon about July 1. Surveys are now being made.

Canadian Northern.—Construction work proposed by the Canadian Northern Ry. for this year includes the grading for the Hanna and Medicine Hat line in Alberta. This line will cross the Bassano-Empress-Swift Current new main line at Jenner. Another new line from Alsask through Empress southwest to a point about 40 miles north of Medicine Hat, where this line will join the new Hanna-Medicine Hat line, is under consideration.

Chicago, Rock Island & Pacific.—A plan for reorganizing the Rock Island railroad properties without a receivership has been announced. The plan provides in brief: (1.) For the immediate elimination of two of the three existing corporations, both holding companies, leaving only the original Chicago, Rock Island & Pacific Ry. (2.) The extinguishment of \$357,000,000 of capital obligations of the two holding companies. (3.) The creation of a new issue of \$75,000,000 of 7 per cent preferred stock, only \$30,000,000 of which is to be issued at this time, and that in exchange for \$30,000,000 of cash to provide for rehabilitation needs. (4.) An assessment of 15 per cent of the par value upon the holders of Rock Island company preferred and common stock and on the Chicago, Rock Island & Pacific R. R. collateral trust bonds.

Great Northern.—The Great Northern Ry. has awarded a contract to the Guthrie-McDougall Co., Spokane, Wash., for the construction of its proposed double-track tunnel near Paolo, Mont. Estimated cost, \$500,000.

The Great Northern Equipment Co. has been organized by officials of the Great Northern Ry., with capital stock of \$5,000,000, to supply the railroad with rolling stock.

Illinois Central.—The Illinois Central R. R. recently awarded contracts for grade reduction work between Princeton and Paducah, Ky., at an estimated cost of \$700,000.

Laramie, Hahn's Peak & Pacific.—See New Roads and Projects under Colorado.

Las Vegas & Tonopah.—Press reports state that the Las Vegas & Tonopah R. R. and the Tonopah & Tidewater R. R. are to be consolidated and a considerable amount of trackage abandoned.

Minneapolis, St. Paul & Sault Ste. Marie.—At the annual meeting of the stockholders of the Minneapolis, St. Paul & Sault Ste. Marie Ry., September 15, they will be asked to approve an increase in the capital stock from \$42,00,000 to \$63,000,000. The same ratio will prevail between the new preferred and common shares as now exists between the outstanding amounts of these two issues. Of the proposed \$21,000,000 new stock \$7,000,000 will be preferred and \$14,000,000 common.

Missouri Pacific.—The Missouri Pacific Ry. will completely rebuild its low line between Omaha, Neb., and Nebraska City Junction this year. The line passes through Springfield, Louisville and Weeping Water and is used as a second track by the Missouri Pacific, whose main line parallels the Missouri river between Omaha and Kansas City. New and heavier rails will be laid, ties replaced and ballasting done.

New York, Ontario & Western.—The directors of the New York, Ontario & Western Ry. have decided not to declare a dividend at this time.

Norfolk & Western.—The Norfolk & Western Ry. is preparing to spend about \$51,000 in extending its passing tracks at various points in Virginia.

Oklahoma Central.—The Oklahoma Central Ry. will be sold at auction at Purcell, Okla., July 31, according to an order issued in the United States court at McAlester, Okla., by Judge Ralph E. Campbell. See Railway Review of June 13.

Pennsylvania Railroad.—The public service commission of Pennsylvania has approved the proposed lease of the railroad and other property and franchises of the Northern Central Railway company to the Pennsylvania Railroad, and also approved the petition for a certificate of valuation authorizing an increase in the capital stock of the Northern Central from \$9,342,550 to \$27,079,600.

Pittsburgh, Cincinnati, Chicago & St. Louis.—The directors of the Pittsburgh, Cincinnati, Chicago & St. Louis Ry. have passed the dividend on the common stock and reduced the dividend on the preferred stock to one-half of 1 per cent for the quarter. Three months ago the dividend rate was reduced from 5 to 4 per cent and on the common stock from 5 to 3 per cent per annum in the quarterly distributions then made.

St. Louis & San Francisco.—The court has refused an application to issue receiver's certificates to pay the interest due July 1 on the 4 per cent refunding bonds of the St. Louis & San Francisco R. R., and the bondholders' committee has issued a call for the immediate deposit of the bonds.

The receivers of the St. Louis & San Francisco R. R. plan to contest the liability of the railroad for bonds of \$26,000,000 issued by the New Orleans, Texas & Mexico. When the 'Frisco bought the St. Louis, Brownsville & Mexico Ry. the purchase price was included in the New Orleans, Texas & Mexico bond issue, payment of which was guaranteed by the 'Frisco. The attorneys for the receivers believe that the purchase was illegal, because the New Orleans line has no direct connection with the 'Frisco. Such a connection, it is held, is necessary, under the laws of Missouri, to make legal the purchase of one railroad by another. The St. Louis & San Francisco is governed by Missouri laws. As the purchase was illegal, it will be contended, the bond issue that made possible the purchase also is illegal.

Sligo & Eastern.—The Sligo & Eastern R. R., 12½ miles long from Sligo to Dillard, Mo., with several extensions, making 31 miles altogether, is hereafter to be a common carrier, according to a decision of the Missouri public service commission. The line was built and has been operated by the Sligo Furnace Co. to transport coal and iron ore from its mines to its furnace.

Tonopah & Tidewater.—See Railway News under Las Vegas & Tonopah R. R.

PERSONALS.

A. A. Brown has been elected president of the Rio Grande Ry.; **D. A. O'Brien**, vice-president and general manager, and **H. Vance**, secretary and auditor. The headquarters of the company are at Brownsville, Tex.

J. E. Roberts has been appointed superintendent of car service of the Delaware & Hudson Co., with office at Albany, N. Y. **F. W. Bradt** has been appointed assistant trainmaster of the Susquehanna division of the Delaware & Hudson at Oneonta, N. Y., succeeding **M. W. Sullivan**, promoted.

Ernest Baxter has been appointed purchasing agent of the St. Louis Southwestern Ry., with headquarters at St. Louis, Mo., effective June 22, to succeed **J. E. Sargeant**.

W. V. S. Thorne has resigned as vice-president in charge of purchases of the Union Pacific R. R., effective July 1, and **William Averill Harriman**, elder son of the late **E. H. Harriman**, has been elected to succeed him.

James E. Kelby has been appointed general attorney of the San Pedro, Los Angeles & Salt Lake R. R., with office at Los Angeles, Cal., succeeding **Pennel Cherrington**, deceased.

O. H. Wadleigh has been appointed trainmaster of the Nevada-California-Oregon Ry. at Reno, Nev.

F. L. Richards has been appointed trainmaster of the Chicago, Milwaukee & St. Paul Ry., at Savanna, Ill., in place of **W. P. Moran**, resigned. **F. D. Campbell** has been appointed trainmaster at Mobridge, S. D., to succeed **W. C. Ennis**, transferred.

J. D. Stack, former superintendent of the Ohio division of the Baltimore & Ohio Southwestern R. R., has been appointed general superintendent of the Norfolk Southern R. R., in charge of the departments of transportation and equipment, with headquarters at Norfolk, Va., succeeding **W. A. Witt**, granted a leave of absence.

J. W. Everman, general superintendent of the Texas & Pacific Ry., Dallas, Tex., will take service with the St. Louis Southwestern Ry. July 1 as first vice-president and general manager of the St. Louis Southwestern Ry. of Texas and general manager of the system, with headquarters at Tyler, Tex.

TRAFFIC.

H. L. Willard has been appointed commercial agent of the New York, New Haven & Hartford R. R. at Brooklyn, N. Y.

C. L. Hilleary, general agent of the New York Central Lines at St. Louis, Mo., effective July 1, will become traffic manager for the F. W. Woolworth company, with headquarters in New York. The position of general agent in St. Louis has been abolished.

Rufus M. Pile, assistant general passenger agent of the Pennsylvania Railroad, having reached the age of seventy years, will retire from active service on July 1, under the pension rules of the company. He has served the Pennsylvania Railroad system more than 44 years.

H. H. Hamill has been appointed commercial agent of the Grand Trunk Ry. at Detroit, Mich., succeeding **James McPeak**, granted temporary leave of absence.

H. L. Hudson has been appointed district freight and passenger agent at the Oregon-Washington Railroad & Navigation Co., at Lewiston, Idaho, succeeding **A. MacCorquodale**, resigned.

J. O. Jones has been appointed traveling passenger agent of the Southern Railway at Charlotte, N. C. and **O. F. York**, traveling passenger agent at Raleigh, N. C.

George E. Bates, division freight and passenger agent of the Delaware & Hudson Co. at Scranton, Pa., has been appointed industrial agent, with office at Albany, N. Y. **John J. Coyle**, general eastern freight agent, succeeds **Mr. Bates** at Scranton and **C. E. Rolfe**, general freight agent has been made general eastern freight agent.

S. G. Langston, general immigration agent of the Missouri, Kansas & Texas Ry., has been appointed division passenger agent, with headquarters in St. Louis, Mo. Effective July 1, the office of general immigration agent will be abolished and the work of that department will be supervised by **R. W. Hockaday**, industrial commissioner.

ENGINEERING.

C. G. Washbon, resident engineer of the Canadian Pacific Ry., at Brandon, Man., has been appointed resident engineer

at Souris, Man., and **C. W. Coburn** resident engineer at Souris, has been made resident engineer at Brandon.

K. K. Kuney, formerly assistant engineer of the Great Northern Ry., has been appointed locating engineer on the government railway surveys in Alaska.

S. Hickson has been appointed roadmaster of the second district of the Oregon-Washington Railroad & Navigation Co., with office at Colfax, Wash., succeeding **T. Keaveny**, resigned.

A. F. Dorley, superintendent of water service of the Missouri Pacific Ry., has been appointed principal assistant engineer, with headquarters at St. Louis, Mo., and **J. A. Lahmer** has been appointed assistant engineer at St. Louis. **F. Neher**, assistant engineer on construction, has been appointed assistant engineer in the maintenance of way department at St. Louis. **R. H. Hallstead**, assistant engineer at Little Rock, Ark., has been transferred to Kansas City, Mo. **W. R. Luhn**, assistant engineer at Wichita, Kan., has been transferred to Coffeyville, Kan., vice **R. E. Warden**, who has been transferred to Atchison, Kan. **P. V. Sherman**, assistant engineer at Falls City, Neb., succeeds **Mr. Luhn**. **P. T. Simons**, assistant engineer at St. Louis, succeeds **Mr. Hallstead**, and **E. Sullivan**, assistant engineer at Kansas City, takes the place of **Mr. Sherman**.

Hans Olson has been appointed assistant roadmaster of the Northern Pacific Ry., first district, with headquarters at Staples, Minn.

John J. Daley has been appointed roadmaster of the Dunkirk, Allegheny Valley & Pittsburgh R. R., with headquarters at Dunkirk, N. Y., vice **H. B. Shoemaker**. **George H. Jedele** has been appointed roadmaster of the Alliance division of the Lake Shore & Michigan Southern Ry., at Alliance, Ohio, vice **Mr. Daley**.

Oscar S. Bowen, whose appointment as principal assistant engineer of the Great Northern Ry. has been announced in these columns, entered railway service in 1888 with the engineering department of the Coeur d'Alene Ry. & Navigation Co. in Idaho. He held various positions with the Washington & Idaho, the Seattle, Lake Shore & Eastern, the Spokane Falls & Northern, the Nelson & Fort Sheppard and the Great Northern until 1903 when he was made resident engineer of the Great Northern at Spokane, Wash. He held this position until 1913 when he was transferred to a similar position at Seattle, Wash. In May, 1914, as told in the Railway Review, **Mr. Bowen** was made principal assistant engineer of the Great Northern, with headquarters at Seattle.

MECHANICAL.

John Horan has been appointed acting master mechanic of the Northern Pacific Ry., with headquarters at Minneapolis, Minn., in place of **J. B. Neish**, on leave of absence. **R. E. Hammond** has been appointed acting road foreman, with headquarters at Minneapolis, in place of **Mr. Horan**.

Walter N. Polakov has been appointed supervisor of power plants of the New York, New Haven & Hartford R. R., with headquarters at New Haven, Conn., vice **E. S. Cooley**.

OBITUARY.

William Harder, general agent of the freight department of the Great Northern Ry. at Portland, Ore., died in that city June 18, aged 72 years.

Martin Montgomery Reynolds, vice-president of the Grand Trunk Ry. system, died at Old Point Comfort, Va., June 17, aged 52 years. Early in life **Mr. Reynolds**, who was an American born, was connected with the Mexican National railways, remaining with the same for eleven years. In 1892 he became general auditor for the Central Vermont Ry.; from March, 1896, to April, 1899, he acted as auditor for the receiver of the road and from May, 1899, to September, 1902, he was auditor of the Central Vermont. He returned to the Mexican Railways of Mexico in October, 1902. From April, 1904, to April, 1908, he was comptroller of the Mexican International and the Inter-oceanic Ry. of Mexico. In 1908 he joined the Grand Trunk Ry. as vice-president, and was later appointed vice-president of the Grand Trunk Pacific and Central Vermont railways.

NEW ROADS AND PROJECTS.

California.—The San Bernardino Mountain R. R. has been incorporated with a capital of \$50,000. **G. A. Yisker**, Sacramento, Cal., is interested.

The San Diego & Arizona Ry. has awarded contract to

Robert Sherrer & Co., Los Angeles, Cal., for construction work near the United States-Mexico boundary. The contract includes $2\frac{1}{2}$ miles of heavy work. In this distance are one 1300-ft. tunnel, a 620-ft. tunnel, which starts on Mexican side and ends in the United States, and a steel viaduct about 500 ft. long. The company is arranging to award contracts for 46.21 miles of grading and tunneling from near Campo, Cal., easterly to Carriso Pass. Bids are to be in by June 30.

Colorado.—The Colorado, Wyoming & Eastern R. R. has been incorporated with a capital of \$4,300,000 to take over the Laramie, Hahn's Peak & Pacific Ry.

Florida.—The Pensacola, Mobile & New Orleans Ry. is reported as selling a large block of bonds to a New York banking house; the proceeds to be used in completing the company's line from Pensacola, Fla., to Mobile, Ala. E. M. Laughlin, Pensacola, is president of the railway company.

Idaho.—The Tyson Creek Ry. is reported incorporated to construct and operate a standard gage railroad to connect with Chicago, Milwaukee & St. Paul Ry. in Kootenai county, Idaho. The principal place of business is Coeur d'Alene, capital, \$25,000. The incorporators are: Wm. Dollar, L. M. Busby and C. O. Cowder, all of Coeur d'Alene.

Indiana.—See New Roads and Projects under Ohio.

Iowa.—The Minneapolis & St. Louis R. R., it is said, plans to construct a line of railroad from Des Moines, Iowa, to New Sharon, Iowa.

Kansas.—The North & South Ry. has been granted a charter in Kansas. The company proposes to build a line of railroad from Abilene, Kan., via Clay Center and Washington, to some point in Nebraska.

Kentucky.—The Stephenson Lumber Co., Charleston, W. Va., will construct a logging railway from a proposed sawmill near Daisy, Ky., to connect with the Lexington & Eastern R. R.

Louisiana.—The Vicksburg, Alexandria & Southern Ry. has awarded contract for the construction of the first section of the proposed line from Alexandria, La., to the Tioga gravel pit, eight miles. The Vicksburg, Alexandria & Southern will connect Alexandria with Vicksburg, Miss., on the east, and some point on the Kansas City Southern Ry. on the west, extending diagonally across the state from the northeast to the southwest.

Massachusetts.—See New Roads and Projects under New York.

New York.—The Albany Southern R. R., it is reported, plans to construct an extension from near Nassau, N. Y., to Pittsfield, Mass.

North Dakota.—The Northern Pacific Ry. will construct immediately a branch line in Golden Valley county, leaving main line near Beach, N. D., and running southerly about 25 miles, on condition that right of way and station ground be given to railway company free of charge.

Ohio.—The recently incorporated Cincinnati, Indiana & Ohio River Ry. has elected the following officers: L. S. Cook, president; H. F. Emerson, secretary, and E. F. Layman, 42 Blymer building, Cincinnati, Ohio, chief engineer. The road is projected from Cincinnati, through Southern Indiana, to Louisville, Ky.

The Canton, Akron & Youngstown R. R. will be extended from its present terminal at Mogadore to Canton, Ohio, and the interests back of the railroad will construct a belt line around the latter city. The project will involve an expenditure of \$3,000,000 and about two years will be required to complete the work. The Cleveland, Akron & Youngstown was originally financed by V. W. Davis, of Cleveland. Its line is complete from Akron to Mogadore, right of way has been purchased from Akron to Cleveland and Youngstown, and construction of the line to Youngstown is now under way. H. B. Stewart, Cleveland, is president.

Oregon.—The city of Grants Pass, Ore., has awarded contracts for track material for the ten-mile line which is being built to Wilderville, Ore.

Texas.—The new owners of the Rio Grande Railway (narrow gage) and the Brownsville Street & Interurban railroad, have acquired those properties because of the desirable terminals at Brownsville and Point Isabel, Tex. It is not their purpose to standardize this narrow gage line as has been reported, but to build a standard railroad between the terminals mentioned, 21 miles, along an entirely new right of way.

See Railway News under Beaumont & Great Northern R. R.

L. E. Mitchell, of St. Louis, Mo., is promoting the construction of a railroad between Palestine and Dallas, Tex.,

and is said to have been assured of support of the commercial organizations in both cities. Several previous movements to bring about the construction of a railway have been on foot from time to time.

Washington.—The Port Townsend & Puget Sound Ry., capital \$250,000, has filed articles of incorporation to construct a railroad out of Port Townsend, Wash. The incorporators are: C. G. Erickson, C. E. Erickson, Corwin S. Shank, H. C. Belt and E. W. Bond, Port Townsend.

Contract is reported awarded by the Oregon-Washington R. R. & Navigation Co. to Twohy Bros., Portland, Ore., for grading company's proposed eight-mile line into Olympia, Wash.

Wyoming.—The Wyoming Railway has laid about 5 miles of rails on its line south from Clearmont, Wyo., and grading and bridge work is completed to the first town, Cedar Rapids, Wyo., a distance of 12 miles from Clearmont. It is expected that the line will be completed to Buffalo this fall. George G. Belt, Wyoming Construction & Development Co., Cedar Rapids, Iowa, is interested.

Electric Railways.

The Rock Falls & Southern Traction Co. has been incorporated to construct an electric railway from Sterling and Rock Falls, Ill., to Ladd, about 50 miles. The incorporators are: Bert G. Neville, William Osborne and George F. Young, all of Chicago.

Preliminary arrangements are being made by Middle Tennessee Traction Co., Franklin, Tenn., to begin construction of line to connect Franklin, Columbia, Shelbyville, Fayetteville and College Grove.

Surveys are being made by Tri-State Ry. for an electric railway from Hillsdale to Pioneer, Ohio. Miles T. Davis, Hillsdale, is interested.

Contract is reported practically closed with Walton & Co., Falls Mills, Va., for the construction of the proposed electric railway from Princeton to Bluefield, W. Va., about 10 miles. Samuel J. Evans, president of the Princeton Power Co., is interested.

The California railroad commission has granted permission to the Fresno Interurban Ry. to issue \$120,000 in bonds and \$60,000 in stocks for the purpose of building a standard gage electric line from Fresno to Clovis, Cal., a distance of about nine miles.

The Michigan Railway Co. has issued \$5,000,000 6 per cent five-year notes. The proceeds are to cover the expenditures for purchase or construction of the interurban lines from Flint to Saginaw, from Bay City to Saginaw and from Kalamazoo to Grand Rapids and for the steam road from Allegan to Battle Creek, which is now being electrified. Also for the water power on the Manistee river.

The Niobrara Electric Light, Power & Railway Co., Ann-Carr, Holt county, Neb., has filed articles of incorporation. The company is capitalized at \$300,000 and expects to do a general light and power business and also operate a railroad. The board of directors consists of the president, Hugh O'Neill; Carl W. Grant, secretary; John Korab, treasurer; C. L. Keeler, vice-president, and W. C. Grant.

The Detroit, Almont & Northern R. R. will be open for service between Romeo and Almont, Mich., about July 1. Surveys have been completed from Almont to Imlay City and right of way is now being secured. Construction on this portion of the line will not start until the spring of 1915. This is a project of the Detroit United Ry. Co., Detroit, Mich.

The Putnam, Woodstock & Stafford Springs Ry., according to G. L. Baldwin, chairman, will start to build its proposed 31-mile line early in 1915. McKen motor cars will be used for both freight and passenger service. The road will connect with the Central Vermont Ry. at Stafford, Conn., and with the New York, New Haven & Hartford R. R. at Putnam, Conn. The Providence & Putnam electric railway, now under construction, will be completed this fall, giving through connection from Providence, R. I., to Hartford, Conn. Capital of the new line has been partly paid in. Contracts will be awarded about January 1, 1915.

EQUIPMENT AND STRUCTURES.

Locomotives.

—The Chicago Junction Ry. is contemplating the purchase of 5 or more locomotives.

—The Wabash Railroad has reopened negotiations for the purchase of locomotives. As previously noted in these columns, inquiries were out for 50 mikado (2-8-2) and 10 Pacific type (4-6-2) locomotives.

—The Seaboard Air Line Ry., which was in the market for 10 mountain type (4-8-2) and 15 mikado type (2-8-2) locomotives, is reported as ordering 30 locomotives from the American Locomotive Co.

Freight Cars.

—The Seaboard Air Line Ry. is reported as ordering 440 36-ft. ventilated box cars from the Pressed Steel Car Co.

—The Atlantic Coast Line R. R. has ordered 100 50-ft. logging cars, 80,000 lbs. capacity, from the Cambria Steel Co.

—The Delaware, Lackawanna & Western R. R. is reported in the market for 500 30-ton box cars, in addition to 200 automobile cars, previously noted.

—The Grand Trunk Ry., it is said, will enter the market for 3000 cars.

—The New York Central Lines, as previously reported in these columns, are expected to place additional orders for freight cars. Up to the present the following orders have been placed: 2000 40-ton box cars to be built in the company's shops at Rochester, N. Y.; 2500 40-ton box cars for the Cleveland, Cincinnati, Chicago & St. Louis Ry. to the American Car & Foundry Co.; 2500 50-ton gondola cars for the same road to the Standard Steel Car Co.; 500 50-ton gondola cars for the Boston & Albany R. R. to the Standard Steel Car Co., and 900 40-ton box cars for the Boston & Albany to the American Car & Foundry Co.

—The Wabash Railroad, it is rumored, will purchase 1500 box cars.

—The Illinois Central R. R., as noted in the Railway Review of June 20, has placed orders for 2000 box cars in addition to 3000 recently ordered. The Standard Steel Car Co., American Car & Foundry Co., Pressed Steel Car Co. and the Haskell & Barker Car Co. will each build 500 cars of the new order.

Passenger Cars.

—The Delaware, Lackawanna & Western R. R. is in the market for 48 suburban passenger cars and 7 combination cars.

—The Seaboard Air Line Ry., according to report, has ordered 45 passenger cars from the Pressed Steel Car Co. The company has been taking bids on 15 coaches, 9 passenger and baggage cars, 7 postal, 9 express and 5 mail and baggage cars.

Iron and Steel.

—The St. Louis & San Francisco R. R. has ordered 32,000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

—The Buckhannon & Northern R. R. has ordered 6,800 tons of rails.

Bridges.

—The Illinois Central R. R. has ordered 1000 tons of bridge steel for track elevation work to the American Bridge Co.

—The Chicago, Milwaukee & St. Paul Ry. has awarded contract to the Chicago Bridge & Iron Co. for 210 tons of steel for a highway truss span at North La Crosse, Wis.

—The Pennsylvania Railroad has awarded contract to the Phoenix Iron Works for a bridge at Phoenixville, Pa., 150 tons of steel.

—The Oregon Short Line R. R. has ordered material for a steel viaduct at Third North street, Salt Lake City, Utah.

—The Cumberland Valley R. R. has awarded the contract for the substructure of the bridge across the Potomac river near Williamsport, Md., to Thomas Sheahan, Richmond, Va. The east and west abutments and two of the piers have just been completed. The contract for steel work was awarded to the Pennsylvania Steel Co.

—The Southern Railway has awarded contract for a steel bridge to be erected at Pinners Point, Va., at an estimated cost of \$14,000.

—The Baltimore & Ohio R. R. has ordered 150 tons of steel from the Mt. Vernon Bridge Co.

—The Chicago & North Western Ry. has awarded contract for a bridge over the Chicago river, 1220 tons, to the American Bridge Co.

Buildings, Terminals, Etc.

—The Norfolk & Western Ry. has let contract to Wade & Graham, Roanoke, Va., to erect a \$30,000 passenger and freight station at Charleston, W. Va.

—The New York, New Haven & Hartford R. R. has awarded contract for steel for the proposed new station at Pawtucket, R. I., 400 tons, to Levering & Garrigues Co.

—The Prescott & Northwestern Ry., whose shops at Prescott, Ark., were burned, is preparing to replace them.

—The Cincinnati, New Orleans & Texas Pacific Ry. and Alabama Great Southern R. R. have bought 47 acres of land lying adjacent to the main line of the former railway on the outskirts of Chattanooga, Tenn. The purchase of the tract is understood to mean that both companies will remodel and enlarge their yards at that point.

—The Louisville & Nashville R. R. is planning to build a round house, machine shops and other facilities at Lexington, Ky. Date for taking bids has not been announced.

—The Chicago, Rock Island & Pacific Ry. proposes to issue \$2,000,000 5 per cent bonds to provide funds for terminal improvements. The road will issue \$600,000 at once to pay for real estate purchased at Omaha, Neb., and the balance as needed.

—The Chicago, Rock Island & Pacific Ry. plans to construct new yards and shops in the eastern part of Des Moines, Iowa. The work is to be begun at once and will involve an expenditure of \$1,000,000, it is said.

—The Baltimore & Ohio R. R. will erect a brick freight depot at Weston, W. Va., to cost about \$60,000.

—The Great Northern Ry. is reported as planning to make improvements in Minot, N. D., including rearrangement of yards, a viaduct, new shops, etc.

—The Southern Railway has awarded contract to I. C. Abbott, Brandy, Va., for the construction of an extension 41x43 ft. to the existing freight shed at Danville, Va., and the erection of an additional covered shed 41x253 ft. with an open platform at east end containing 2400 sq. ft. additional floor space.

—The Southern Railway is about to begin construction of new freight houses, storage yards and engine yard at Mobile, Ala. The facilities for handling freight will consist of an outbound freight house, 26x410 ft.; an inbound freight house, 40x410 ft., with office 56x134 ft.; cotton platform, 40x330 ft.; ribbon platform, 12x410 ft.; and necessary tracks, team ways, drainage, and paving with adequate fire protection. The work to be done in providing engine handling facilities will consist of grading, track work, cinder conveyor and the provision of drainage and water supply. A new storage yard with a 50 ft. track scale will also be provided. The track and yard work will be done by the company forces.

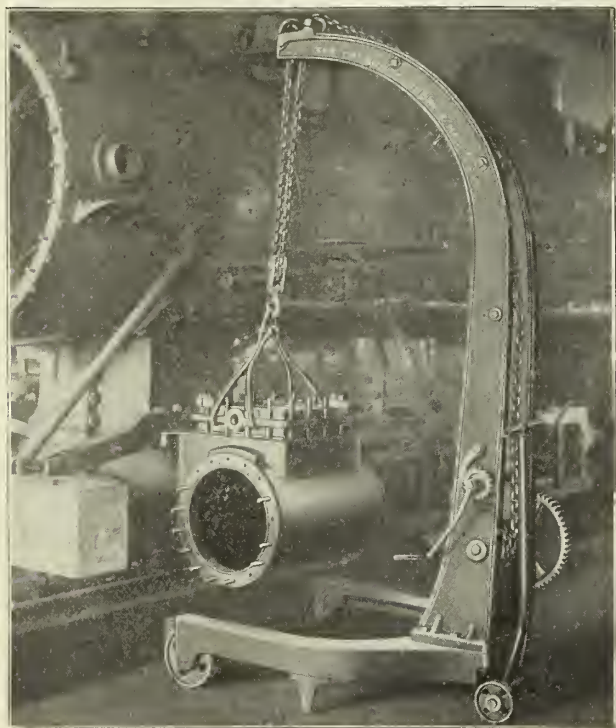
—The Southern Railway has begun construction of the first unit of a two-way gravity classification yard at North Birmingham, Ala., to be known as Finley yard in honor of the late president of the company. The track construction now under way is being handled by a special force organized for that purpose and will provide a receiving yard, gravity classification yard, a storage yard, and repair tracks. A yard office will also be built. There will also be constructed a 25-stall round house and shop buildings, a modern coal, sand and cinder handling station and track scales of heavy capacity. Complete arrangements will also be made for water supply, lighting, and fire protection. The round house will be of reinforced concrete construction with brick walls, roof of concrete joist and tile. Contract for its construction has been awarded to the Consolidated Engineering Co., Baltimore, Md.

—The Southern Railway has begun work on new and enlarged freight yard and shop facilities at Richmond and South Richmond, Va. The work in Richmond proper will include the removal of the present passenger depot at Fourteenth street and the erection on its site of a new outbound freight depot 40x480 ft., the conversion of one of the existing freight depots into an inbound freight depot and the other into a tobacco warehouse; the rearrangement of existing tracks and the construction of new tracks. The new depot which will be of brick construction, with tile roof over office part of the building and tar and gravel roof over the remainder. Bids for its construction are now being solicited and work will be started as soon as the contract has been awarded and necessary building material assembled. The work at South Richmond will consist of the following improvements: New combination depot at Hull street, team yard at Perry street, rearrangement of yard tracks to take switching of main line, four-track bridge over tracks at Seventh street, new main line from shops to connection with Seaboard Air Line Ry., extensions to round house and pattern

house, new tender repair shop, modern coal, cinder and sand handling facilities, overhead walkway for employees, track scales, new smoke jacks on round house and new yard office.

The Canton Portable Crane and Hoist.

A device of more than ordinary usefulness in shops where heavy parts must be lifted and transported, as in many departments of railway machine shops not supplied with crane service, or in erecting shops where the cranes are adapted to heavy work only, and particularly in round houses where crane service of any kind is not usually provided, is the portable floor crane and hoist shown in the illustration. By the use of this apparatus, it becomes possible for a man single handed to take down and replace air pumps, side and main rods, steam



The Canton Portable Crane and Hoist.

chest covers or cylinder head castings, or to place similarly heavy parts on planer beds, or other machine tools, and remove same when the operations have been completed. The builders of these cranes, The Canton Foundry & Machine Co., Canton, Ohio, have been particular to incorporate high grade materials with careful design, so that in addition to the evident utility of these machines, a full measure of dependability and permanence also is provided.

Patents on Railway Devices.

ISSUED BY THE UNITED STATES PATENT OFFICE, JUNE 16, 1914.

- Freight car door mechanism, 1,099,918—Percy M. Elliott, Chicago, Ill.
- Supporting mechanism for freight car doors, 1,099,919—Percy M. Elliott, Chicago, Ill.
- Locomotive brake, 1,099,922—Harry A. Hoke, Altoona, Pa.
- Rail tie plate, 1,099,929—Oscar P. Morrison, Maud, Tex.
- Grain car door, 1,099,946—Cassius A. Snook, Fort Dodge, Iowa.
- Rail with joint support for railways, 1,099,948—Herbert L. Stillman, Westerly, R. I.
- Suspension of rail car bodies and the like, 1,099,949—John Godfrey Parry Thomas, Chiswick, London, England.
- Journal box, 1,099,964—Albert O. Buckius, Jr., Chicago, Ill., assignor to The National Malleable Castings Co., Cleveland, Ohio.
- Smoke consumer nozzle, 1,099,990—Thomas E. McCall, Wilmington, Del.
- Uncoupling lever, 1,099,993—Walter P. Murphy, Chicago, Ill.
- Track sluing machine, 1,100,006—Wilhelm Ulrich Arbenz, Gleiwitz, and Otto Kammerer, Charlottenburg, Germany.
- Overhead contact shoe for electric railways, 1,100,014—George Gibbs, New York, N. Y., and Ernest R. Hill, East Orange, N. J.
- Railway rail and crossing construction, 1,100,042—Wade H. Whittington, Los Angeles, Cal.
- Coupling lock, 1,100,078—Robert E. L. Janney, Chicago, Ill., assignor to American Steel Foundries, New York, N. Y.
- Brake shoe, 1,100,092, 1,100,093 and 1,100,094—Clifton D. Pettis, Ridgewood, N. J.
- Railway switch, 1,100,114—William Berger, Winfield, Iowa.
- Side frame, 1,100,127—George G. Floyd, Chicago, Ill., assignor to American Steel Foundries, New York, N. Y.
- Oil burner, 1,100,141—Clinton McConnell, Los Angeles, Cal., assignor to Machinery & Electrical Co., Los Angeles, Cal.
- Method of making brake shoe reinforcements, 1,100,175—Nathan H. Davis, Philadelphia, Pa., assignor to American Brake Shoe & Foundry Co., Mahwah, N. J.
- Brake shoe, 1,100,196—Clifton D. Pettis, Chicago, Ill.
- Center sill construction, 1,100,206—John F. Streib, Avalon, Pa., assignor to Pressed Steel Car Co.
- Metallic Rail tie, 1,100,209—Zephirin Bourdeau, Taunton, Mass.
- Rail joint, 1,100,210—Stacy Bowman, Curwensville, Pa.
- Spark arrester, 1,100,224—Elmer A. Carey, Sapulpa, Okla.
- Railway signal apparatus, 1,100,243—George Jackson, Jr., Hohokus, N. J.
- Interlocking overhead trolleys, 1,100,268—Samuel B. Stewart, Jr., Schenectady, N. Y., assignor to General Electric Co., Schenectady, N. Y.
- Car brake, 1,100,270—Howard Stillman, Berkeley, Cal.
- Truck bolster, 1,100,275—William E. Woodard, Schenectady, N. Y.
- Pipe coupling, 1,100,315—Thomas F. Lord, Mineral City, Okla.
- Safety railway appliance, 1,100,316—Edward J. Masterson, Elizabeth, N. J.
- Train pipe coupling, 1,100,331—Charles A. Simmons, Rensselaer, N. Y., assignor to Standard Heat & Ventilation Co., New York, N. Y.
- Railway crossing, 1,100,346—Edmond F. Bosdevex, Philadelphia, Pa.
- Shaft rotating means for dump cars, 1,100,352—Fred C. Cameron, Chicago, Ill., assignor to Rodger Ballast Car Co.
- Safety guard rail for railroads, 1,100,378—Lang C. King, Dennis, Miss.
- Automatic train stopping device, 1,100,390—Richard L. Moulton, Providence, R. I.
- Car axle box, 1,100,402—Eliel L. Sharpneck, Winthrop, Mass., assignor to Anti-Friction Roller Bearing Co.
- Lubricating journal box, 1,100,403—Eliel L. Sharpneck, Winthrop, Mass., assignor to Anti-Friction Roller Bearing Co.
- Tank car, 1,100,405—Abram E. Smith, New York, N. Y.
- Underframe, 1,100,419—Claus J. Werner Clasen, Davenport, Iowa, assignor to The Bettendorf Co., Bettendorf, Iowa.
- Six wheeled truck, 1,100,425—George G. Floyd, Chicago, Ill., assignor to American Steel Foundries, New York, N. Y.
- Car door hanger, 1,100,438—Charles O. Mason, Texhoma, Tex.
- Rail joint, 1,100,500—William Smith, Duquesne, Pa.
- Adjustable level and track gage, 1,100,543—Frederick M. Daniel, Jacksonville, Fla.
- Metallic tie and fastener, 1,100,550—Henry J. Faubel and William Roach, Alliance, Ohio.
- Flange lubricator, 1,100,551—Filbert L. Gabbis and Charles H. Jeffery, St. Paul, Minn.
- Locomotive, 1,100,563—George R. Henderson, Philadelphia, Pa., assignor to The Baldwin Locomotive Works, Philadelphia, Pa.
- Freight car door, 1,100,566—Albert Hoiland, Nome, N. D.
- Multiaxle railway vehicle, 1,100,577—Ewald Richard Klein and Heinrich Robert Lindner, Dresden, Germany.
- Rail clamp, 1,100,594—Thomas Maney, Louisville, Ky.
- Emergency brake, 1,100,623—William J. Ryan, Sapulpa, Okla.
- Electric train control system, 1,100,644—Andrew J. Allard, Richmond, Va.

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VOL. 54, NO. 26

CHICAGO, JUNE 27, 1914

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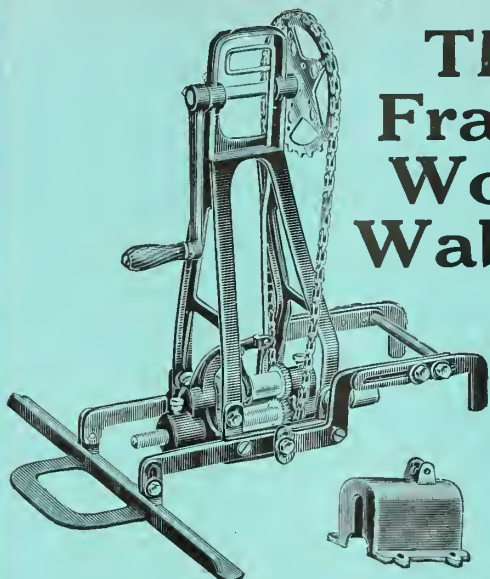
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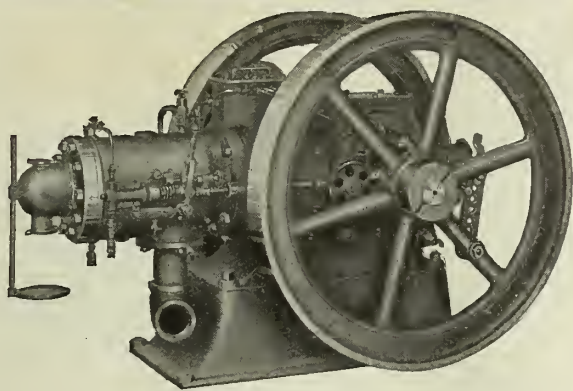
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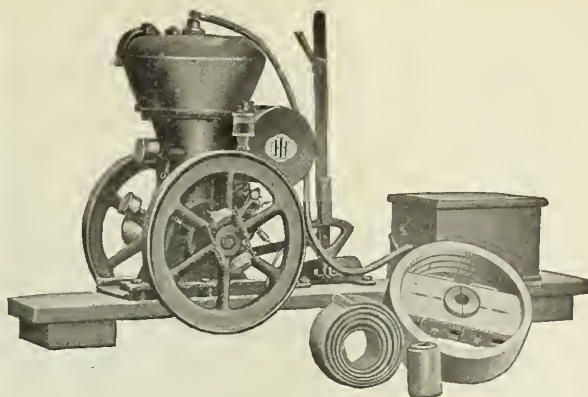
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5. No expense is involved in entering this contest but it is understood that all narratives submitted become the property of the Westinghouse Air Brake Company whether securing an award or otherwise.

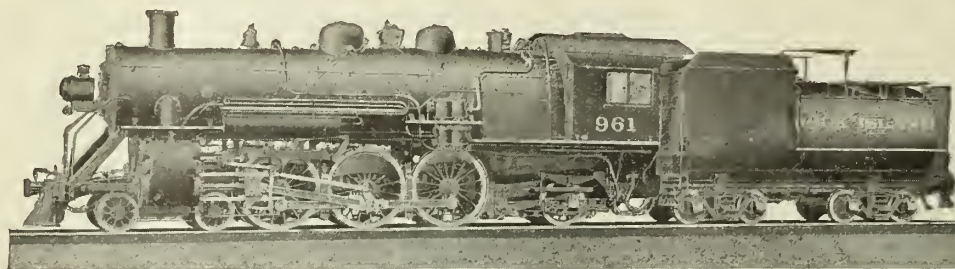
6. Decision as to merits of the stories submitted will be placed absolutely in the hands of a Committee of Judges composed of three prominent persons not associated in any way with the Westinghouse Interests.

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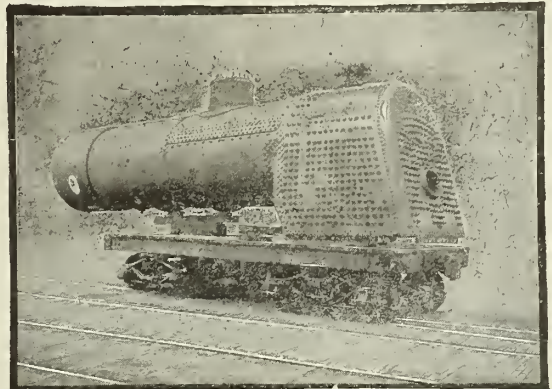
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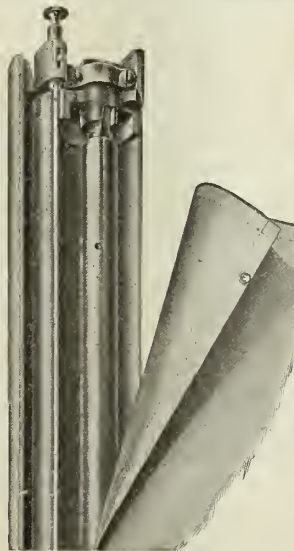
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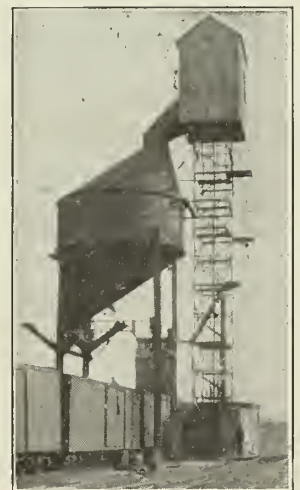
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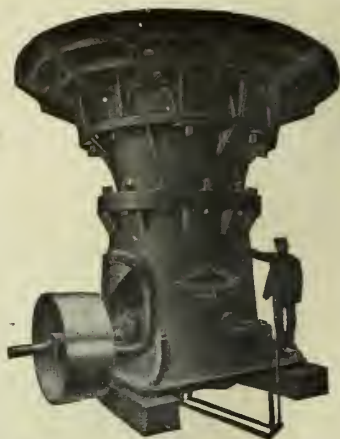
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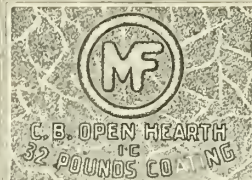
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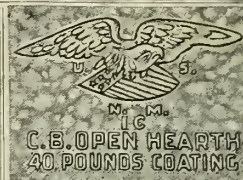
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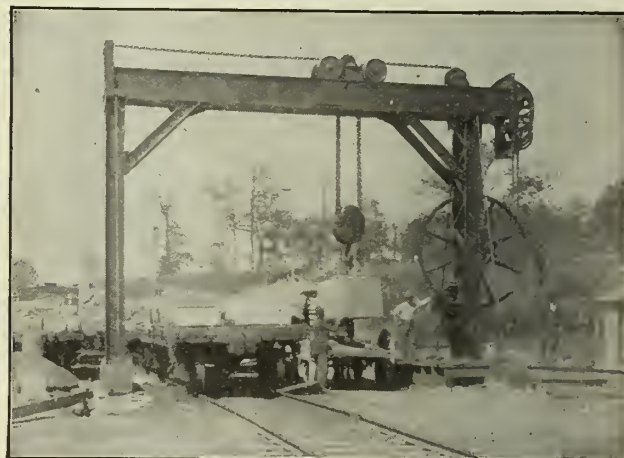
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AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS—Secretary-Treasurer, A. G. Thomason, 845 Old South Building, Boston.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS—Secretary and treasurer, F. M. Dow, Ill. Cent. Rd., Chicago.

AMERICAN ASSOCIATION OF FREIGHT AGENTS—Secretary, R. O. Wells, Ill. Cent. Ry., East St. Louis, Ill.

AMERICAN ASSOCIATION OF FREIGHT TRAFFIC OFFICERS—Secretary-treasurer, E. B. Crosley, G. Coal F. A., Philadelphia & Reading Ry., Reading Terminal, Philadelphia.

AMERICAN ASSOCIATION OF GENERAL BAGGAGE AGENTS—Secretary and treasurer, J. E. Quick, Grand Trunk Ry., Toronto, Canada. Next annual meeting, Detroit, Mich., June 17, 1914.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS—Secretary, W. C. Hope, 143 Liberty St., New York, N. Y. Next annual meeting, Boston, Mass., September 15 and 16, 1914.

AMERICAN ASSOCIATION OF PASSENGER AGENTS—Secretary and treasurer, E. T. Monett, Room 305, 202 So. Clark St., Chicago, Ill. Next annual meeting, San Francisco, October 12 and 13, 1914.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS (formerly Central Association of Railroad Officers)—Secretary-treasurer, E. H. Harman, Room 101 Union Station, St. Louis, Mo. Annual convention, New York City, August 20 and 21, 1914.

AMERICAN ASSOCIATION OF RAILWAY SURGEONS—Secretary, Louis J. Mitchell, M. D., 29 E. Madison St., Chicago. Next annual meeting, Chicago, Oct. 14-16, 1914.

AMERICAN ELECTRIC RAILWAY ASSOCIATION—Secretary and treasurer, E. B. Burritt, 29 W. 39th St., New York City. Next annual meeting, Atlantic City, N. J., October 12-16, 1914.

AMERICAN ELECTRIC RAILWAY ACCOUNTANTS' ASSOCIATION—Secretary and treasurer, M. R. Boylan, Newark, N. J.

AMERICAN ELECTRIC RAILWAY CLAIMS ASSOCIATION—Secretary and treasurer, B. B. Davis, Columbus, O.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOCIATION—Secretary-treasurer, H. G. McConaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN ELECTRIC RAILWAY TRANSPORTATION AND TRAFFIC ASSOCIATION—Secretary-treasurer, E. B. Burritt, 29 W. 39th St., New York City.

AMERICAN ELECTRIC RAILWAY ENGINEERING ASSOCIATION—Secretary and treasurer, E. B. Burritt, 29 W. 39th St., New York City.

AMERICAN RAILWAY ASSOCIATION—General secretary, W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION—Secretary, C. A. Lichty, C. & N. W. Ry., Chicago. Next annual meeting, Los Angeles, Calif., October 20, 21 and 22, 1914.

AMERICAN RAILWAY ENGINEERING ASSOCIATION—Secretary, E. H. Fritch, 900 So. Michigan Ave., Chicago. Next convention, March 16-18, 1915.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION—Secretary, Jos. W. Taylor, Karpen Bldg., Chicago. Annual Convention, Atlantic City, N. J., June 15, 16 and 17, 1914.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION—A. R. Davis, secretary-treasurer, 750 Pine St., Macon, Ga. Next annual meeting, Hotel Sherman, Chicago, July 20-22, 1914.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS—11 Broadway, New York City. Secretary, J. R. Wemlinger. Meetings held the second Thursday of each month.

AMERICAN SOCIETY FOR TESTING MATERIALS—Secretary, Prof. Edgar Marburg, University of Penn., Philadelphia. Next annual meeting, June 30 to July 4, Hotel Traymore, Atlantic City, N. J.

AMERICAN WOOD PRESERVERS' ASSOCIATION—Secretary-Treasurer, F. J. Angier, B. & O. Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS—Secretary, C. G. Phillips, Highland Park, Ill. Next annual meeting, Minneapolis, Minn., June 24, 1914.

ASSOCIATION OF RAILWAY CLAIM AGENTS—Secretary-treasurer, C. W. Egan, Gen'l. Claim Agent, B. & O. R. R., Baltimore, Md.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS—Secretary-treasurer, J. A. Andreucetti, Asst. Elect. Engr., C. & N. W. Ry., Chicago. Semi-annual meeting will be held in Atlantic City, N. J., at time of Master Car Builders' meeting. Next annual meeting, Chicago, Oct. 1914.

ASSOCIATION OF RAILWAY SUPPLY MEN—Secretary-treasurer, Wm. S. Furry, 1437 Monadnock Block, Chicago. Next annual convention, Hotel Sherman, Chicago, July 14, 15, 16 and 17, 1914.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS—Secretary and treasurer, P. W. Drew, 112 W. Adams St., Chicago.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS—Secretary, G. P. Conard, 75 Church St., Savannah, Ga. Next annual meeting, Savannah, Ga., June 23 and 24, 1914.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION—H. A. Neally, Joseph Dixon Crucible Co., Boston, Mass. Meeting with American Railway Bridge and Building Association.

CENTRAL & WESTERN ASSOCIATION OF CAR SERVICE OFFICERS—Secretary, W. E. Beecham, C. M. & St. P. Ry., Chicago. Next semi-annual meeting, Chicago, November 12, 1914.

CHIEF INTERCHANGE CAR INSPECTORS AND CAR FOREMAN'S ASSOCIATION of America—Secretary, S. Skidmore, C. F. C. C. & St. L. Ry. Co., Cincinnati, O. Next annual convention, Cincinnati, August 25, 26 and 27, 1914.

EASTERN RAILROAD ASSOCIATION—Secretary, John J. Harrower, Washington, D. C.

FREIGHT CLAIM ASSOCIATION—Secretary and treasurer, W. P. Taylor, Richmond, Va. Next annual meeting at Galveston, Tex., May 20-22, 1914.

GENERAL MANAGERS' ASSOCIATION of Chicago—Secretary, H. Deming, 1863 Transportation Bldg., Chicago. Meetings third Thursday of alternate months.

GENERAL MANAGERS' ASSOCIATION of Texas—Secretary, G. W. Young, Waco, Texas. Meetings first Thursday in February, April, June, August, Oct.

GENERAL SUPERINTENDENTS' ASSOCIATION of Chicago—Secretary-Treasurer, A. M. Hunter, Room 605 Grand Central Sta. Next annual meeting Wednesday preceding third Thursday of July.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION—Secretary and treasurer, A. L. Woodworth, C. H. & D. Ry., Lima, O. Annual meeting Milwaukee, Aug. 18, 19, 20, 1914.

INTERNATIONAL RAILWAY CONGRESS—Executive committee, rue de Louvain, 11, Brussels. Next meeting, Berlin, 1915.

INTERNATIONAL RAILWAY FUEL ASSOCIATION—Secretary-treasurer, C. G. Hall, 922 McCormick Bldg.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION—Secretary, Wm. Hall, 829 W. Broadway, Winona, Minn. Next annual meeting Hotel Sherman, Chicago, July 14-17, 1914.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION of the United States and Canada—Secretary, W. G. Wilson, Lehigh Valley, 149 Beacon St., Middletown, N. Y. Next convention, Detroit, Mich., November 17-19, 1914.

MASTER BOILERMAKERS' ASSOCIATION—Secretary, H. D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION—Secretary, Jos. W. Taylor, Karpen Bldg., Chicago. Annual Convention, Atlantic City, N. J., June 10, 11, 12, 1914.

MASTER CAR AND LOCOMOTIVE PAINTERS' ASSOCIATION of U. S. and Canada—Secretary and treasurer, A. P. Dane, B. & M. Rd., Reading, Mass. Next annual convention Nashville, Tenn., Sept. 8, 9, 10, 11, 1914.

NATIONAL ASSOCIATION OF RAILWAY COMMISSIONERS—Secretary, Wm. H. Connolly, Interstate Commerce Commission, Washington, D. C. Next annual meeting, Washington, D. C., Nov. 17, 1914.

NATIONAL RAILWAY APPLIANCE ASSOCIATION—Secretary, Bruce V. Crandall, 537 So. Dearborn St. Next convention, March 15 to 19, 1915, Chicago.

NEW ENGLAND ASSOCIATION OF RAILROAD SUPERINTENDENTS—Secretary, E. H. Morse, N. Y., N. H. & H. R. R., Boston, Mass. Meetings in November and March.

NORTH CENTRAL ASSOCIATION of Railroad Commissioners—Secretary, William Kilpatrick, Room 712 Insurance Exchange Bldg., 175 W. Jackson Boul., Chicago.

PEORIA ASSOCIATION OF RAILROAD OFFICERS—Secretary, M. W. Rotchford, Union Station, Peoria, Ill.; 2nd Thursday.

RAILWAY BUSINESS ASSOCIATION—Frank W. Noxon, 30 Church St., New York City. Next annual meeting, Waldorf-Astoria Hotel, New York City, December 10, 1914.

RAILWAY DEVELOPMENT ASSOCIATION—Secretary, F. B. La Baume, N. & W. Ry., Roanoke, Va. Next annual meeting, Chicago, on or about November 10, 1914.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOCIATION—J. Scribner, 1010 Monadnock Bldg., Chicago, Ill. Meets with Association of Railway Electrical Engineers.

RAILWAY GARDENING ASSOCIATION—Secretary, W. F. Hutchison, Penna. Lines West. Sewickley, Pa. Annual meeting N. Y. City, Aug. 11-14, 1914.

RAILWAY SIGNAL ASSOCIATION—Secretary, C. C. Rosenberg, Bethlehem, Pa. Next annual meeting Bluff Point, N. Y., September 22nd.

RAILWAY STOREKEEPERS' ASSOCIATION—Secretary-treasurer, J. P. Murphy, Box "C," Collinwood, O. Next annual convention, Hotel Raleigh, Wash., D. C., May 18, 19 and 20, 1914.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION—Secretary-treasurer, J. D. Conway, 630 Oliver Bldg., Pittsburg, Pa. Next annual meeting, Atlantic City, June 10-17, 1914.

RAILWAY TEL. AND TEL. APPLIANCE ASSOCIATION—G. A. Nelson, Secretary, 50 Church St., New York City. Meetings with Association of Railway Telegraph Superintendents.

ROADMASTERS' AND MAINTENANCE of Way Association—Secretary, L. C. Ryan, C. & N. W. Ry., Sterling, Ill. Next annual meeting Auditorium Hotel, Chicago, Sept. 7-11, 1914.

SIGNAL APPLIANCE ASSOCIATION—F. W. Edmunds, 3865 Park Ave., New York City. Meetings with Annual Convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS—C. Nyquist, La Salle St. Station, Chicago, Ill.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS—E. & W. P. Ry., Montgomery, Ala. Next annual meeting July 23, 1914.

TRACK SUPPLY ASSOCIATION—W. C. Kidd, Ramapo Iron Works, Hillburn, N. Y. Meeting with Roadmasters' and Maintenance of Way Association. Next annual meeting Auditorium Hotel, Chicago, Sept. 8-11, 1914.

TRAFFIC CLUB OF CHICAGO—Secretary, W. H. Wharton, Commercial Agent, N. C. & St. L. Ry. Meetings monthly in Chicago. Next annual meeting, March 30, 1915.

TRAFFIC CLUB OF PITTSBURGH—Secretary, D. L. Wells, Gen'l. Agt. E. R. R., Pittsburgh, Pa. Meetings bi-monthly. Annual meeting June 8, 1914.

TRAFFIC CLUB OF NEW YORK—Secretary, C. A. Swope, 291 Broadway, New York City. Last Tuesday in month, except June, July and August. Next annual meeting, November 24, 1914.

TRAFFIC CLUB OF ST. LOUIS—W. S. Crilly, 911 Washington Ave. Regular meetings last Tuesday January, March, May and October. Next annual meeting Mercantile Club, December 1, 1914.

TRAIN DISPATCHERS' ASSOCIATION of America—Secretary, J. F. Mackie, 7122 Stewart Ave., Chicago, Ill. Next annual meeting, Jacksonville, Fla., June 16-18, 1914.

TRANSPORTATION CLUB OF Buffalo, N. Y.—Secretary H. Thompson. Meetings Saturday following first Wednesday in each month. Annual meeting, second Monday in December each year.

TRANSPORTATION CLUB OF Detroit—Secretary, W. R. Hurley; Chief Clerk, Supt's office L. S. & M. S. Ry., Detroit.

TRAVELING ENGINEER'S ASSOCIATION—Secretary, W. O. Thompson, East Buffalo, N. Y. Next meeting August, Chicago.

WESTERN RAILROAD ASSOCIATION—President, A. J. Barling; general counsel and treasurer, G. S. Payson; secretary, E. P. Amory, 122 Michigan Ave., Chicago. Next annual meeting, second Tuesday in January, 1915.

Railway Clubs.
CANADIAN RAILWAY CLUB—Secretary, Jas. Powell, St. Lambert, near Montreal, P. Q. Meets second Tuesday of each month, except June, July and August, at Windsor Hotel, Montreal.

CAR FOREMEN'S ASSOCIATION of Chicago—Secretary, Aaron Kline, 841 N. Lawler Ave. Meets second Monday each month, 8 p. m., 12 floor Karpen Bldg. Next annual meeting October 12, 1914.

CENTRAL RAILWAY CLUB—Secretary, Harry D. Vought, 95 Liberty street, New York. Meets at Hotel Statler, Buffalo, N. Y., second Thursday in March, May, September and November. Next annual meeting, Buffalo, N. Y., second Friday in September.

NEW ENGLAND RAILROAD CLUB—Secretary, Wm. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Meets at Boston, second Tuesday each month, except June, July, August and September. Annual meeting, Boston, 2nd Tuesday in March, each year.


NEW YORK RAILROAD CLUB—Secretary, Harry D. Vought, New York City. Meets on the third Friday of each month at 8 p. m., excepting June, July and August, at United Engineering Societies Bldg., 29 W. 39th St., New York. Next annual meeting, third Friday in September.

THE RAILROAD CLUB OF Kansas City—Secretary, Claude Manlove. Meeting each third Monday at 1008 Walnut St., Kansas City, Mo. Next annual meeting June 27, 1914.

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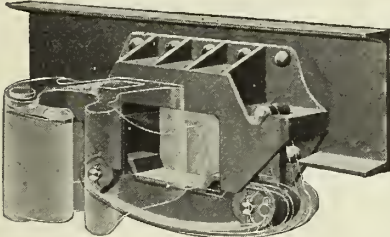
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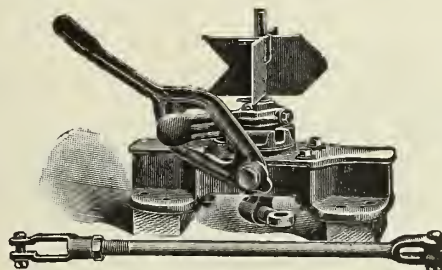
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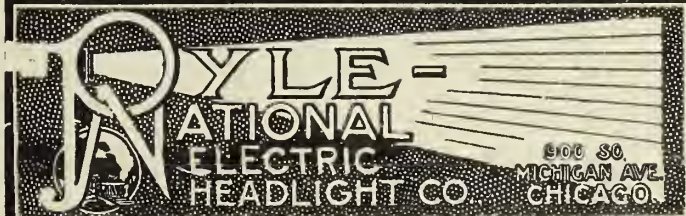
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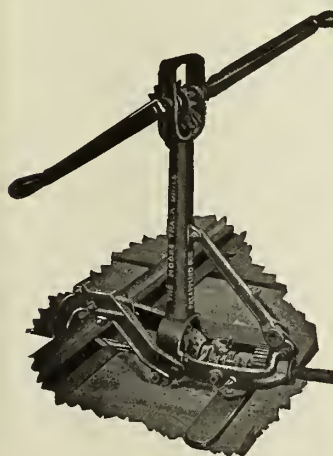
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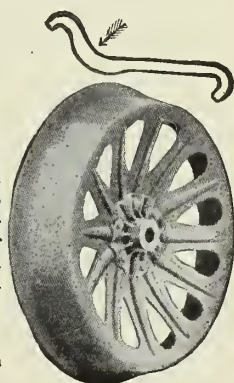
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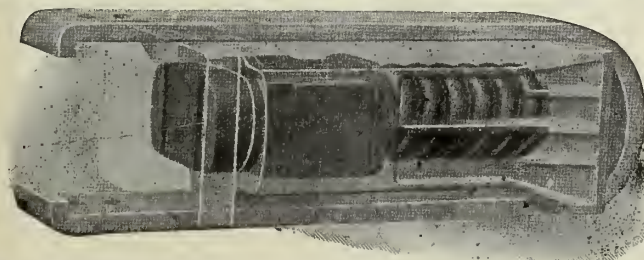
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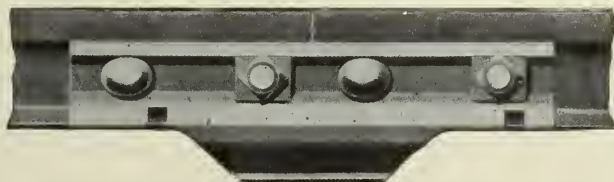
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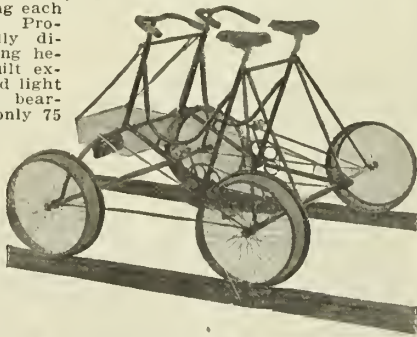
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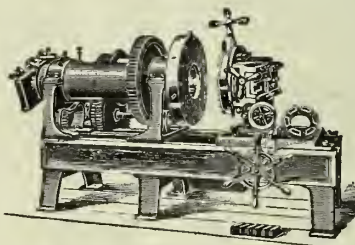
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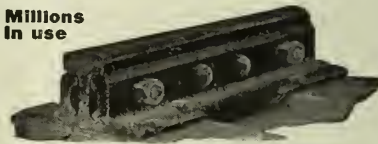
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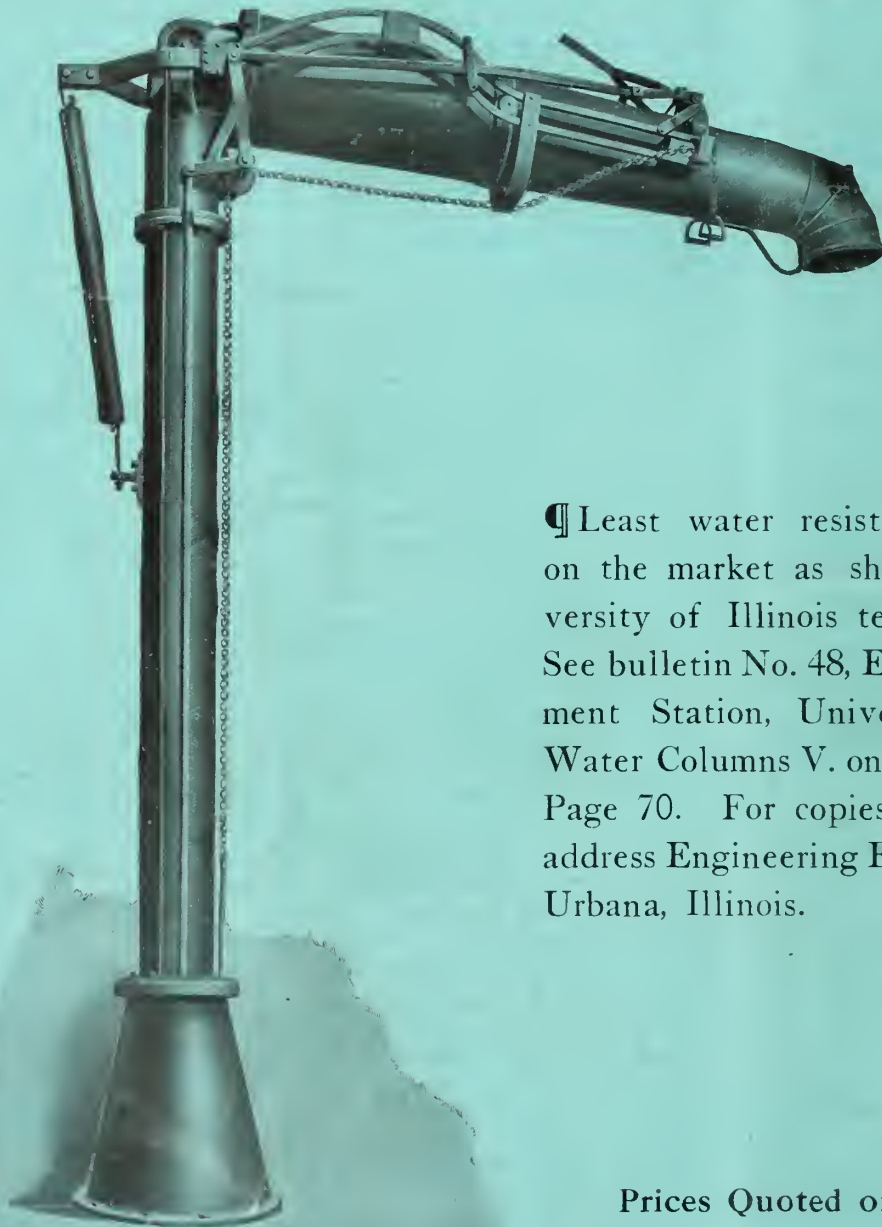
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